

Truckee-Carson River Basin Study

Final Report

*Jeremy Pratt
Clearwater Consulting
Corporation
Seattle, Washington*

**Report to the Western Water
Policy Review Advisory Commission**

Truckee-Carson River Basin Study

Final Report

**Jeremy Pratt
Clearwater Consulting Corporation**

Seattle, Washington

Report to the Western Water
Policy Review Advisory Commission

September 1997

The Western Water Policy Review Advisory Commission

Under the Western Water Policy Review Act of 1992 (P.L. 102-575, Title XXX), Congress directed the President to undertake a comprehensive review of Federal activities in the 19 Western States that directly or indirectly affect the allocation and use of water resources, whether surface or subsurface, and to submit a report of findings to the congressional committees having jurisdiction over Federal Water Programs.

As directed by the statute, the President appointed the Western Water Policy Review Advisory Commission. The Commission was composed of 22 members, 10 appointed by the President, including the Secretary of the Interior and the Secretary of the Army, and 12 members of Congress serving *ex-officio* by virtue of being the chair or ranking minority member of the 6 congressional committees and subcommittees with jurisdiction over the appropriations and programs of water resources agencies. A complete roster is provided below.

Commission Membership

Denise Fort, Chair

Albuquerque, New Mexico

Appointed Members:

Huali Chai San Jose, California	Patrick O'Toole Savery, Wyoming	Secretary of the Interior Washington, D.C. Represented by: Joe Sax, September 1995 - December 1996 Patricia J. Beneke, December 1996 -
John H. Davidson Vermillion, South Dakota	Jack Robertson Portland, Oregon	
John Echohawk Boulder, Colorado	Kenneth L. Salazar Denver, Colorado	Secretary of the Army Washington, DC Represented by: Dr. John H. Zirschky
Janet Neuman Portland, Oregon		

Members of Congress (Ex-officio Members):

U.S. Senate: Committee on Energy and Natural Resources

Hon. Frank Murkowski, Chairman

Hon. Dale Bumpers, Ranking Minority Member

Hon. J. Bennett Johnston (September 1995 to January 1997)

U.S. Senate: Subcommittee on Water and Power, Committee on Energy and Natural Resources

Hon. Jon Kyl, Chairman

Hon. Daniel K. Akaka, Ranking Minority Member

Hon. Larry E. Craig (September 1995 to January 1997)

Hon. Bill Bradley (September 1995 to January 1997)

U.S. Senate: Committee on Appropriations

Hon. Ted Stevens, Chairman

Hon. Robert C. Byrd, Ranking Minority Member

Hon. Mark O. Hatfield (September 1995 to January 1997)

U.S. House of Representatives: Committee on Resources

Hon. Don Young, Chairman

Hon. George Miller, Ranking Minority Member

U.S. House of Representatives: Committee on Transportation and Infrastructure

Hon. Bud Shuster, Chairman

Hon. James L. Oberstar, Ranking Minority Member

U.S. House of Representatives: Committee on Appropriations

Hon. Bob Livingston, Chairman

Hon. David R. Obey, Ranking Minority Member

This is an Independent Report to the Commission

The report published herein was prepared for the Commission as part of its information gathering activity. The views, conclusions, and recommendations are those of the author(s) and are not intended to represent the views of the Commission, the Administration, or Members of Congress serving on the Commission. Publication by the Commission does not imply endorsement of the author's findings or recommendations.

This report is published to share with the public the information and ideas gathered and considered by the Commission in its deliberations. The Commission's views, conclusions, and recommendations will be set forth in the Commission's own report.

Additional copies of this publication may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia, 22161; phone 703-487-4650.

Contents

	<i>Page</i>
Executive Summary	S-1
1. Existing Setting	1
1.1 Climate and Hydrology	1
Climate	1
Surface Hydrology and Water Development	2
Groundwater Hydrology and Use	10
1.2 Water Quality	15
1.3 Natural Resources	18
Carson River Ecosystem	19
Truckee River Ecosystem	23
1.4 Socioeconomic Setting	28
1.5 Public Lands and Public Trust Resources	31
Carson River Watershed	32
Truckee River Watershed	33
1.6 Institutional Setting	34
Federal Agencies	34
State Agencies	36
Regional Agencies	36
Cities and Counties	37
Native American Tribes	38
Environmental Community	41
Lahontan Valley Environmental Alliance	41
Newlands Water Protective Association	42
Truckee-Carson Leasing Authority	42
2. Water Use and Rights	43
2.1 Water Use	43
Municipal Use	43
Agricultural Use	46
Hydroelectric Use	49
Environmental Use	50
2.2 Water Purveyors	51
Sierra Pacific Power Company/WestPac Utilities	51
Truckee-Carson Irrigation District	52
Carson-Truckee Water Conservancy District	52
Carson Water Subconservancy District	52
Small Purveyors	53
2.3 Water Operations in the Truckee-Carson Basin	53
Principal Storage Facilities of the Truckee River Basin	53
Principal Storage Facilities of the Carson River Basin	61
Current Diversion from the Truckee River and Lake Tahoe Basins	61
Current Diversions into the Carson River Basin	65

Contents

	<i>Page</i>
Agreements, Decrees and Doctrines Governing the Allocation of Water in the Truckee-Carson River Basins	67
Operating Criteria and Procedures	87
Unappropriated Water	98
2.4 Water Transfer Markets	99
Historical Development of the Regional Water Market	99
Present-Day Water Transfers Market	104
3. History and Implementation of the Settlement Act	109
3.1 Early Conflicts	109
3.2 History of Settlement Act of 1990	112
3.3 The Settlement Act Negotiations	118
3.4 Washington, D.C.: The Bigger Picture	120
3.5 The Settlement Provisions: P.L. 101-618	123
3.6 Implementation of P.L. 101-618	126
The Fallon Paiute-Shoshone Tribe	126
Federal Water Master	127
Water Allocation Between Nevada and California	128
TROA and the PSA	130
Newlands-Related Issues	132
Pyramid Lake Paiute Tribe-Related Issues	133
Stillwater National Wildlife Refuge	134
3.7 Subsequent Negotiations and Agreements	136
The “Second Generation” or “Facilitated” Negotiations	136
Negotiations Sponsored by Nevada Department of Conservation and Natural Resources	139
Water Quality Agreement	139
Suit Seeking Programmatic Environmental Impact Statement	140
4. Critical Issues: Case Study Discussion	143
4.1 Water Transfers	144
Description of Emerging Markets	144
Market Evaluation	159
Mechanisms to Mitigate Problems	163
Evaluation of Other Issues	178
4.2 Surface-Groundwater Relationships	180
Water Use	181
Interactions of Basin Waters	181
Effects of Land Use Changes, Particularly Changes in Irrigation	184
Impacts from Non-Irrigation Land Uses	185
Mitigation to New Equilibria in the Ground/Surface Water Interactions	187

Contents

	<i>Page</i>
Key Lessons Learned	189
4.3 Newlands Irrigators	189
Effects of Fundamental Change in Federal Goals on Irrigators and Rural Communities	191
Alienation of the Irrigators	192
Newlands Spokesperson	215
Negotiating Strategy	217
The “Takings” Issue	218
Facilitating a Positive, Proactive Role	221
4.4 Water Management: TROA, OCAP and the Negotiated Settlement	231
TROA	231
The Use of Models	233
Federal Leadership	237
Role of Justice Department	240
OCAP and Recoupment	242
4.5 Watershed Management and Carrying Capacity	250
Watershed Management	250
Local Watershed Initiatives	259
Land Management Planning	262
Land Evaluation and Site Assessment (LESA)	268
Carrying Capacity	272
Endnotes	275

Figures

	<i>Follows page</i>
1-1 Features of the Truckee-Carson River Basins	2
1-2 Truckee River Watershed Isohyetal Map	2
1-3 Carson River Watershed Isohyetal Map	2
1-4 Truckee River Watershed and Vicinity	4
1-5 Truckee River Watershed Details	4
1-6 Truckee River Watershed Contours of Elevation	4
1-7 Longitudinal Profile of the Truckee River	4
1-8 Historical Pyramid Lake Levels	6
1-9 Truckee River Watershed Average Annual Streamflows at Selected Locations	6
1-10 Carson River Watershed and Vicinity	8
1-11 Carson River Watershed Details	8
1-12 Carson River Watershed Contours of Elevation	8
1-13 Longitudinal Profile of the Carson River	8
1-14 Locations of the Carson River Watershed High Alpine Reservoirs	8

Contents

Figures (continued)

Follows page

1-15 Features of the Carson Sink	10
1-16 Carson River Watershed Average Annual Streamflows at Selected Locations	10

Page

2-1 Lake Tahoe and Upper Truckee River Flow Schematic	54
2-2 Lower Truckee River Flow Schematic	55
2-3 Carson River Flow Schematic	56
2-4 Market Prices for Water Rights, Truckee Basin, Nevada	100

Tables

Page

2-1 Statistics for major reservoirs in the Truckee River Watershed	57
--	----

Executive Summary

The arid lands of the Truckee-Carson basins are in transition: urbanization is increasing and the agricultural base is declining. Significant amounts of water are being allocated to the preservation of Indian cultures, endangered fish and wetlands. The 1990 Truckee-Carson-Pyramid Lake Water Rights Settlement Act (P.L. 101-618), a negotiated settlement confirmed by Congress, suggests that water use conflicts can be resolved through a combination of litigation, legislation, voluntary transfers, and consensus-building processes. Regulatory property rights were initially asserted to produce a reallocation foreclosed by the law of prior appropriation but, within the shadow of litigation, physical solutions and the operation of the market are producing a new reallocation. However, important parties have not yet fully bought into this settlement, including irrigated agriculture and the rural communities of the Truckee-Carson basins.

The Truckee-Carson transition is characterized by creative use of water transfers, primarily from agriculture, to solve the intense water allocation conflicts that have arisen between traditional and nontraditional users. A heretofore relatively powerless minority, an Indian tribe, was able to influence the water allocation process through assertion of federal environmental laws and tribal trust responsibilities. Litigation was successfully pursued by the Pyramid Lake Paiute Tribe (Tribe) to change the balance of power among major water users in the basin and to reallocate water in favor of protecting Pyramid Lake and its endangered fish (cui-ui and Lahontan cutthroat trout). The Tribe also asserted a fiduciary duty on the part of the United States to preserve water for Pyramid Lake by preventing improper and wasteful use of Truckee River water diverted to the Newlands Project.

Despite the existence of a favorable water rights adjudication, the Newlands Irrigation Project and the local irrigation economy created in the first half of this century are being compelled to adjust to a fundamental shift in water resource values that has occurred in the past two decades. Restoration—including protection of historic ecological diversity and Indian cultural values—is forcefully replacing the past emphasis on consumptive water uses.

The new balance of power forged by tribal litigation provided an incentive for some of the major water users in the basins to devise solutions that worked for their collective interests, but balance the water books with a combination of water transfer purchases and forced efficiency improvements from irrigated agriculture. The resulting reduction in irrigation diversions and irrigated lands are expected to impact local, agriculturally-based rural communities as well.

For tribal, environmental, and municipal interests, however, efforts to address basin wide problems comprehensively and to devise creative solutions that promote both efficiency and equity have produced an acceptable compromise. These players have moved to trade firm rights for a risk-based physical solution that provides an adequate margin of safety in water-short years.

Through the Settlement Act, Congress played a critical role in the long trek from conflict to consensus. The resulting legislation (the Truckee-Carson-Pyramid Lake Water Settlement Act, Title II of P.L. 101-618) may prove to be a model for other western basin settlement acts. However, the Truckee-Carson basin has several distinctive features that suggest caution in applying the negotiated settlement to other basins:

- It is a relatively small, self-contained geographic area.
- The competing interests are discrete, entrenched and relatively well organized.
- Few examples of Congressional settlements exist.
- The consensus achieved to date does not yet include a positive settlement with the irrigators.
- The Newlands Project is not typical of federal water projects in the West. It contracts for operation and maintenance, not water, while the water rights are held by individuals.
- The Truckee River itself is not a federal water project, but rather the United States is bound by a federal court order, along with other parties. Therefore, the role of the federal Water Master, who is a court appointee to administer the terms of the federal court decree is important to understand as an authority separate and apart from the United States.

One commentator to the draft report felt that the degree of contention and litigation with regard to the Newlands Project has led to a unique history that may have limited applicability in other river basins. However, a history of contention and litigation is characteristic of a number of western river

basins; each of which is unique in its own way, but all of which share elements in common among the stresses they face and the contention this engenders.

In the past decade, tribal people have been able to gain unprecedented power in the Truckee-Carson to influence the water allocation process through federal environmental and tribal laws, a power denied them in earlier adjudications. Ironically, the Indians' success, along with the ongoing effects of a prolonged drought and of substantial urban and agricultural diversions of water, has contributed to the reduction of a formerly thriving wildlife habitat—the Stillwater Marsh and surrounding Lahontan Valley wetlands. Wetlands in the Lahontan Valley have been variously affected by the advent of irrigated agriculture: first, by diversion of the historic Carson River flow, then by diversion of the Truckee River flow, and more recently, by efforts to improve the efficiency of the Newlands Irrigation Project. These remnant wetlands were able to coexist precariously with an upstream irrigation district but not with the additional goal of restoring the native fishery. To the extent that inflows to Pyramid Lake required to meet Endangered Species Act requirements are met, there is a reduction in the amount of water available to the irrigation project and the wetlands. A water rights acquisition program implemented to transfer water from irrigation to wetlands maintenance holds promise for stabilizing the wetland area.

Lessons Learned and the Federal Agenda for the Next 20 years

Drawing upon interviews with federal, state, and local officials, both in the Truckee-Carson basins and at their headquarters offices, together with the other major players in the process, we have developed the following list of important lessons learned and suggestions as to what the federal government should be doing to address critical water problems in the next 20 years.

Level the Playing Field

Finding

The Federal government has enormous resources and when these are committed to a particular side in a water conflict, it can be very difficult and prohibitively expensive for the affected parties to cope. For decades, the weight of the government was on the side of reclamation values. Today, it has swung to favor tribal trust and endangered species issues.

Recommendations

- Where the federal government provides legal and technical assistance, it should work to equalize the balance among legitimate interests and assure that the negotiating playing field is level. Pursuing such a goal need not, as some commentators on the draft report would have it, entail “funding non-Indian groups to undermine [federal] tribal trust responsibilities”—or any other federal responsibility. It would entail giving fair and balanced support to all federal responsibilities.
- Protection of established water rights and protection of tribal trust or environmental values need to be balanced. Neither should be made secondary to one another.

Direct Negotiations Among Stakeholders

Finding

The Preliminary Settlement Agreement negotiated directly between the Tribe and Sierra Pacific is a model of stakeholders taking the initiative to solve water issues directly among themselves, and provided the breakthrough on which the Settlement Agreement could be founded.

On the other end of the spectrum, it has been said more than once that the issues remaining in the basins will not be resolved until the tribe and irrigators sit down together and work them out directly. The Pyramid Lake Paiute Tribe feel that the most basic issue concerns filling Lahontan Reservoir. The irrigators believe that they are entitled to an absolute right to divert all the Truckee River water it takes to fill Lahontan Reservoir each year. The Tribe believes that the right to divert should consider how much of that supplemental water is beneficially used or how much is wasted due to conveyance losses, evaporation or spills. The Tribe’s attorney considers this the fundamental impasse issue affecting the basin.

Recommendation

- These two counterpoints in the success of direct negotiation and the need for direct problem-solving between key water-users in the basins

suggests that the federal government should explore opportunities for direct negotiations in western water policy and, where appropriate and potentially productive, encourage the parties representing differing interests to negotiate directly with one another. This should be subject to federal approval where federal funds or facilities are involved.

Risk-Sharing Formulas

Finding

Stakeholders in the Truckee-Carson are recognizing that the purpose of a negotiation is not to simply shore up property entitlements, but to find risk-sharing formulas. However, efforts to accommodate some stakeholders in the basin have been hampered by their failure to recognize that the conceptual foundation of resource conflict negotiations are changing. At base, property rights reflect different risk-sharing arrangements and progress among conflicting stakeholders can only be made if each recognizes that they can each live with the alternatives proposed. Such a negotiation succeeds when it can articulate the necessary conditions (e.g., flow regime) that will allow essential activities to be carried out. The objective then becomes to find physical solutions and adaptive management strategies that provide high—but not absolute—assurances that these conditions will be met, or provide adequate contingency plans.

Recommendation

- Consider risk-based physical solutions, trading firm rights for an adequate margin of safety in water-short years. The federal government can empower such approaches by supporting a mix of water exchanges and flexible use of storage and water rights, maximizing use of available facilities.

Creativity, Flexibility, and the Market

Finding

Creativity in using storage exchanges was key to creating the flexibility needed to unlock the system and meet diverse goals while satisfying rights (at least, for most players). Another key was in rescheduling the consumptive use portion of Nevada water which allowed purchase of agricultural rights to increase summer reservoir storage. Integrating operations and other watershed or river management agreements, such as was done with TROA and the Water Quality Agreement, had tremendous synergy in benefitting fish and other basin resources. In the Truckee-Carson, the addition of the PSA worked to benefit municipal water during drought as well.

Revising Floriston rate requirements to allow water to be retained in storage for the benefit of the Pyramid Lake fishery to the extent the water that would have been released would have been diverted solely for the generation of hydroelectric power and would have flowed to Pyramid Lake is a good example of the kind of creative solution that provided a breakthrough in Truckee River management.

Recommendation

- The Truckee-Carson illustrates the power of creative and flexible solutions to unlock long-standing conflicts. The federal government should empower and encourage such initiatives, staying within water law, protecting basic rights, and meeting federal trust responsibilities. There is no model or formula for successful settlement; each settlement needs flexibility to be successful. Where creativity and flexibility are encouraged, such latitude should be afforded to *all* players.

Operating Criteria and Procedures (OCAP)

Finding

An innovation in the Truckee-Carson has been the federal development and imposition of “Operating Criteria and Procedures” designed to minimize the loss of water to irrigation inefficiencies and place the farmers of the Newlands Project on a strict water budget. The objective is to conserve as

much Truckee River water as possible from diversion, allowing it to serve endangered fish and tribal trust responsibilities in the watershed of origin. The OCAPs approach is open to significant question as a viable strategy. It is not clear to what extent OCAPs themselves have reduced diversions (as opposed to other driving factors). Even though water may have been conserved, the cost in good will has been very large. Both the reported tendency for unproductive accounting disputes to overtake larger objectives (on the part of both the irrigators and the Tribe) and the tendency to foster an unproductive focus on the issue of rights raise questions as to whether other conservation strategies can both save water and serve a more positive, inclusive solution.

Recommendation

- We strongly recommend against pursuing an OCAP approach in other Western river basins. The federal government should promote solutions that depend on market incentives and enlightened self-interest over those that depend on the use of a large stick. Third-party micro-management of reclamation projects (not only through OCAP, but also such things as water-transfer and water-rights litigation) is clearly deeply resented and leads to entrenchment rather than cooperation.

Negotiating Framework

Finding

Keeping an ongoing discussion among so many diverse parties for so long has been a major achievement in the Truckee-Carson negotiations. However positive the negotiated settlement may have been for most major players in the basin, there remain key players who have not yet fully bought into this settlement, including irrigated agriculture and the rural communities of the Truckee-Carson basins. On the one hand, the negotiations have served to alienate these players. On the other hand, parties have to want to settle, and the players who have come to consensus are frustrated that the irrigators and rural communities have not been willing to buy into solutions despite long, sincere and numerous efforts to seek consensus. Western water policy occurs in a fishbowl, and the Truckee-Carson is a prime example of how perceptions can be as damaging to solutions as an actual injustice would be.

Some of those interviewed stated that TROA meetings were much too big. Some said there were 100 people around a table. Small sessions are seen as more productive. The Interior lead official responds that the largest sessions had about 60 people in attendance. These were “plenary” session intended to update a wide audience on the status of negotiations and new information. Negotiating sessions were said to be smaller, but making them smaller than they are is difficult because of the number of interests involved that need to be represented.

Recommendations

- Define a water baseline using good science, policy and the law. Use the baseline to clearly bound the process by identifying when federal responsibilities, such as endangered species protection or tribal trust responsibility will have been met.
- Maintain an appearance of fairness as the highest priority. Consistent with established rights and needs, no bias should shown in favor of or against any party with respect to opportunities to participate in such water management practices as water transfers, storage, and exchange.
- Vigilantly protect the appearance of objectivity on the part of the federal government. In the Truckee-Carson, contractual relationships with environmental parties were interpreted by the irrigators as presenting conflicts of interest to the role and confidences with which the irrigators had entrusted them.
- Work toward solutions, not victory. Resolve to bring peace among the parties as a priority. Develop behaviors that would further that goal.
- Consider all proposals on their merits, not based on who might be offering them.
- Avoid continual change in policy.
- Carefully manage the role of the Department of Justice to protect the legitimate policy-setting and technical assessment roles that properly belong to other agencies.

- A durable settlement requires a good faith effort by all participants. An unwillingness to seek solutions by any party, or attempts to scapegoat or exclude an uncooperative party will weaken and perhaps jeopardize the entire process.
- Do not underestimate the ability of groups that may be marginalized to object to a process that does not appear to hear or include their interests.
- Participant stability and consistency is important. These build trust as a basis on which agreements can be concluded.
- The challenge with large meetings for such multiparty, multi-stakeholder negotiations as TROA is to keep them to a size where they can be productive.
- Parties such as tribes and irrigators may need extra time to work through grassroots decisionmaking processes. These needs should be respected.

Negotiation Strategy

Finding

It is important to note that Sierra paid a price in the form of water, a waiver of hydroelectric rights and expensive conservation measures for the use of space in federal reservoirs. TCID had and continues to control equally valuable asset. But while both Sierra and TCID had valuable assets, Sierra brought theirs to the table, bargained them and negotiated for their interests, but TCID did not. The irrigators believe their assets were taken from them; others hold that their lose of bargaining position is their own fault. This was a strategic coup for Sierra and has been an ongoing strategic failure for the Newlands irrigators. Some feel that the focus on being treated unfairly has kept the irrigators from engaging in the kind of give-and-take necessary to get some return on their assets. These parties feel that the irrigators did not assess their assets well; they were not really detached enough from their emotional involvement in them.

Recommendations

- Seek to shift focus from rights to interests. Acknowledge rights and move to take advantage of mutual self-interest as a negotiation driver.
- Advantage should not be taken of a lack of success in negotiating effectively on the part of any key player; instead, assistance should be lent to help improve and mature the quality of negotiations on all sides.
- The irrigators are criticized for “saying no to everything.” Other parties feel that this put irrigators in position of going down with the ship. Hard choices may be needed between achieving consensus or meeting pressing goals for redressing past wrongs and present environmental degradation. Both tribes and irrigators feel that consensus for its own sake is not always more important than basic core values that cannot be “traded off.” This is a recipe for ongoing stalemate.
- Strong central leadership may break stalemate; when such leadership is lacking, the situation may tend to revert to stalemate.

Local Governance and Local Coordination

Finding

Perhaps because so much of Nevada is under federal management, marked sensitivity was shown to the issue of local governance. The establishment of the local Truckee-Carson Coordination Office and the long-term local ties of federal officials in several agencies have been served to address such concerns in very positive ways. The conflict between federal and state interpretations of water law requirements is a potential flashpoint.

Recommendations

- Move to empower the local level, including local federal officials, with decisionmaking authority.
- Providing federal coordination among the various agencies involved, as has been accomplished with the Truckee-Carson Coordination Office, is a model to be considered for other river basins. However, the effort to speak with one voice should not stifle the needed articulation of

sometimes competing interests which the federal agencies represent, nor should it be allowed to lead the federal to government to favor one set of interests over other, equally legitimate ones. A local coordination office should be paired with a Washington D.C. official not beholden to any of the bureaus or Assistant Secretaries.

- Some felt a loss of authority on the Truckee River on the part of the Secretary of Interior was due to the focus placed by the Truckee River Agreement on the federal Watermaster. In that context, federal regulation came as an imposition. A continuing strong presence would have made things smoother. Others felt that making the Watermaster responsible for day-to-day operations, as TROA does, is as it should be.
- Work to improve the federal-state relationship on water law. The federal side must recognize and comply with state law, and the state must recognize and support the duties and responsibilities of federal agencies charged with land management, tribal trust and fish and wildlife.
- Congressional allocations are not necessarily superior to interstate compact as a means of interstate water allocation. In either case, care must be taken not to neglect the interests of legitimate parties, notwithstanding current and shifting social values. Federal leadership is critical, whatever the vehicle, but the imposition of federal will must always be handled with kid gloves.
- Joint leadership, collaboratively involving federal, state, local, tribal, environmental, and major private economic interests holds the greatest promise for success.

Resource Carrying Capacity

Findings

Although western water issues are driving by classical carrying capacity issues, long-term questions of planning for growth and accommodating the carrying capacity of the resource are frequently not directly addressed.

Recommendations

- It would be well for future generations and the long-term economic and environmental health of the Truckee-Carson basins that such long-term

questions be more explicitly addressed, both here and throughout western water policy.

Maintaining Rural Agricultural Communities

Findings

The reduction in irrigation diversions and irrigated lands will bring impacts to the local, agriculturally-based rural communities. The marginal economic value of crops grown with irrigation water in the area must be balanced against the desire to avoid these impacts and preserve a way of life. To date, the majority of irrigated lands going out of agriculture as part of water rights acquisition programs have been from urban development rather than wetlands water right transfers. The lands being fallowed are the less productive lands and there remains a strong potential to maintain a viable agricultural core in Churchill County.

Recommendations

- Answers to the following key questions are needed are west-wide:
 - (1) What is a viable ag community?
 - (2) Can agriculture bring itself to move off a “rights focus” and engage in risk-sharing give-and-take?
 - (3) Can a partnership approach to solutions be fostered?
- The Land Evaluation and Site Assessment (LESA) method might be used in conjunction with water rights acquisition programs to focus irrigation on the most efficient canals, best soils, and most productive farmers. Such an approach has been advocated as a basis to shrink irrigation projects to a tight core, using land swaps to trade outliers back into the center. The Natural Resource Conservation Service might provide leadership in such an approach, as it is a trusted agency experienced in the land evaluation process. The cost of this endeavor could be funded through a water transfer fee at the time of water right acquisition as well as real estate transfer tax.

Surface-Groundwater Relationships and Water Quality

Findings

Surface and groundwater conditions have equilibrated to changes brought about by human use and changes in that use drives a reequilibration.

Irrigation efficiency improvements and changes in irrigation patterns (e.g., due to water rights acquisition), may or may not have detrimental effects. This is not clear either with regard to water quality or quantity. Contemporary urbanization effects may have greater effects on the shallow water aquifer than the effects of irrigation over the past century. The Truckee-Carson basins are exceptionally sensitive to change.

Land use changes are more significant in terms of water quality in basins where surface-groundwater continuity is strong than in western basins where groundwater is confined and hydrologic conductivity is low.

Water quality may be more limiting and may have more significant long-term impacts on the ability of the water resource to sustain use in these situations than water quantity, although the latter has received far more attention in the Truckee-Carson basins.

Decision Science

Findings

TROA leaders point out the critical need for good and flexible modeling in these kinds of programs. However, the development and documentation of the Negotiation Model has been subject to significant question by expert reviewers hired by the federal government itself.

It is not possible to measure the original surface and groundwater conditions or the effects of original changes on those conditions. The possibility exists that the uncertainty involved in those events may be larger than the changes that have occurred since. Effects to wetlands and other water-related phenomena due to the changes such as irrigation may not be capable of being definitively differentiated from the potential effects due to climatic change in this century.

Recommendation

- Model development and documentation is critical. These should occur in an open, public forum. For systems as complex as most high-controversy Western water basins, model development, documentation and maintenance it is probably important that the federal government take this role. Access to use the model to test questions and develop scenarios should be provided all major players.

1. Existing Setting

This section describes the setting of the Truckee-Carson River basins and the history of water-related development and problems which have characterized the past 100 years in the basins. Figure 1-1 presents an overview of project watersheds, features, major land use designations and water facilities.

1.1 Climate and Hydrology

Climate

Nevada is the driest state in the nation, with an average annual precipitation of approximately 9 inches (230 mm) per year. Fallon, in the lower Truckee basin, averages 4.9 inches of precipitation per year, and Reno, higher upstream, averages 7.5 inches. Of Nevada's average annual precipitation, 90% is lost to evaporation and transpiration. Droughts are commonplace; indeed, every six out of ten years, the major rivers in the state experience below-average mean flows. This regularly places increased pressure on water supplies in the state. The most recent severe drought lasted for eight years (1987-1994).

Elevations in the watersheds range from 9,000 to over 10,000 feet in the Sierras, on their western edges, to less than 4,000 to 5,000 feet in the valleys of the basin and range terrain to the east. In the Carson watershed, elevations drop to just under 4,000 feet.

The high elevations in the Sierras are the coldest and wettest part of the region; the lower areas to the east lie in the rain shadow of the Sierras and are much more arid. The difference in precipitation are demonstrated by the change in vegetation, from coniferous forests in the Sierras to sagebrush, rabbit brush and alkali grasses in the desert areas (TRA:29, CRA:37).

The basin's climate is characterized by long, very cold winters, particularly in the Sierras, and by short moderate to warm summers. Precipitation follows a seasonal pattern, primarily occurring from late October through early May. Summer thunderstorms are common in the region, but seldom produce significant amounts of precipitation over a wide area. Winter precipitation above the 5,000 foot elevation usually takes the form of snow. The spring runoff season lasts longer than is normal for watershed of lower elevation, extending into early July, because the snowpack at the highest elevations melts late in the season (TRA:33, CRA:37).

Temperatures can vary widely with location in the region. In the coldest areas, around Truckee and Lake Tahoe, extreme lows can reach from -15° to -30° F, with maximums in the 90° to 100° F range. The eastern portion of the region is warmer; temperature extremes in the Reno/Sparks area range from

-10 ° to about 110 °F (TRA:33, CRA:37). The *Truckee* and *Carson River Atlases* provide detailed tables of temperature extremes and frost-free days at key locations.

Figures 1-2 and 1-3 are isohyetal (precipitation) maps for the Truckee and Carson watersheds. In the Truckee River watershed, annual precipitation is below 10 inches per year below Washoe Lake and Farad. In the Carson River watershed, the 8-inch per year isohyete crosses the watershed well upstream of Lahontan Reservoir.

Surface Hydrology and Water Development

Water users depend primarily on two rivers, the Carson and the Truckee, which drain from the eastern slope of the Sierra Nevada into two closed Great Basin systems, Pyramid Lake and the Lahontan Valley marshes, including the Stillwater National Wildlife Refuge and the Carson Sink.

Carryover storage and transbasin diversions both play a large role in meeting existing water needs, but water diversions play the most significant role in the Truckee-Carson basins. The Carson River has been dammed only at the lower end to supply the Newlands Project; above Lahontan Reservoir its flows have great seasonal variability. To guarantee firm yield to the Newlands Project, part of the annual flow of the Truckee River is diverted to the Carson through the Truckee Canal, which runs from Derby Dam to Lahontan Reservoir. Several upstream reservoirs have been constructed on the Truckee, but there is insufficient carryover storage to provide normal flows during a two- or three-year drought cycle.

These features of the Truckee-Carson water delivery system are described further below and in more detail in the new Truckee River Operating Agreement and in the *Truckee River Atlas* (TRA) and *Carson River Atlas* (CRA) published by the California Department of Water Resources. Figures 1-2 through 1-16 are taken from these sources. Far more detailed hydrologies are contained in the *Truckee River Chronology* (TRC) and *Carson River Chronology* (CRC) published by the Nevada Division of Water Planning (and available on the NDWP home page).



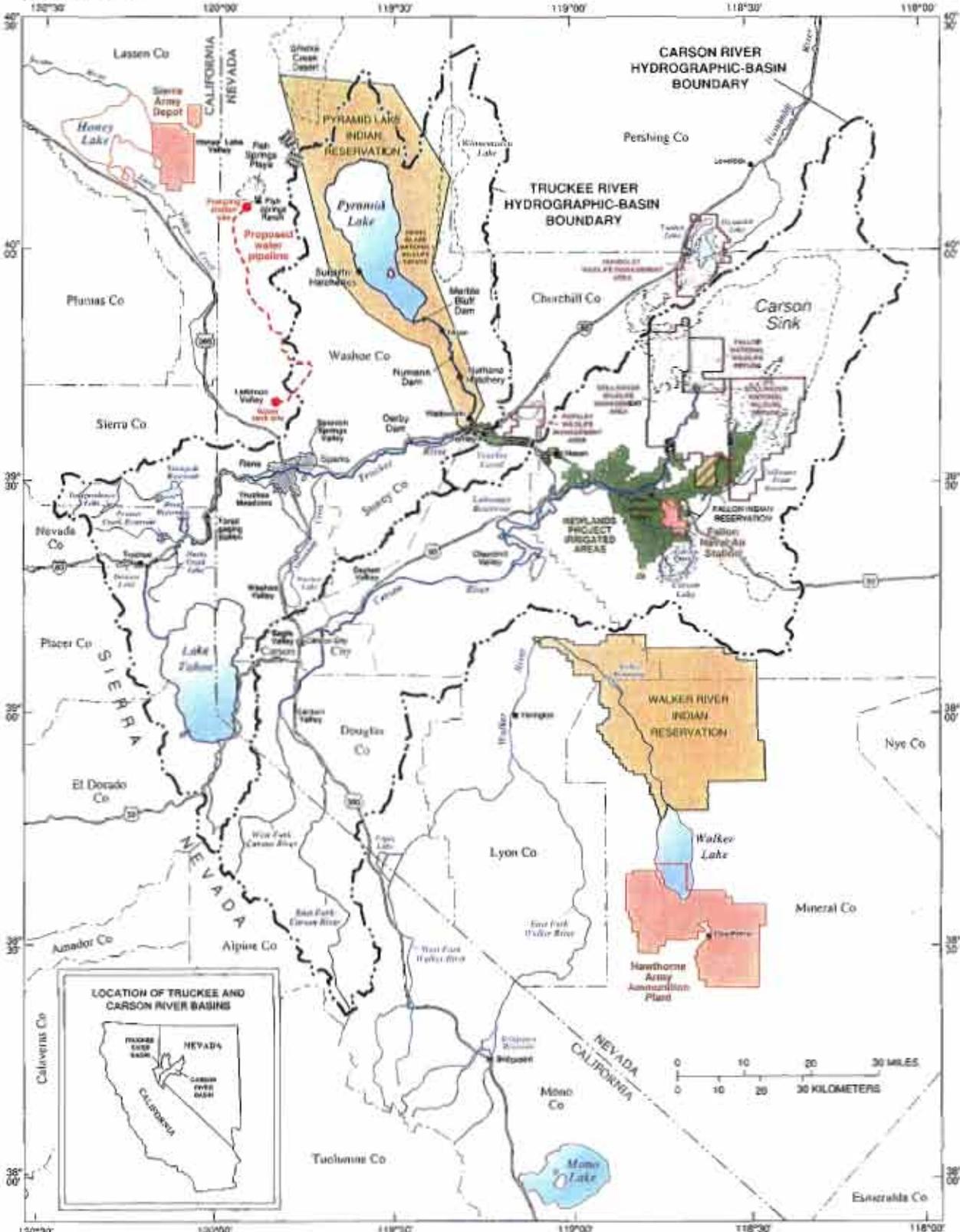
HYDROLOGIC FEATURES OF THE TRUCKEE AND CARSON RIVER BASINS AND ADJACENT AREAS, WESTERN NEVADA AND EASTERN CALIFORNIA

By
Jeffrey V. Trionfante and Lorri A. Peltz
1994



U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 93-368



Base from U.S. Geological Survey digital data 1:100,000, 1977-85
Albers Equal-Area Conic projection
Standard parallels 29°30' and 42°30', central meridian -119°00'

For additional information, contact
District Chief / U.S. Geological Survey
333 W. Nye Lane / Carson City, NV 89706

A product of the Truckee-Carson Program

Figure 1-1

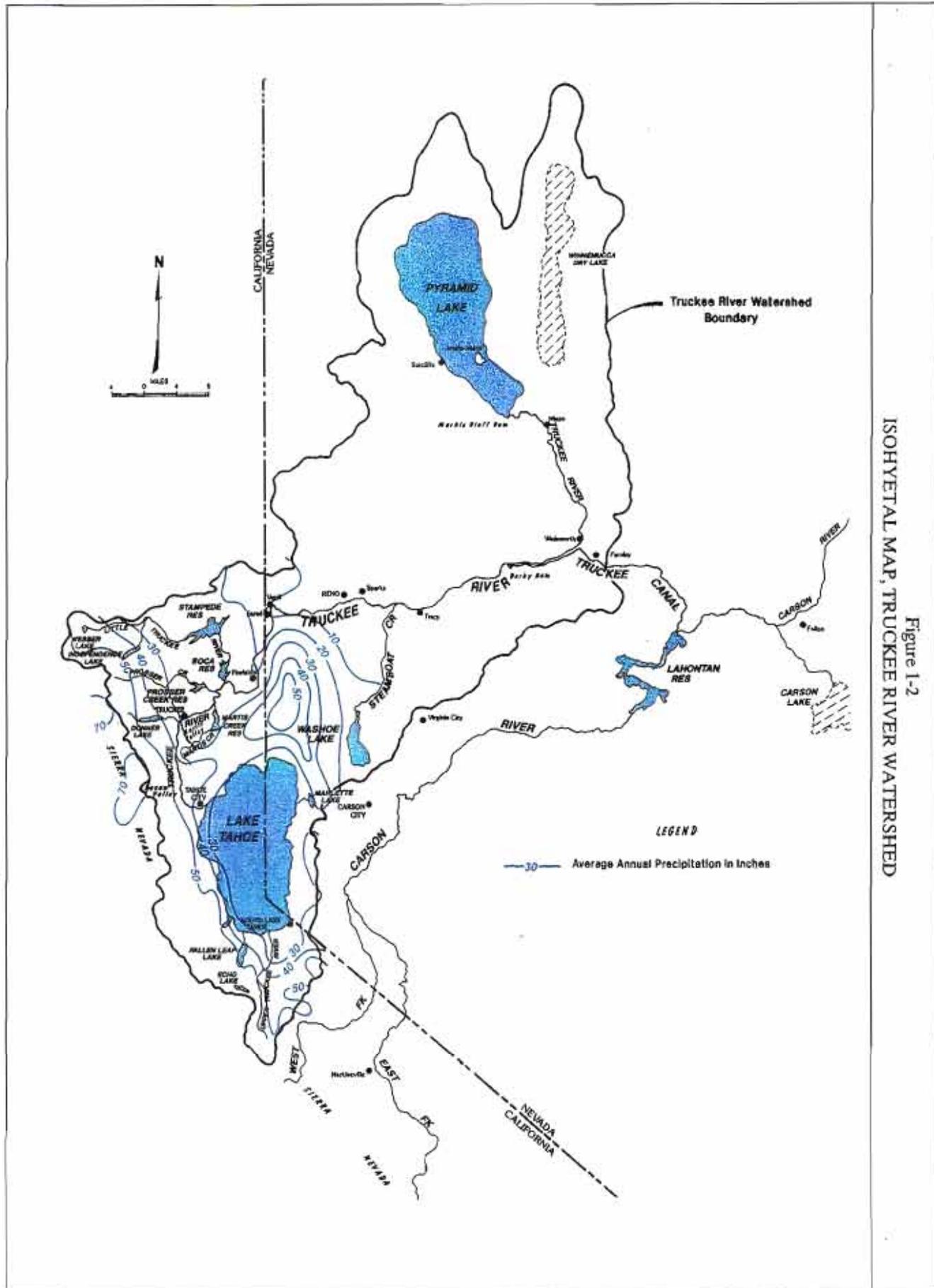
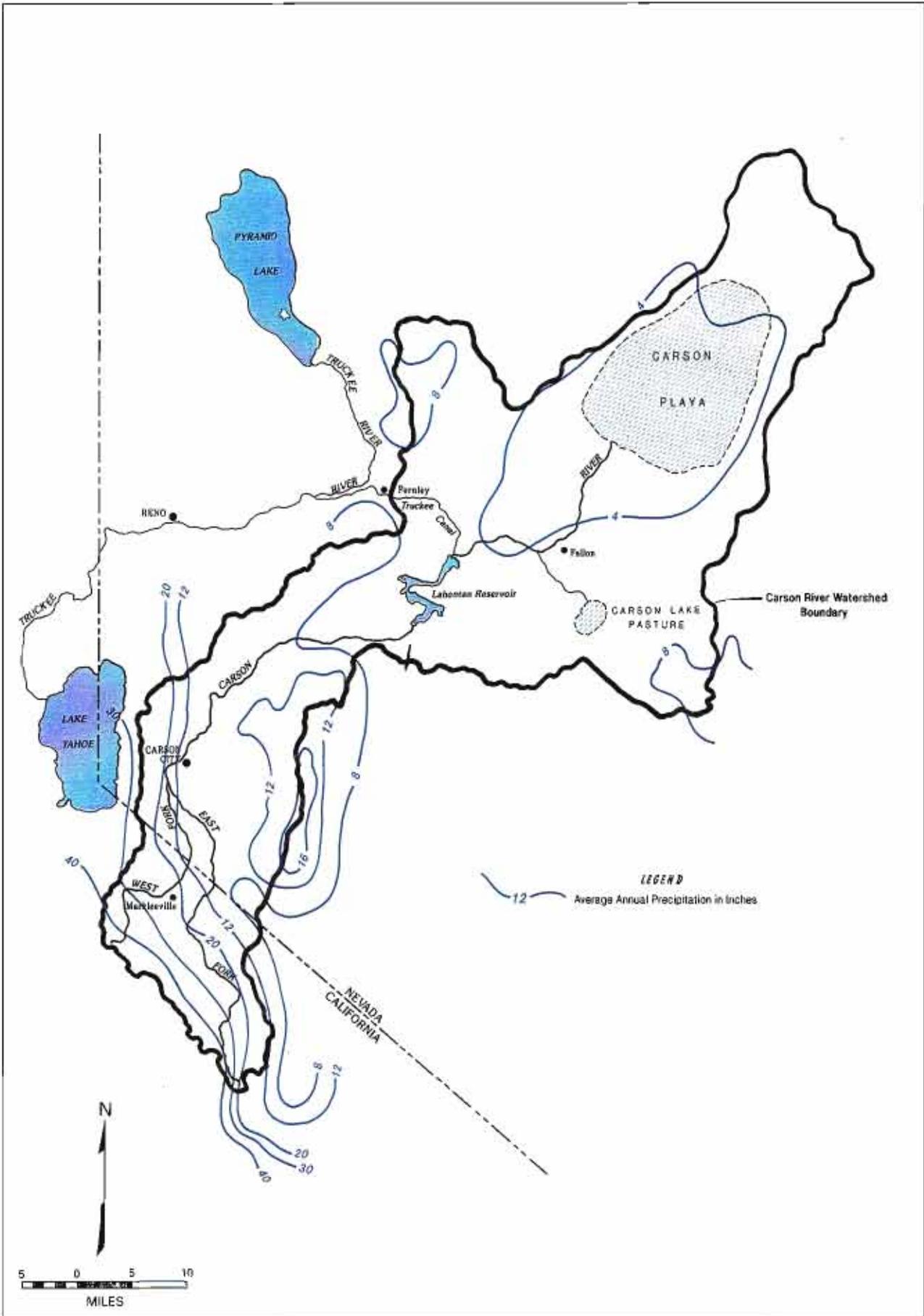


Figure 1-2
ISOHYETAL MAP, TRUCKEE RIVER WATERSHED

Figure 1-3
ISOHYETAL MAP



Truckee River and Lake Tahoe.—Flowing 114 miles from Lake Tahoe to Marble Bluff Dam, above Pyramid Lake, the Truckee River drains a watershed of 3,120 square miles (including the Tahoe subbasin), about 75% of which lies in Nevada and the remainder in California. Figures 1-4 through 1-6 show watershed detail and elevations. The river has its headwaters in California's Sierra Nevada mountains, from which it flows into Lake Tahoe. This segment resembles a typical alpine stream, relatively unaffected by human activities (TRA:5). Its chief characteristic is its steep gradient (Figure 1-7).

Lake Tahoe is the first point at which the river's flow can be controlled. Tahoe covers 192 square miles with an average depth of 990 feet, the tenth deepest in the world. The lake drains an area of 506 square miles and occupies an unusually large proportion of its drainage area.

Lake Tahoe is both a natural lake of great beauty and a storage reservoir for the Truckee. It has received designation from the Environmental Protection Agency as an Outstanding Natural Resource Water, protecting water quality in the lake from degradation. The lake could provide all the carryover storage that the area would need for the long term, but most of the water has been dedicated to in-place, non-consumptive use. This is not to imply that water rights established such purpose have been issued, but the early Truckee Basin history is one of conflict not over Pyramid Lake, but rather Lake Tahoe pumping. The State of California, Lake Tahoe residents and environmental interests have strongly defended the lake against such demands, and proposals that would affect the lake beyond the existing arrangements (see discussion immediately below) would likely be politically very difficult if not impossible.

Although Tahoe is a natural lake, it is controlled by a small dam constructed 400 feet downstream of the natural outlet rim at the northwestern edge of the lake, which lies at an elevation of 6223 feet. Tahoe has a total capacity of about 122,160,000 acre-feet, but the dam, constructed in 1913 by the Truckee River General Electric Company, regulates lake level to fluctuate a maximum of 6.1 feet, yielding a usable storage capacity of 744,600 acre-feet.

Six other small storage reservoirs constructed on the upper Truckee and its tributaries have a total capacity of 324,400 acre-feet (see Chapter 2 below). From Tahoe City, the Truckee River flows northward through a small canyon toward the town of Truckee. The only tributaries of any size in this canyon reach are Bear Creek and Squaw Creek. The next significant tributary is Donner Creek, just upstream of Truckee. Flow in Donner Creek is controlled

by a small dam on Donner Lake, another natural lake whose storage capacity has been enlarged by damming. Rights to the usable capacity of this lake are held jointly by Sierra Pacific Power Company (Sierra Pacific) and Truckee-Carson Irrigation District (TCID), and the water is used for municipal supply in Reno and irrigation on the Newlands Project.

Downstream of Truckee, several major tributaries join the river. All of these are controlled by federal reservoirs, reflecting the fact that most of the significant water supply development has been in California, where topography and annual precipitation are more favorable for reservoir construction (TRA:6). Both Prosser Creek and Martis Creek join the Truckee River near Martis Valley; each is controlled by a reservoir named after the creek. Further downstream the Little Truckee River joins from the north. The Little Truckee itself has one significant tributary, Independence Creek, which is controlled by a privately owned dam at Independence Lake. In addition to the very small privately owned Webber Lake at the extreme northwestern edge of the watershed, the larger federal Stampede and Boca reservoirs control flow on the Little Truckee. All of this development and these tributaries are entirely contained within California.

Stampede is noteworthy as the second-largest of the Truckee River watershed reservoirs at 226,500 acre-feet and has been the object of contention as to its primary purpose. It was originally constructed to serve multiple purposes, including to supplement Reno's water supply. However, after listing of threatened and endangered fish in Pyramid Lake (see below), the Ninth Circuit Court of Appeals held in 1982 that reservoir storage had to be managed to maintain fish flows rather than for municipal and industrial uses.

Shortly below the Little Truckee River confluence, the river enters a deep canyon, turns north and passes the town of Floriston, significant for lending its name to agreed flows maintained on the river by release from Lake Tahoe (as well as Prosser and Boca, see discussion below; these flows are actually measured at a gage near Farad). The river enters Nevada at Farad, where the first of four small turn-of-the-century hydroelectric plants can be seen (there were once five, but one no longer operates).

Bending east at the border, the Truckee River flows through the Truckee Meadows, a bowl-shaped valley and alluvial fan bounded by mountain ranges and hills. At one time, Truckee Meadows was a wet meadow area largely developed for agriculture; today it is occupied by the rapidly growing cities of Reno and Sparks. The Truckee River flows through downtown Reno and then

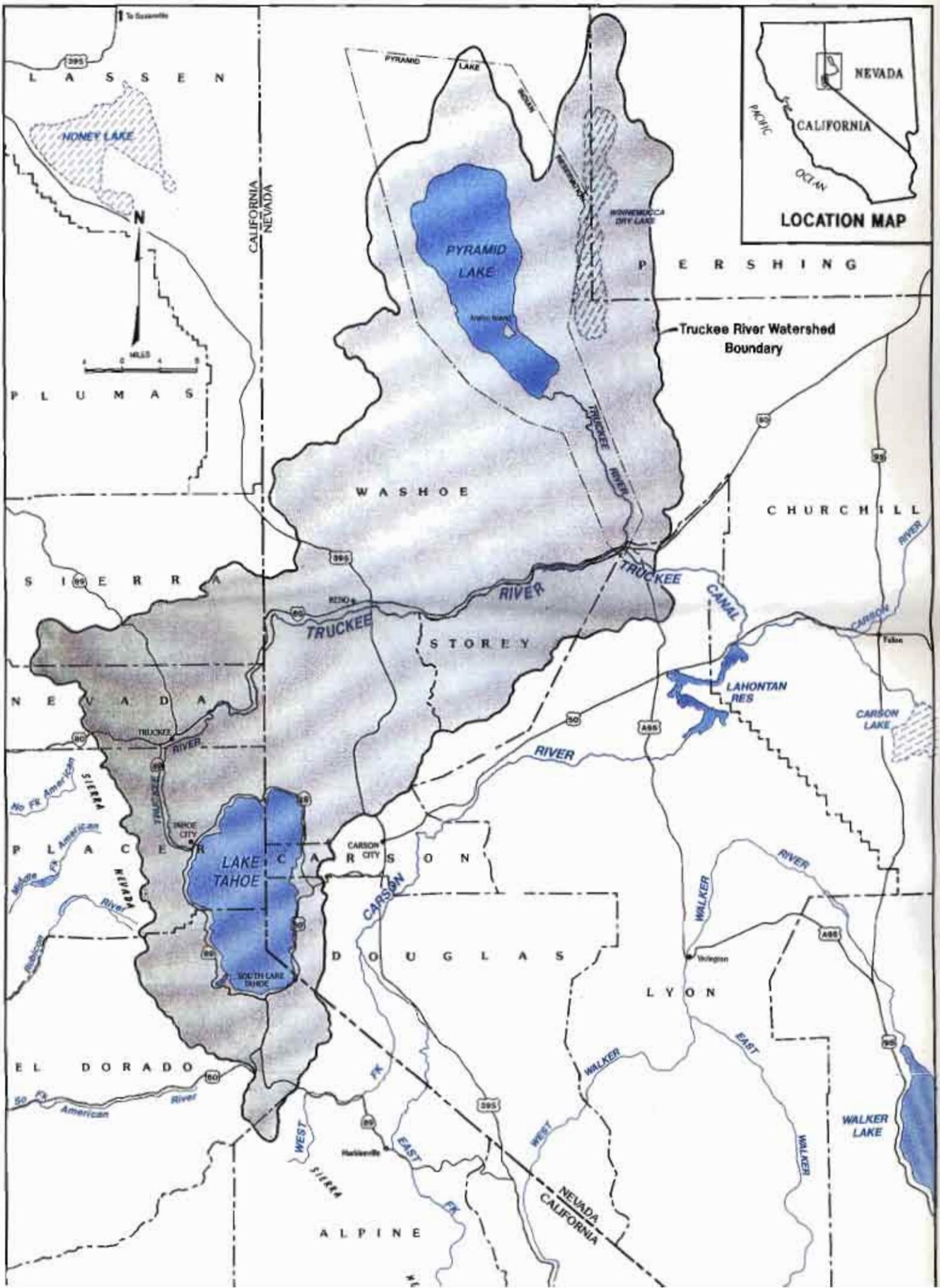
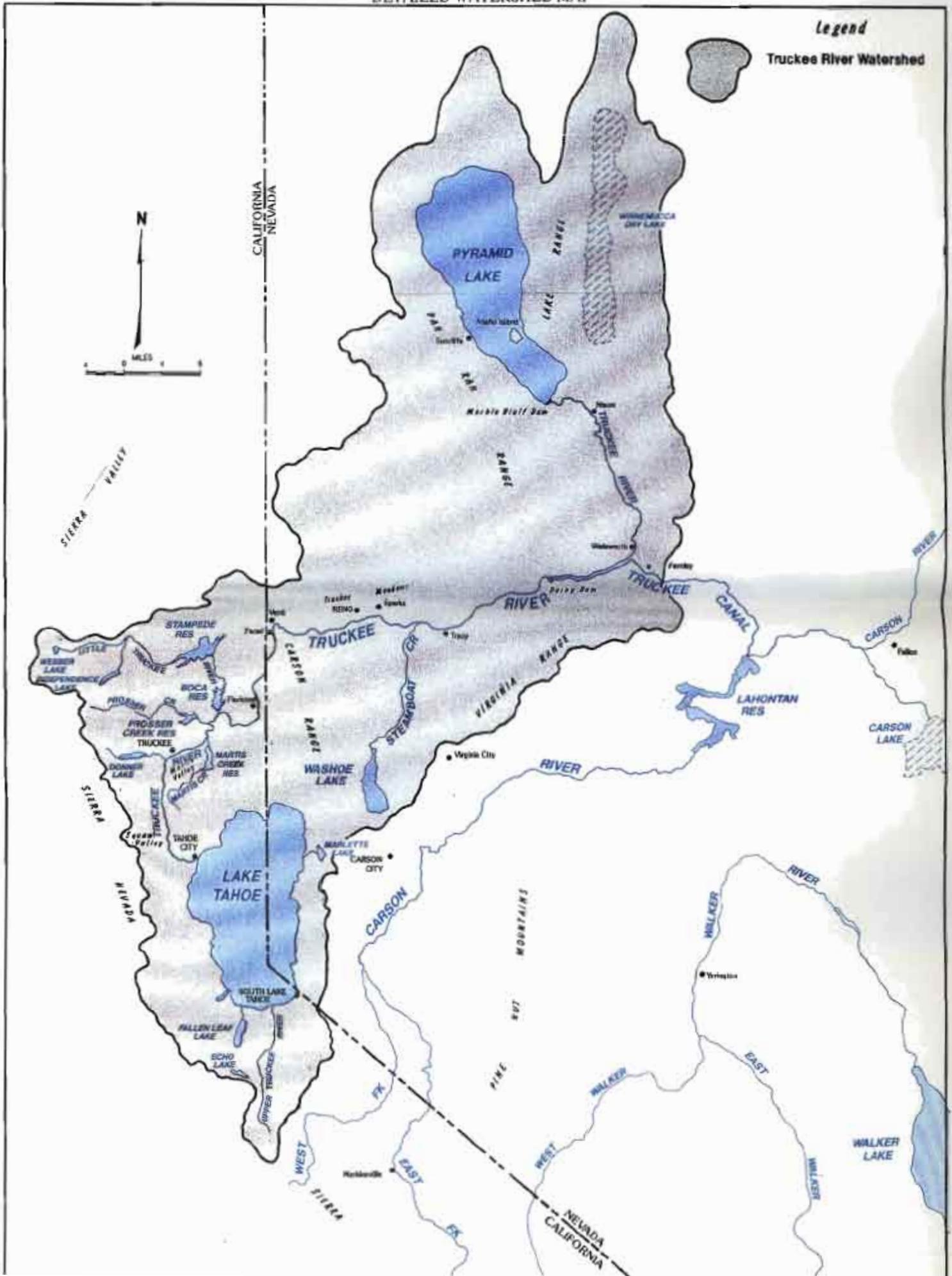


Figure 1-5
DETAILED WATERSHED MAP



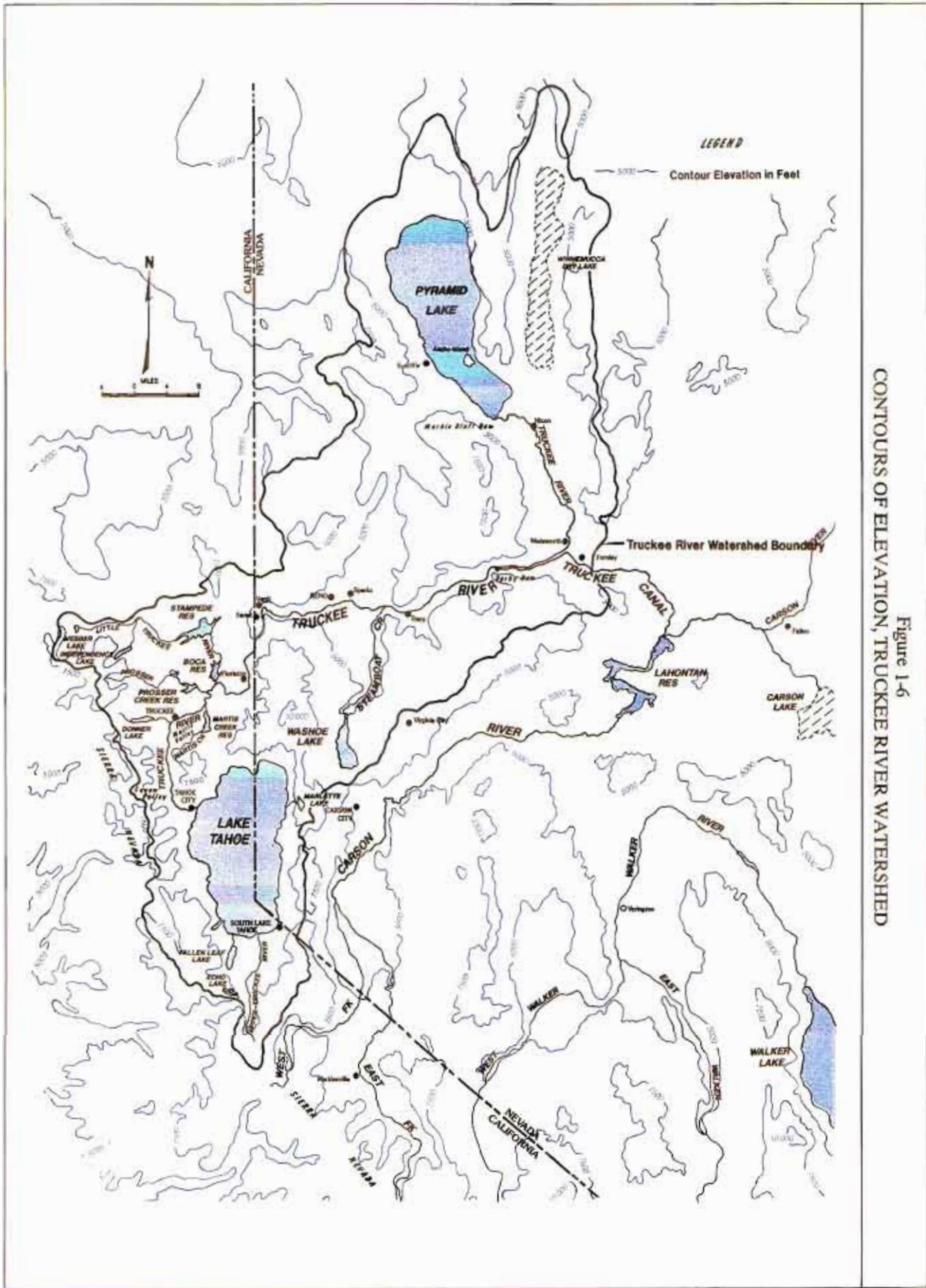
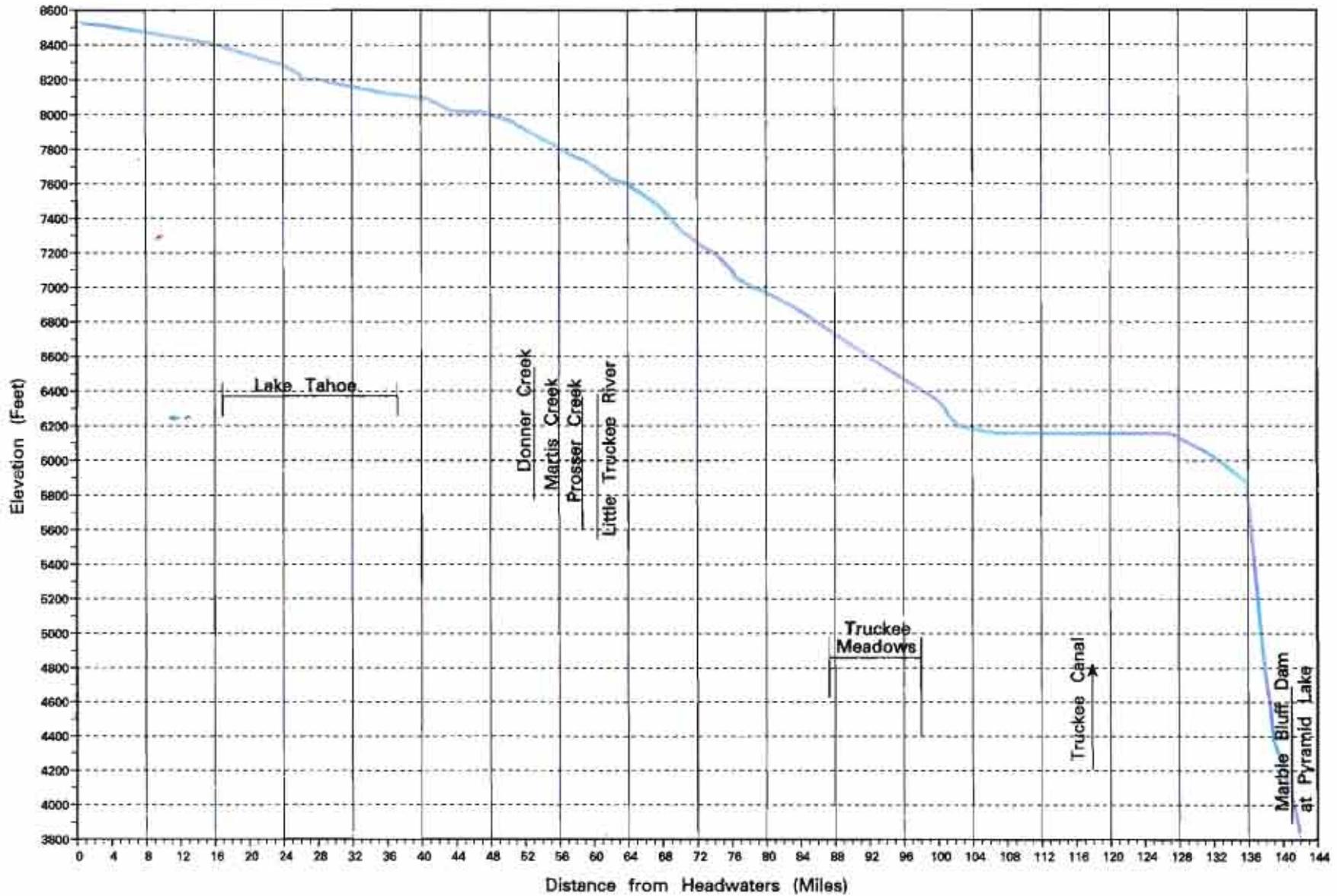


Figure 1-6
 CONTOURS OF ELEVATION, TRUCKEE RIVER WATERSHED

Figure 1-7
LONGITUDINAL PROFILE OF THE TRUCKEE RIVER



is joined by its only significant Nevada tributary, Steamboat Creek which flows north from Washoe Lake.

Leaving Truckee Meadows, the river flows through an arid basin and range terrain. At Derby Dam, a small diversion dam, the Truckee Canal carries water from the river southeast into the watershed of the Carson River. The 32.5 mile canal has a capacity of about 900 cfs. It was constructed by the U.S. Bureau of Reclamation (Reclamation) as part of the Newlands Project, the Nation's first project under the Reclamation Act of 1902. The canal transports Truckee River water to Lahontan Reservoir near Fallon, to supplement Carson River water in irrigating Project lands. Truckee River water is also used for irrigation within its own watershed, in the Truckee Division of the Newlands Project, near Fernley (TRA:10).

Beyond Derby Dam, the river turns north and enters the Pyramid Lake Indian Reservation, home of the Pyramid Lake Paiute Tribe of Indians. This lower segment of the river cuts deeply into alluvial valley soils, and alternating channel erosion and sedimentation are evident. As the river enters Pyramid Lake, about fifty miles northeast of Lake Tahoe, sediment deposition—in combination with reduced river flows and a consequent drop in Pyramid Lake—has created a delta that can impede upstream passage of migratory fish.

Pyramid Lake is a remnant of ancient Lake Lahontan, which once inundated the arid valleys of western Nevada (including the Lahontan Valley, an important feature of the Carson system, discussed below). Created by giant glaciers, ancient Lake Lahontan reached its last high water mark (4380 feet elevation) around 13,000 years ago. It began to alternately recede and advance as the climate became more arid, finally leaving many smaller lakes at the ends of the remaining river systems. The deepest basin in the region remained as a lake, which we know today as Pyramid Lake.

Pyramid is a terminal lake or “sink”, meaning it occupies a topographic depression, and water leaves it only by evaporation. The lake evaporates approximately four feet per year, or roughly 440,000 acre-

Figures 1-4 through 1-7 color figures **(NOT AVAILABLE)**

feet. With the advent of the Newlands Project, a steep decline in the level of Pyramid Lake began around 1910, as shown in Figure 1-8 (this corresponds with a loss of about 20,000 acres in lake surface area). It stands today (as of March 1997) at about 3808 feet in elevation, roughly fifty feet below its level at the time it was discovered in 1844 by John C. Fremont and Kit Carson (TRA:22-24). The effects of this decline on native fish and Native Americans are discussed below.

Because the Truckee River has no outlet from Pyramid Lake, in wetter years prior to diversion its excess water would overflow into a trough to the east, creating another large lake, Winnemucca. At its highest historical level, Winnemucca Lake was once about 85 feet deep, and about 25 miles long and 3.5 miles wide. Its greatest volume was about 3.6 million acre-feet of water, as compared to Pyramid Lake's 26 million acre-feet. As the flow of the Truckee diminished following completion of the Newlands Project, the overflow to Winnemucca was eliminated. The lake became permanently dry by 1939 and is today a dry alkali lake.

The Bureau of Reclamation comments "Diversions from the Truckee River are not totally responsible for Winnemucca Lake becoming a dry lake. A 1987 thesis by Wendy Milne from the Colorado School of Mines (*A Comparison of Reconstructed lake Level Records Since the Mid-1800's of Some Great Basin Lakes*) shows that Winnemucca Lake would have desiccated in 1949-52, 1961-67, and 1979-82 under pristine conditions; i.e., even if the Newlands Project had never diverted water out of the Truckee River. . .it should also be mentioned that Winnemucca Lake had dried up several times before the Newlands Project began diverting water out of the Truckee River."

Figure 1-9 shows average annual streamflow at selected locations. Most of the runoff in the watershed is generated in the upper elevations in California, where precipitation is greatest. On average, the potential Pyramid Lake inflow for 1910-1966 was 508,500 acre-feet. Annual diversions from the Truckee River to the Newlands Project for that period averaged 230,000 acre-feet, approximately 45% of the Truckee River flow. For the 1967-1995 period, when various OCAP imposed diversion limitations, the potential Pyramid Lake inflow was 602,900 acre-feet and average annual diversions to the Newlands Project averaged 181,800 acre-feet, about 30 percent of the Truckee River flow. Under the 1988 OCAP now in place, annual diversions from the Truckee River are calculated to average 109,100 acre-feet, less than 20% of the Truckee River flow.

Figure 1-8
HISTORICAL PYRAMID LAKE LEVELS

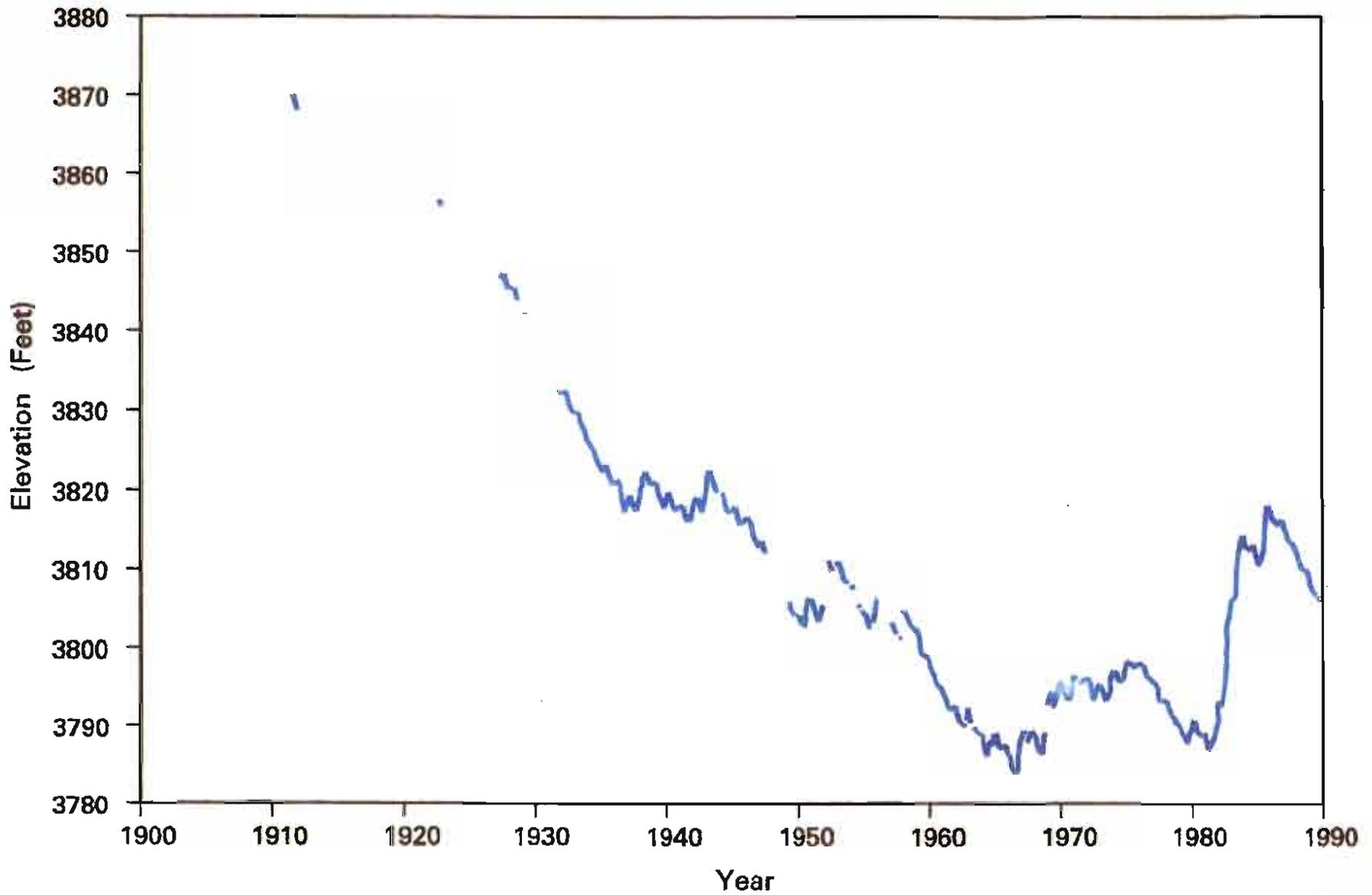
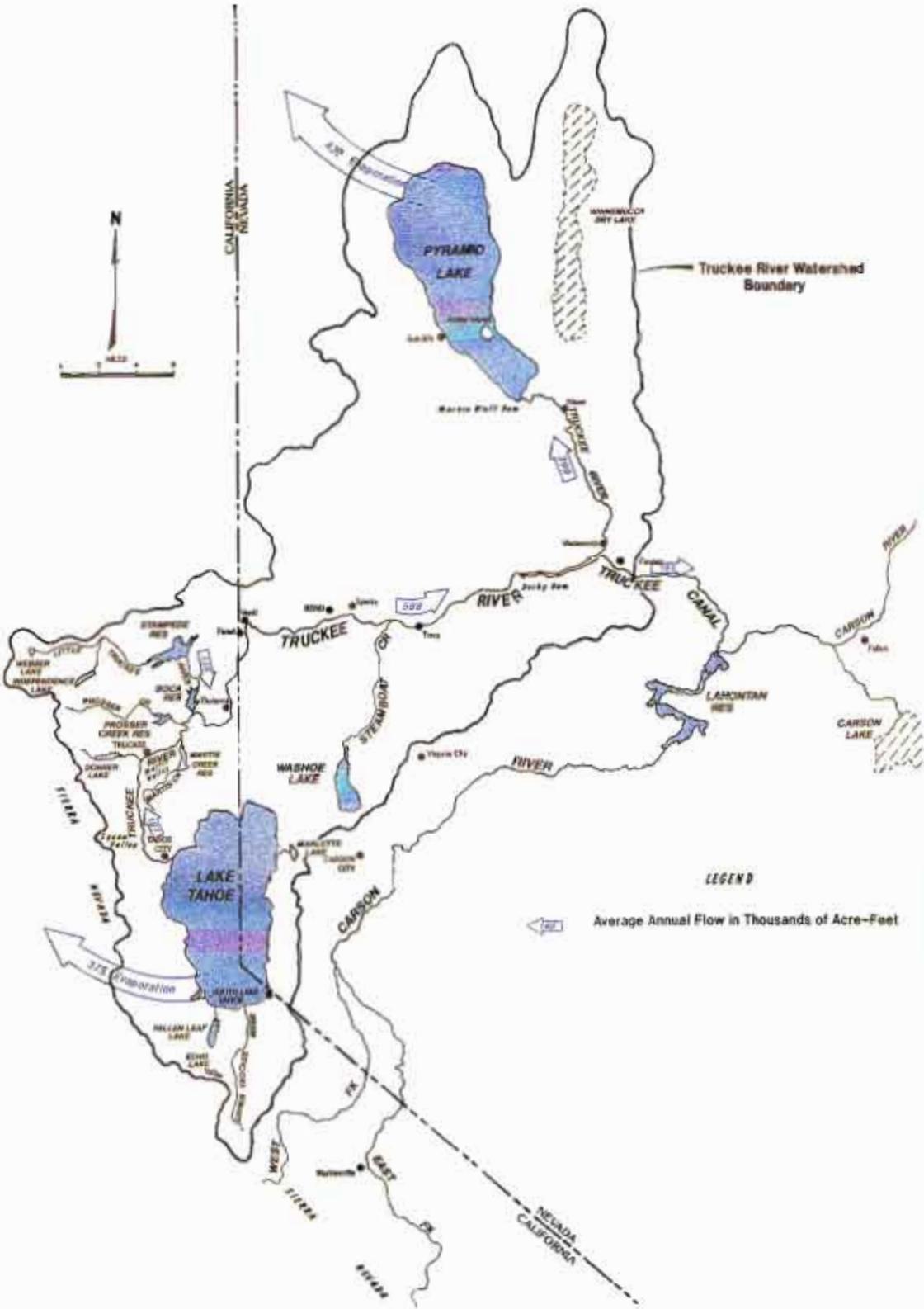


Figure 1-9
 AVERAGE ANNUAL STREAMFLOWS AT SELECTED LOCATIONS



The Truckee River's greatest historical annual flow at stateline (Farad gage) was 1,769,000 acre-feet in 1983; the lowest was 133,200 acre-feet in 1931. The greatest flood of record at Reno was in December 1955, when peak flow reached 20,800 cfs. Flood damage occurs when flows in the Truckee Meadows area exceed about 6,000 cfs (TRA:34).

Carson River.—The Carson River also originates in the Sierra Nevada in California and flows eastward to drain into the marshes of the Stillwater National Wildlife Refuge and eventually into the Carson Sink, where any remaining surface water evaporates. Figures 1-10 through 1-12 show watershed detail and elevations. The 184-mile long Carson River drains an area comparable to the Truckee, about 3,966 square miles, of which 85% lies in Nevada, the remainder in California. Although it is a relatively small river, it is an important water source in arid western Nevada (CRA:1).

In the upper watershed, the Carson River is divided into two parts—the East and West forks—both of which arise in the Sierras. A characteristic shared by both forks at their higher elevations is their steep gradients, as shown in Figure 1-13. Another shared characteristic is the number of small lakes at the higher elevations (Figure 1-14; see *Carson River Atlas* for a detailed discussion). Some are small natural lakes which have been converted to reservoirs by construction of small dams at their outlets. Some are reservoirs that were originally constructed to serve water for agricultural purposes such as raising alfalfa and irrigating pasture for livestock, a use which they still serve with few exceptions. There are no large reservoirs in the upper watershed (CRA:5, 17).

Construction of most of the high alpine reservoirs began around the turn of the century. Many of the reservoir sites were acquired and developed under the auspices of the Alpine Company (later known as the Alpine Land and Reservoir Company), formed by a group of farmers in the Carson Valley who sought to conserve spring runoff for summer irrigation

The West Fork, the smaller of the two, flows northeast from Markleeville into Diamond Valley just before stateline. Diamond Valley is the only agricultural area of any size in the upper watershed. The East Fork originates further south, near Sonora Pass and flows through the Carson-Iceberg Wilderness. The highest elevations of the East Fork contain several small alpine lakes used for storage. Important tributaries include Silver King, Silver, and Wolf creeks. It crosses into Nevada just above its confluence with Bryant Creek, which drains the Leviathan Mine area

Figures 1-8 through 1-9 color figures **(NOT AVAILABLE)**

bringing water quality concerns. Several small tributaries of the East Fork in this vicinity are fed by hot springs (CRA:7).

The East and West forks leave the mountainous terrain of the Sierras as they join downstream of stateline, near Genoa, about in the middle of the broad Carson Valley. Though largely agricultural, suburban development is increasing in the Minden/Gardnerville area. The river skirts Eagle Valley, where Carson City is located, and turns east to traverse a narrow canyon and issue into a small valley by Dayton. In this vicinity, drainage from the Comstock silver mine brings additional water quality problems (mercury contamination), and the river in this reach is a Superfund site (CRA:9)

The Carson River then empties into Lahontan Reservoir (average inflow into the Reservoir from the Carson is 261,350 acre-feet/year). The Lahontan Reservoir is the principle Carson River storage feature of the Newlands Project (Lake Tahoe, in the Truckee River watershed, actually has the larger storage capacity for Newlands Project use). Completed by the Bureau of Reclamation in 1915, the facility has a capacity of 295,500 acre-feet (316,900 acre-feet with flashboards installed) and impounds the entire flow of the Carson River plus water diverted from the Truckee via the Truckee Canal. A 1.92 MW hydropower plant is located immediately downstream (CRA:11).

The Carson Division of the Newlands Project is larger than the Truckee Division, and irrigates lands in the Lahontan Valley. Water released from the Lahontan Dam travels about five miles down the old river channel before reaching Carson Diversion Dam, a 23-foot concrete dam that diverts water into the two main canals. The "T Canal" and "V Canal" carry the water into an extensive network of canals and laterals. Once in the distribution system, the water can be regulated at several other small facilities including Coleman and Sagouspe diversion dams and Sheckler, S-Line and Harmon reservoirs. The system is operated by TCID, which has an operation and maintenance contract Reclamation for the Newlands Project. TCID has constructed a small hydropower plant 12, 28) on the V Canal (CRA:12,28).

The facilities also include a deep agricultural drainage system, constructed to combat the twin problems of saline and/or alkaline soils and a locally high ground water table (CRA:29). Groundwater levels rose to near the ground surface in parts of the project area after construction, due to applied irrigation water and canal seepage,

Figures 1-10 through 1-14 color figures **(NOT AVAILABLE)**

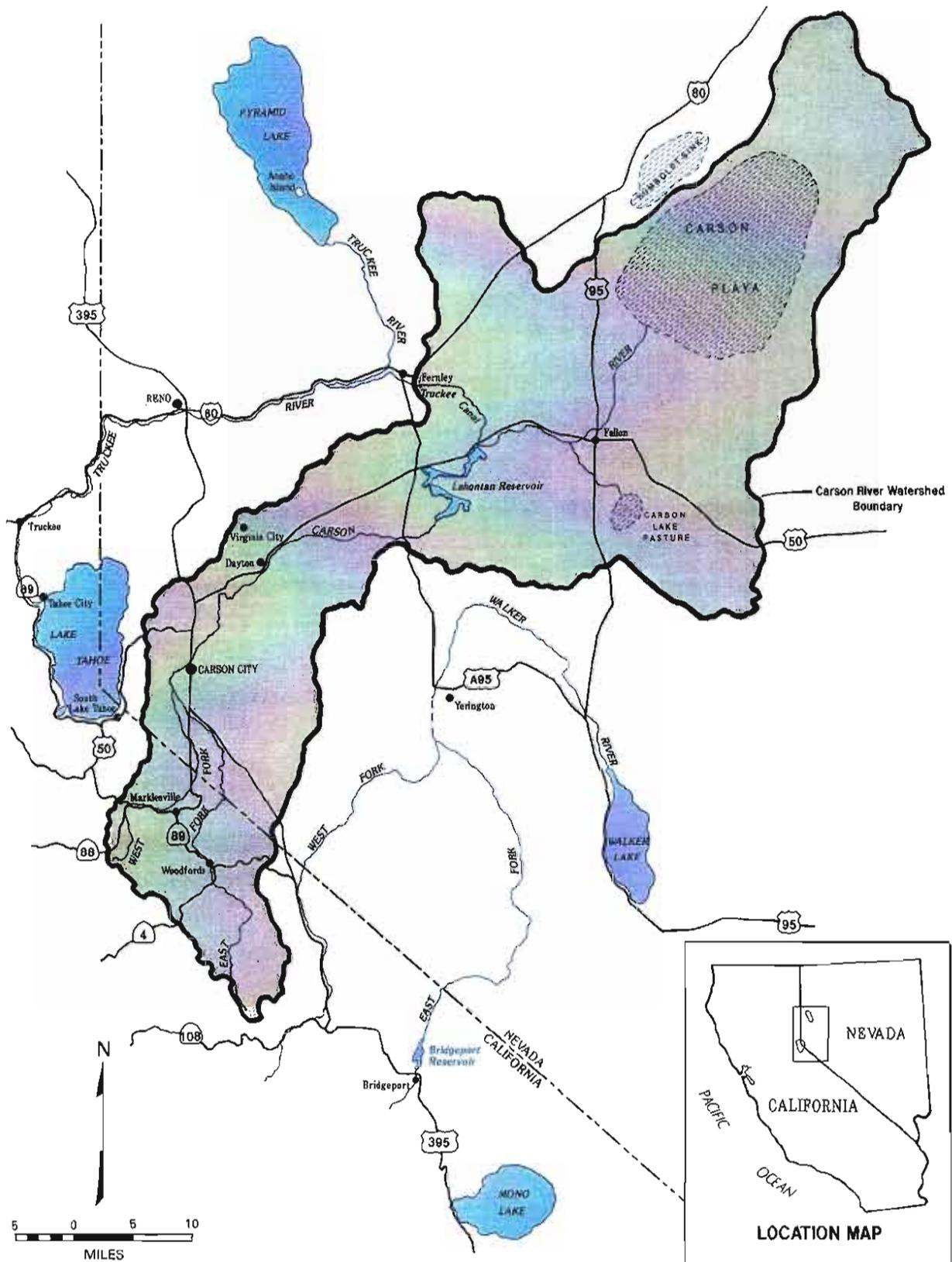
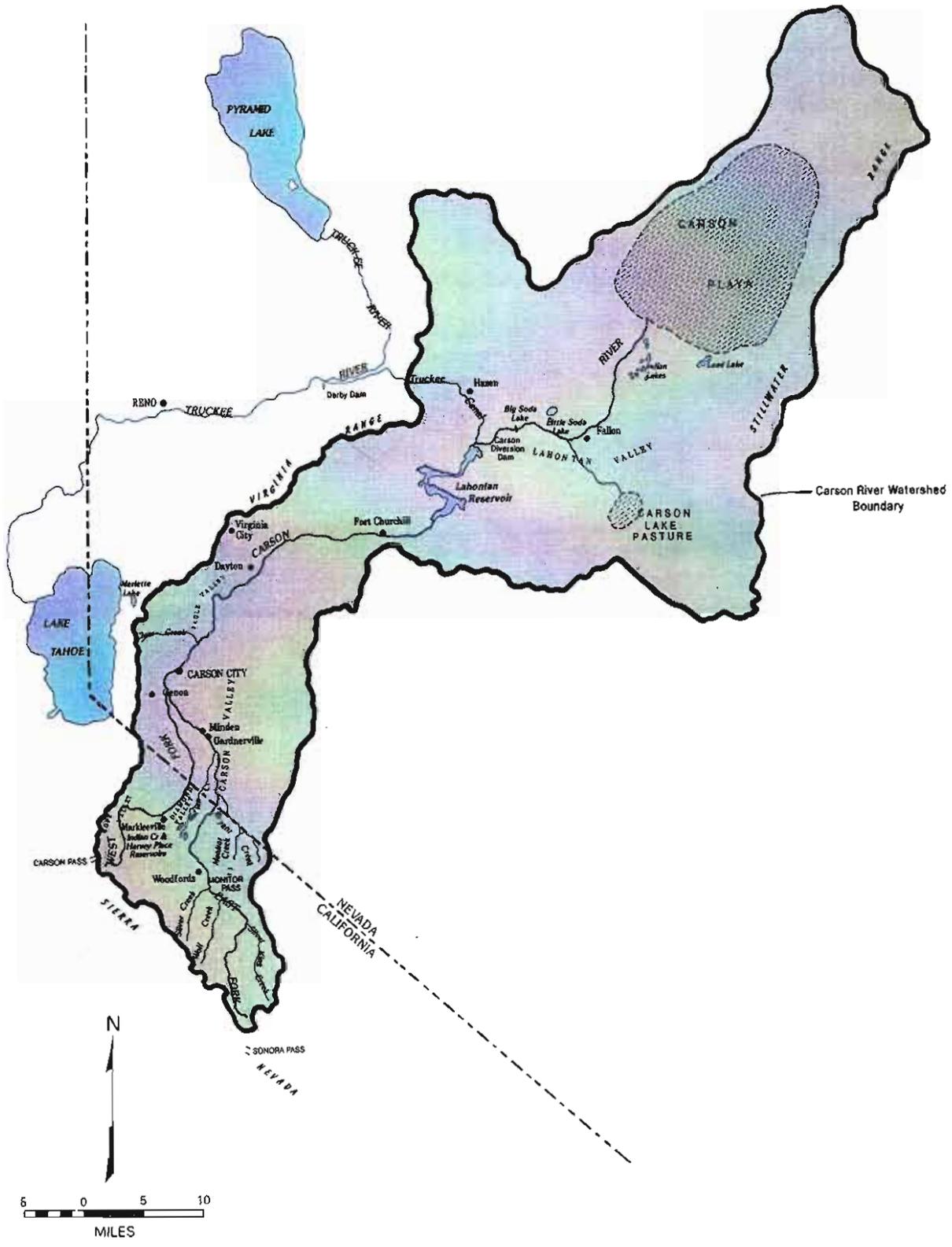


Figure 1-10
 LOCATION OF THE CARSON RIVER WATERSHED AND VICINITY



THE CARSON RIVER WATERSHED
Figure 1-11

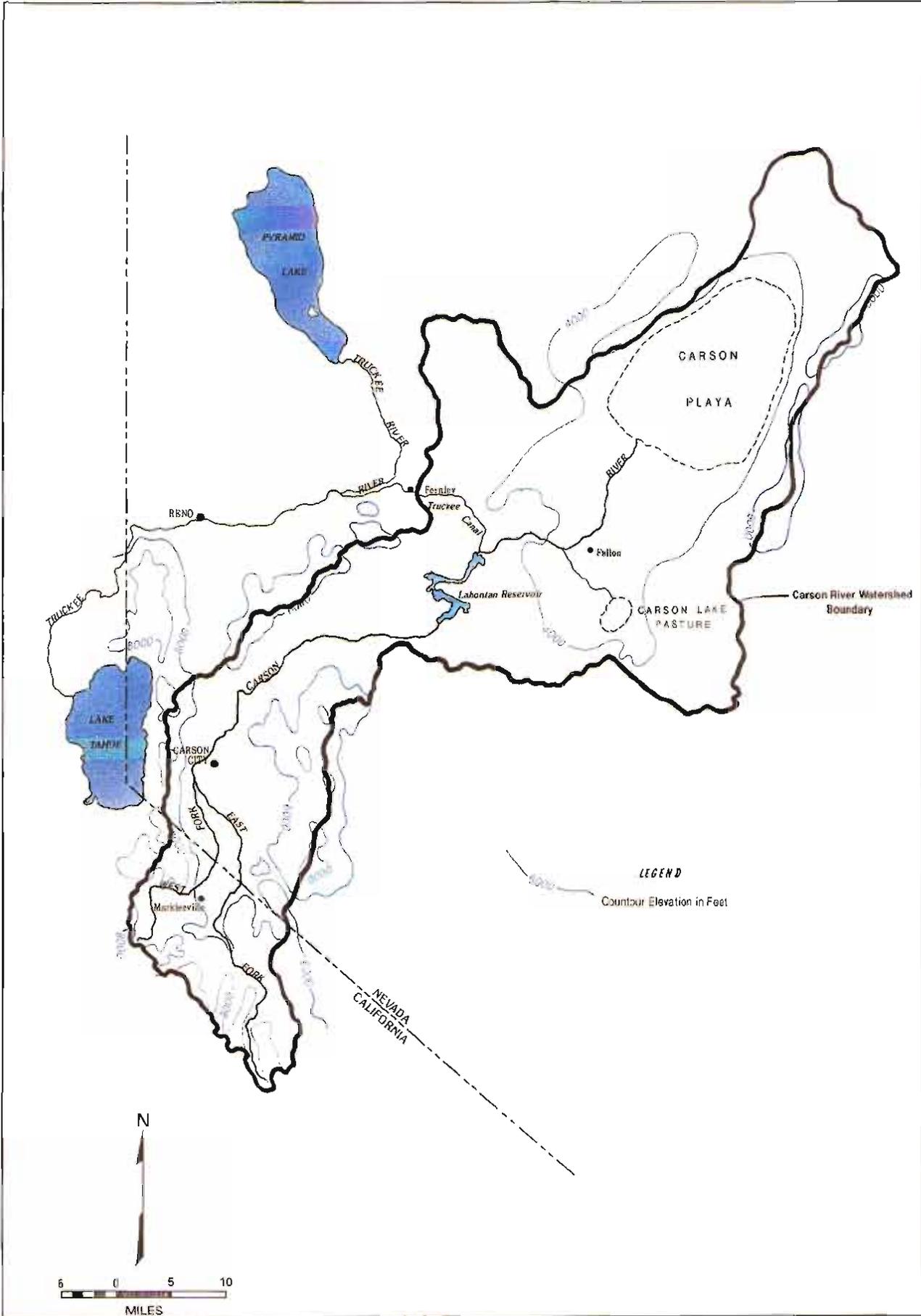
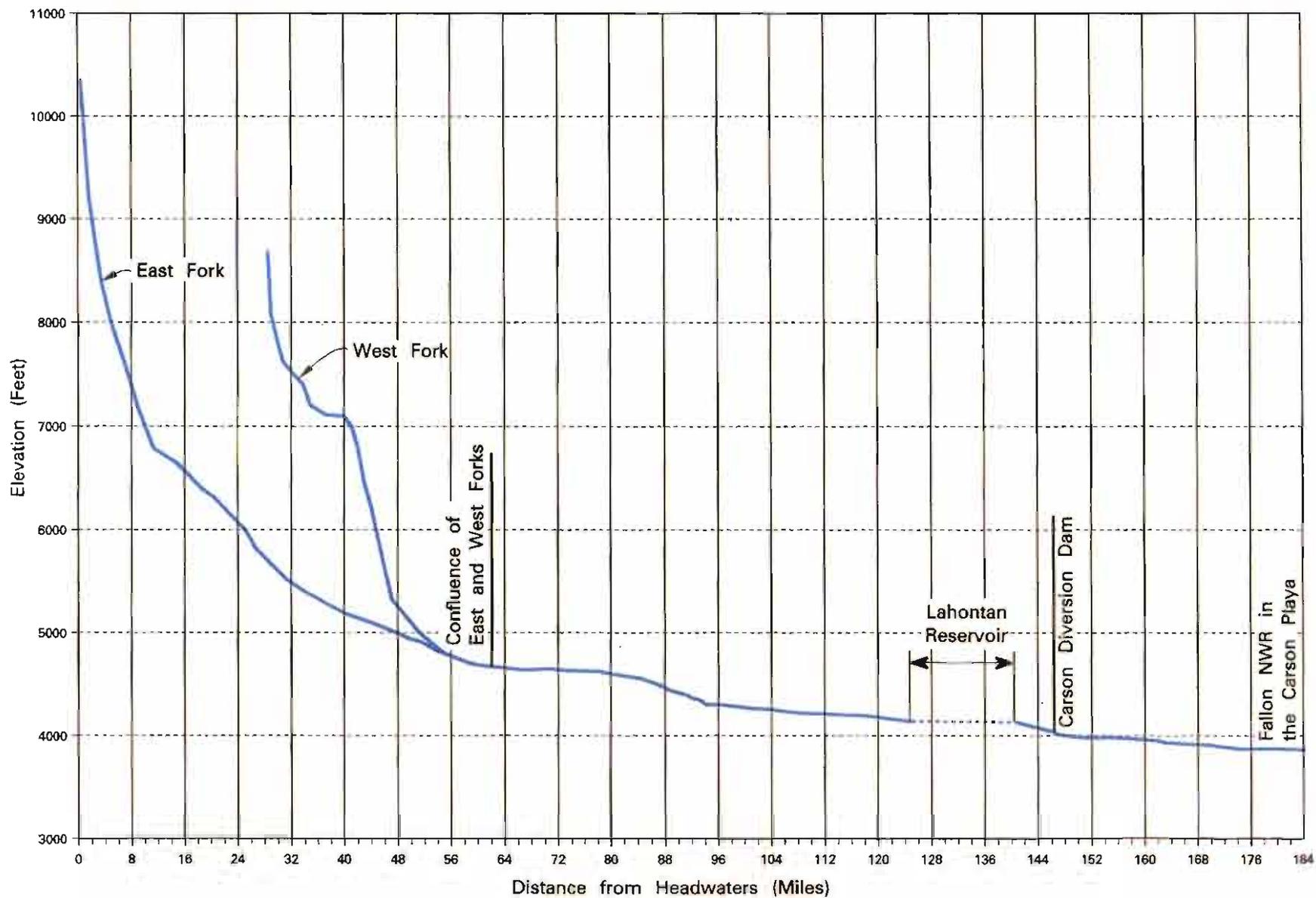


Figure 1-12
CONTOURS OF ELEVATION

Figure 1-13
LONGITUDINAL PROFILE OF THE CARSON RIVER



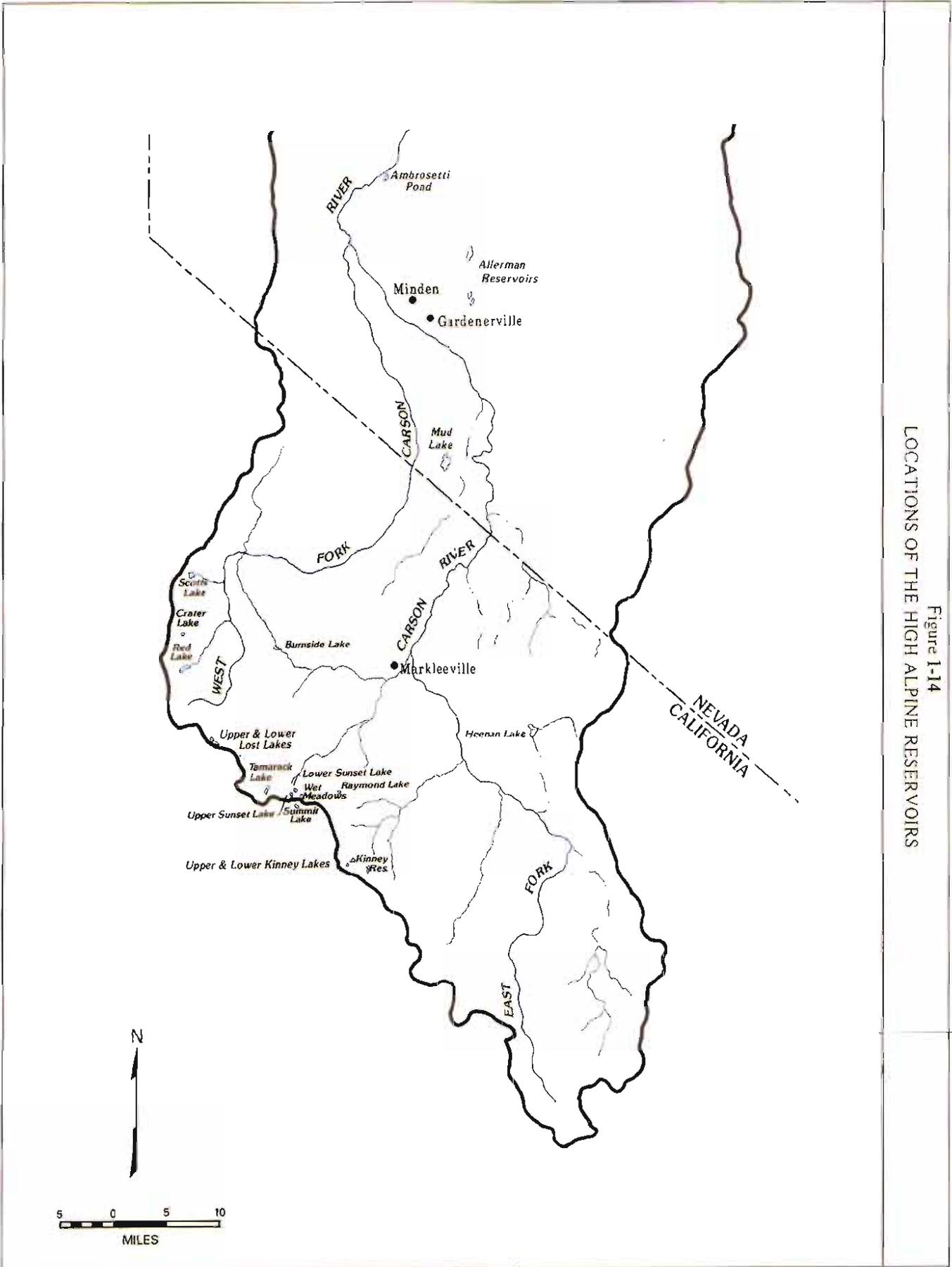


Figure 1-14
 LOCATIONS OF THE HIGH ALPINE RESERVOIRS

eventually creating perched water tables in some locations. Much of the Project's drain water has supplied the downstream Stillwater marshes, creating water quality concerns on the one hand and a potential conflict with mandated efficiency improvements on the other (both discussed further below).

Construction of the irrigation works in the Fallon area has led to agricultural and municipal development over much of the former desert land. Although it is generally said that the river terminates in the "Carson Sink", there are today several individual sinks within the larger closed drainage basin (Figure 1-15). One channel of the river turns northward near Fallon, leading to the playa lake called "Carson Sink" by many. Water now reaches this extreme northeastern portion of the basin only in the wettest years. Another channel turns south toward another important sink known as "Carson Lake and Pasture" (CRA:12-13). There are several other lakes or collections of ponds in the basin, including Indian Lakes, the lakes in the Stillwater area, and Soda Lakes. These are described in more detail in the *Carson River Atlas* (1991, Chapter 2).

Following convention established in the *Carson River Atlas*, the term "Carson Sink" is used in this report in its broadest possible sense to refer to the closed drainage basin below Lahontan Reservoir, which contains a number of individual sinks. The alkali flats in the extreme northeastern portion of the basin are designated "Carson Playa", and include the area called "Big Water."

Historically, waters of the Carson River spread out over a broad region to the east of the present-day Fallon, creating a series of lakes and marsh areas, some ephemeral and some permanent. The Lahontan Valley wetlands formed in these sinks created high-value waterfowl and shorebird habitat. The Stillwater area, discussed below, is a remnant of these wetlands.

Settlement and agriculture have altered the flow patterns and volume of water reaching the remaining wetlands in the sink. In wet years when floodwaters exceed the needs of agricultural users, excess flows primarily have reached Carson Lake and Pasture and the Stillwater; floodwaters seldom reach the alkali flats of Carson Playa. Proposals to purchase and transfer water rights to the wetlands are a major feature of the negotiated settlement in the Truckee-Carson basins, and are discussed in detail below.

A detailed hydrology of Stillwater itself has not been undertaken. There are 23 wetland management units (ponds and small lakes) in the present Stillwater National Wildlife Refuge. While each of these is more or less self-

contained, they are connected by a variety of dikes, canals and headgates for water management. As water is added to the system, new units are opened and, if needed, water conveyance facilities are created to get water where it is wanted. The efficiency of these conveyance facilities is not much of an issue—water is moving from wetland to wetland. “Big Water” at the downstream end of the Stillwater is used as a “sump”—water reaching the far end of the system at Big Water quickly evaporates, dries, and the salts blow away.¹

The size of the main feed canals limits the amount of water that can be brought into the refuge at any one time. It is estimated that it would cost \$3 million to enlarge the canals; this may be needed if the water rights purchase program succeeds (or if the refuge is to take spill water now going to Carson Sink).²

Figure 1-16 shows average annual streamflow at selected locations. Most of the runoff in the watershed is generated in the upper elevations in California, where precipitation is greatest. The Carson River’s greatest historical annual flow at the confluence of the East and West Forks was 796,000 acre-feet in 1967; the lowest was 42,320 acre-feet in 1977. During the historic 1928-34 drought, Lahontan Reservoir operated at a very low capacity and was essentially dry during 4 of the 7 years. The Carson River near Fort Churchill has gone dry on a number of occasions because upstream diversions take all of the river’s flow during dry years (CRA:42).

At the opposite extreme, the greatest floods are estimated at about 30,000 cfs (at Carson City) during 1955. Since the upper watershed is not regulated to provide flood control, large peak flows occur downstream. The developed areas along the Sierra front, particularly the suburban areas around Minden and Gardnerville are particularly at risk.

Groundwater Hydrology and Use

Geohydrology.—Groundwater resources occur throughout the Truckee and Carson River basins. Estimates of total groundwater recharge and discharge are available for most of the individual valleys in these two river basins from a series of reconnaissance studies performed in the

Figures 1-15 through 1-16 color figures **(NOT AVAILABLE)**

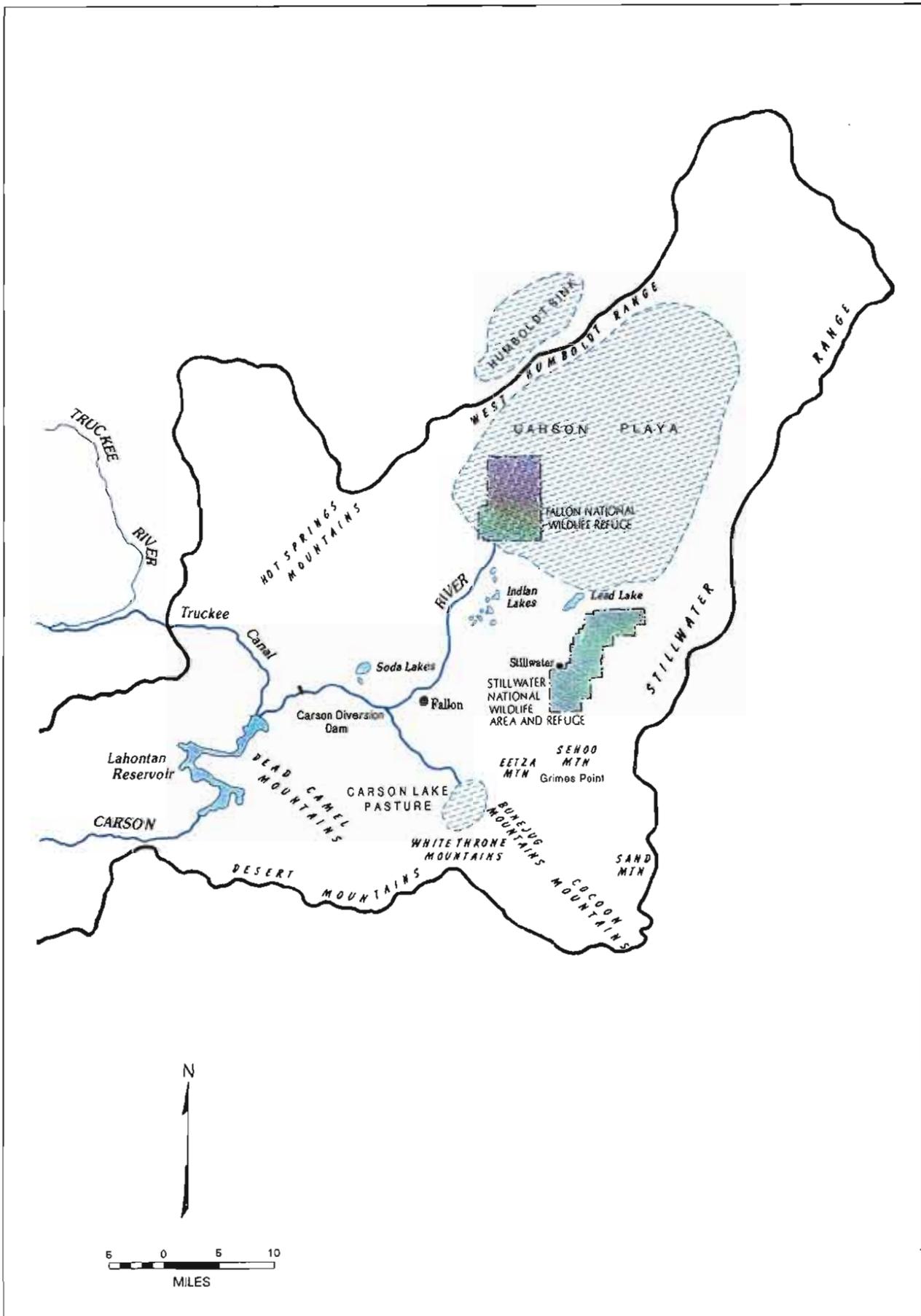


Figure 1-15
FEATURES OF THE CARSON SINK

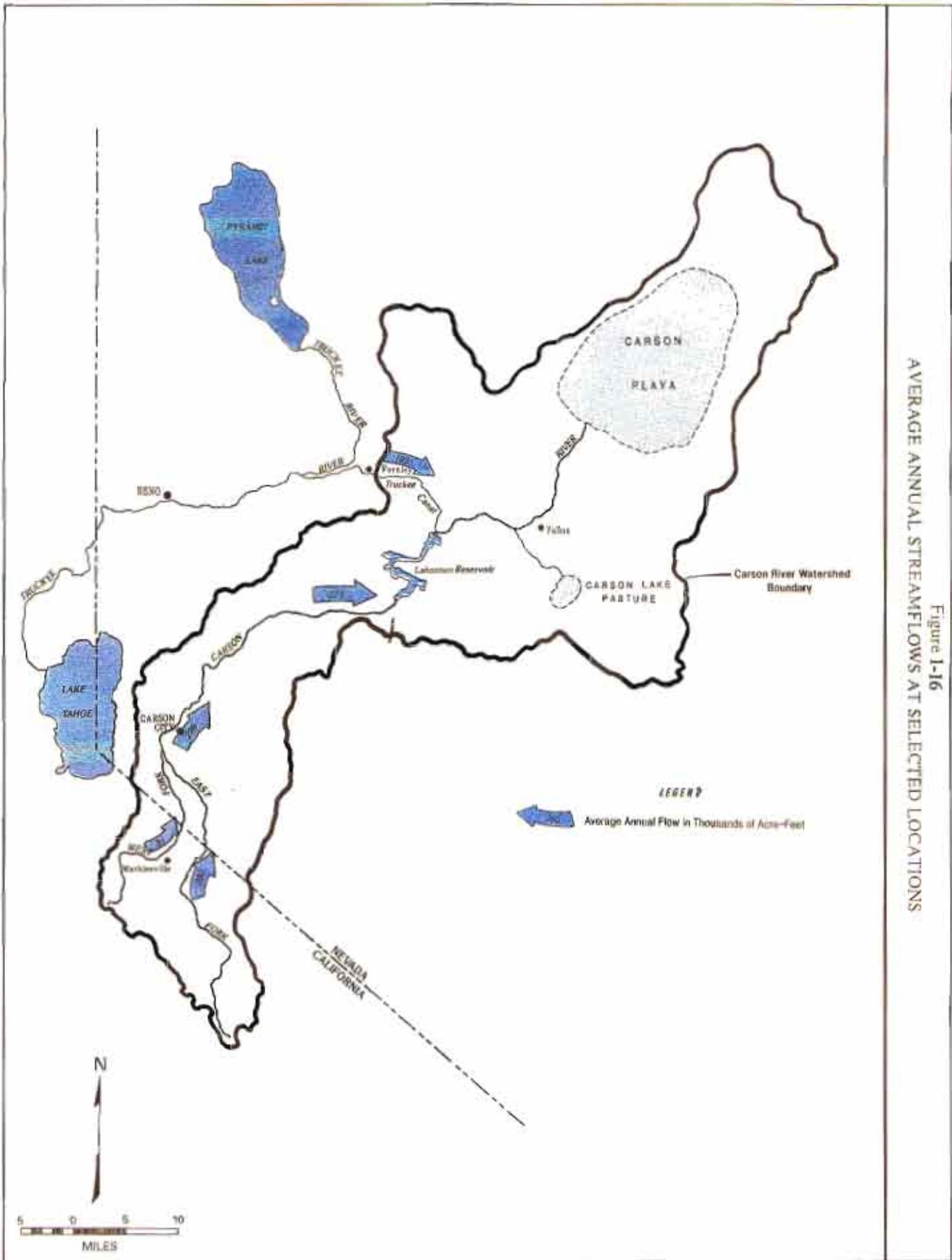


Figure 1-16
 AVERAGE ANNUAL STREAMFLOWS AT SELECTED LOCATIONS

1960s and 1970s by the U.S. Geological Survey in cooperation with the Nevada Department of Conservation and Natural Resources. However, detailed quantitative knowledge of the availability and quality of the groundwater resources ranges from well documented in some of the valleys where the groundwater is a significant source for irrigation and domestic supplies to little known or uncertain in undeveloped valleys that have not been studied other than to a reconnaissance level.

The principal source of groundwater recharge to the valleys of the two river basins is from precipitation as rain and snow in the higher altitudes of the bordering mountain ranges, principally in the headwaters valleys along the east slope of the Sierra Nevada. Locally, infiltration of ephemeral stream flows down alluvial fans, from both surface water and groundwater irrigation and irrigation by treated sewage effluent on the valley floors, and recharge from the rivers (from both by natural infiltration losses and induced by pumping adjacent alluvial aquifers) may be important secondary sources of groundwater recharge.

Groundwater is discharged from the valleys of the two river basins by evapotranspiration of native phreatophytic plants and irrigated crops, domestic and municipal pumpage, inflow into gaining reaches of some river segments, and minor underflow to adjacent down-gradient valleys. The principal production aquifers in the valleys are in thick permeable alluvial deposits under valley floors. Where fractured or consisting of more permeable volcanic rocks, bedrock aquifers in the mountains forming the valley boundaries may be used locally for domestic, irrigation or small public water system supplies. However, water yields from the localized bedrock aquifers are usually much lower than from the alluvial deposits in the valley fills.

The only significant development of groundwater from a consolidated bedrock aquifer in the two river basins is from a very permeable basaltic stock in the Carson Desert near Fallon at the terminus of the Carson River basin. The volcanic aquifer at Fallon may be conceptualized as a mushroom-shaped island intruded from an unknown depth upwards through the surrounding alluvial deposits to outcrop at Rattlesnake Hill northwest of Fallon. The basalt is composed of dense massive layers separated by very permeable cinder zones which yield as much as 1,000 gallons per minute to wells. The entire basalt stock is highly transmissive.

Generally the individual valleys of the two river basins act as closed systems with respect to groundwater flow. Most groundwater discharge is internal

within the valleys, or where the valleys are connected by the channels of the two rivers, discharge to the river near the downstream end of the valley. Small amounts of groundwater underflow may occur to down gradient adjacent valleys. A general regional groundwater gradient exists in an easterly direction that follows the river drainages from the headwaters in the Sierra Nevada to the terminus of the Truckee River in Pyramid Lake Valley and the Carson River in the sink of the Carson Desert. Minor subsurface recharge to and discharge from adjacent valleys occurs along this regional gradient.

The general hydrology of the aquifers of the Newlands Project is known and has been summarized in two recent USGS reports (Seiler and Allander, 1993; Maurer and others, 1994). The principal source of recharge to the shallow alluvial aquifer is infiltration of irrigation on the Newlands Project west and northwest of Fallon and to a lesser extent episodic flood flows in the lower Carson River. West of Fallon, the intermediate aquifer is in turn recharged by the shallow system. The basalt aquifer receives its recharge from surrounding shallow and intermediate alluvial aquifers. The general direction of groundwater flow is from recharge areas west and north of Fallon east and northeast towards discharge areas is and near the Stillwater and Fallon wildlife wetlands and the Carson Sink. In these discharge areas, the intermediate and shallow aquifers discharge upward to the irrigation drains, wetlands areas, and to evapotranspiration by native plants and farm crops and evaporation from the desert soils. Deeper geothermal waters also discharge upward through the intermediate and shallow aquifers in the Stillwater area (Olmstead and others, 1984), adding to the loading of evaporative salt residues to the surficial soils and drains.

Groundwater Development and Use.—The largest areas of groundwater use in the Truckee River Basin are in the Truckee Meadows in Nevada. In the California portion of the basin, the only potentially large groundwater resource is in the alluvial deposits of Martis Valley near Truckee (TRA:34). However, some communities in the Lake Tahoe Basin also pump groundwater from localized fractured bedrock and alluvial deposits.

In the Truckee Meadows, the valley containing the largest portion of the Reno-Sparks urban area, municipal water purveyors operate high-capacity production wells. Sierra Pacific Power Company, the largest water utility in the valley, holds rights to about 48,000 acre-feet per year of groundwater. However, the Nevada State Engineer has restricted groundwater extractions to about 15,000 acre-feet per year. Other valleys in the Truckee River

system pumping groundwater for domestic and smaller municipal systems include the so-called 'north valleys' (Lemmon, Cold Springs, Warm Springs, Spanish Springs, and Sun valleys) north of the Truckee Meadows, the Truckee Canyon and Dodge Flat areas of the lower Truckee River basin, and the Fernley Area adjacent to the Truckee Canal that diverts water from the Truckee to the Carson River's Lahontan Reservoir.

Urban growth in the Reno-Sparks metropolitan and suburban areas has strained the existing sources of both surface-water and groundwater supplies.³ The Silver State Project, proposed in a report prepared for Washoe County, would have constructed a pipeline as far north as the Oregon border to import groundwater from valleys along the California-Nevada border into the Reno-Sparks area for municipal supply. Since some of the target valleys extended into California, the project received strong opposition from several northeastern California counties. The California Department of Water Resources assisted these counties in forming groundwater management districts to provide a framework for possible regulation of withdrawals in the California portions of these valleys.

Although the Silver State Project never materialized, one of the proposed components, export of ground water from the Nevada Portion of Honey Lake Valley, located along the state line about 50 miles northwest of Reno, was pursued by Washoe County and a private concern (Western Water Development Company, Inc.) through the Truckee Meadows Project. A large ranch in the basin was purchased and water rights were secured with the intent to import water from Honey Lake.⁴ The rights were found to be in the public interest by the Nevada Supreme Court.⁵ The court relied primarily on a finding by the Nevada State Engineer that there was no evidence that pumping groundwater would result in an impairment of other water rights.

Work on this project was halted when the Environmental Impact Statement on the pipeline from Honey Lake Valley was suspended in April, 1994, by the Secretary of Interior pending resolution of three issues by Washoe County: potential effect of the project on efforts by the Army to remediate groundwater contamination at the Sierra Army Depot in Honey Lake Valley, an Indian Trust issue related to potential capture of regional groundwater underflow to the Pyramid Lake Indian Reservation, and technical concerns about groundwater modeling done for the draft EIS. The Nevada State Engineer placed a moratorium on all appropriations and transfers on Nevada lands in the basin pending the completion of studies on the basin's characteristics and water reserves.⁶

The largest groundwater resource in the Carson River Basin is comprised of the valley-fill aquifers of Carson Valley in Nevada. Currently most pumpage is for supplemental irrigation during periods of deficient river flow and for municipal supplies in the Minden-Gardnerville area. Ground water is also used as a source of domestic and municipal supply in Carson City (Eagle Valley, Dayton (Dayton Valley), Silver Springs (Churchill Valley), and Fallon (Carson Desert). An issue in the upper Carson River Basin (Carson, Eagle, Dayton, Churchill Valleys) is whether or not provisions of the Alpine Ditch Decree will allow transfer of ground-and surface-water irrigation rights to storage in Lahontan Reservoir for use for maintenance of wetland wildlife habitat by the U.S. Fish and Wildlife Service at the Stillwater refuge in the Carson Desert. Resolution of this issue is complicated by both water-management requirements of the Alpine Decree and complex groundwater/surface-water interactions in the irrigated areas of Carson Valley. Although a steady-state mathematical model of the Carson Valley groundwater reservoirs and their interaction with the Carson River is available⁷ the spatial resolution and time steps of this model are currently insufficient to assess all the potential legal and water-management issues related to water-rights transfers from Carson Valley to Lahontan Reservoir. In order to more quantitatively address the potential effects of changes in land use and groundwater pumpage in Carson Valley on Carson River flows, linkage of the existing groundwater model would need to be provided to a river management/flow model under development by the USGS⁸ or a water-rights model under development by the Carson Water Subconservancy District Regionally, in order to fully address such issues through the rapidly developing Upper Carson River Basin, the existing groundwater model needs to be combined with a model of the Eagle Valley aquifers⁹ and extended regionally to include Dayton and Churchill Valleys.

Groundwater Recharge.—A major groundwater issue in the lower Carson River Basin revolves around potential effects on groundwater recharge in the Fallon area of the Carson Desert(also known as the Lahontan Valley) from transfer of Newlands Project irrigation water rights(surface waters from the Carson River and Truckee Canal Diversions from the Truckee River, both stored in Lahontan Reservoir) to the Stillwater wetlands. This would be achieved by a federal buyout of water rights and lands from willing sellers in the Newlands Project. Currently, municipal water for the City of Fallon, the Fallon Naval Air Station, and the Fallon Paiute-Shoshone Indian Tribe is pumped from a volcanic bedrock aquifer near Fallon. The source of water for about 4,000 wells serving the farms and rapidly expanding suburban population of Churchill County outside of the Fallon service area is

groundwater from a very shallow (less than 50 feet) aquifer system, which is recharged by infiltration of Newlands Project irrigation water. Also present in the area around Fallon is an intermediate depth alluvial aquifer that is being increasingly tapped (currently about 1,000 wells) by new suburban homes and businesses in Churchill County.

Groundwater Quality.—The quality of ground water in the three main aquifers in the Fallon/Newlands area of Churchill County is highly variable. The shallowest surficial aquifers contain generally potable water currently recharged by the Newlands Project irrigation system of canals and ditches from Lahontan Reservoir. However, this shallow ground water may locally have levels of dissolved solids, arsenic, boron, and other salts derived from the desert soils that exceed drinking water standards and criteria. The deeper (50 to over 500 feet) intermediate aquifer also generally has potable water but locally may be affected by hydrogen sulfide from organic matter deposited during various stands of the Pleistocene Lake Lahontan that covered much of northwestern Nevada about 10,000 years ago.

In groundwater discharge areas in north, east, and southeast of Fallon, dissolved solids, arsenic and other salts may also be a problem in the intermediate aquifers. Water levels in the volcanic aquifer at Fallon have been declining in recent years because of increased pumpage. Concomitantly, concentrations of chlorides and arsenic have been increasing. Although the salinity of the water currently is well below drinking water standards, the increasing trend is of concern as the exact cause—infiltration of poor quality water from surrounding alluvium or induction of saline water present at depth in the basalt—is not known. Arsenic levels in the basalt aquifer already approach or exceed current drinking water standards, requiring some blending with water from other sources to meet standards for public consumption.

Groundwater quality in the shallow and intermediate aquifers in the current recharge areas west and north of Fallon, although variable, is generally acceptable for domestic and municipal uses. Water quality decreases as the flow becomes upward through the desert soils and saline alluvial sediments east of Fallon. The permeability of the alluvial aquifers also decreases along the west to east flow lines, as the sediments grade from relatively coarse deposits of old Carson River deltas and Lahontan shorelines to the fine-grained lacustrine sediments deposited in Lake Lahontan beds east of Fallon. For these reasons, it has been difficult to obtain significant groundwater supplies of acceptable quality east of Fallon in the Stillwater

area. For example, the Fallon Indian Reservation ended up piping water over 6 miles from a well in the basalt aquifer to the reservation in order to obtain a reliable potable water supply.

1.2 Water Quality

In several areas, impaired water quality limits the beneficial uses of surface or ground water. In the upper Carson basin, water quality constraints are primarily associated with former mining areas, including the Leviathan Mine and Monitor-Mogul mining district. There are also localized water quality constraints caused by elevated mineral levels associated with thermal waters. Mining impacts are again evident on the mainstem Carson River near Dayton, where elevated mercury levels are residual from the Comstock mines. Mercury from the Comstock is found in the remainder of the river downstream, including sediments in Lahontan Reservoir and the Carson Sink (CRA:46-47). Any activity which disturbs the sediments could potentially release the trapped mercury and create toxic contamination.

The Carson Sink area has additional water quality constraints on both surface and ground water. Surface water quality is affected by the concentration of minerals by evaporation and by agricultural drain water. Some of this drain water carries elevated levels of metals such as arsenic, that may be associated with geothermal features (Stillwater lies on the edge of a geothermal resource area). Surface water tends to become increasingly saline as it flows through the sink, reducing its value for wildlife. Ultimately, water too saline for use is disposed of in evaporation ponds (CRA:47).

Groundwater quality is a function of both the materials the water passes through and the water's residence time in those materials. Land uses in the surface water drainage area contribute minerals and chemicals to the water prior to seepage into the shallow aquifers. Metals associated with historic mining practices are known to have accumulated in the drainages and to be exhumed during floods. The desert nature of the lower areas of the drainages results in the potential to both mobilize salts by contact with imported water as well as reprecipitate these salts by evaporation of those waters. The development of "fronts" of high Total Dissolved Solid (TDS) groundwater has been reported and may be impacting the shallow aquifer water quality as well as river water where such water drains back to the rivers.

Groundwater in shallow alluvial aquifers in the Carson Sink exhibits mineralization common to geothermal zones, making it not potable in most

instances. Groundwater flowing into some of the agricultural drains may be the source of some of the contaminants reaching Stillwater. Groundwater in the deeper basalt aquifer in the valley does support municipal use in the Fallon area, although special treatment is necessary to remove arsenic. This aquifer contains elevated levels of naturally occurring arsenic, again associated with geothermal activity. Although a large volume of water is stored in Lahontan Valley, much of it is too saline or alkaline for domestic use.

The interaction between groundwater and surface water is significant to both quantity and quality in the middle and lower areas of the Truckee-Carson River Basins. Substantial study and understanding of the physical characteristics of the shallow groundwater occurrence exists, but not for the deeper aquifers. The changes in land use and distribution of surface water has impacted both the storage and the quality of water in the shallow aquifer unit. There is increasing well development of the aquifers in this area but the impacts on quantity and quality of the groundwater is uncertain.

The TJ Drain typifies the water quality problem which the Lahontan Valley wetlands have experienced with the coming of the Newlands Project. Previously-clean water supplies in the remaining wetlands has been replaced by agricultural runoff from irrigated acreage. Water from the TJ Drain flows into both the SWMA and the SNWR. Between 1987-90, water from this drain was found to contain some of the highest recorded concentrations of trace elements in drainwater sampled in the Newlands Project, including potentially toxic concentrations of trace elements, such as dissolved arsenic, boron, lithium, molybdenum, and selenium.¹⁰

The TJ Drain is being closely monitored. Recent sampling of the agricultural drain water that flows to the TJ Drain indicates that farm drainage is not likely to be the problem. The TJ Drain water quality samples that should such high dissolved solids concentrations were taken at the discharge end of the canal. The problem is that the TJ Drain intercepts highly contaminated groundwater. Over the past several years, there has not been an indication of continued toxic flows into the wetlands. This could be due, in part, to the long drought that occurred, or it could represent a more permanent change, if the leaching process that occurs during first years new lands are brought into production is nearing completion. To assure that the toxic drainage does not recur, however, the Bureau of Indian Affairs and the Fallon Tribes are proceeding to close the drain, as called for in Section 106 of P.L. 101-618.

As the efficiency of the irrigation system in the area improves through enforcement of OCAP, agricultural drainage will be reduced, with consequent

reductions in return flows to the wetlands. This may increase concentrations of trace elements and, potentially, toxics in the drain water. However, as documented in the Lahontan Valley Wetlands Water Rights Acquisition EIS, as direct service water from the project is acquired for the wetlands (see below), the total water supply to the wetlands will greatly improve in quality.

Water quality issues add a further layer of complexity to regional water management. Fisheries require adequate clean, cool water and are affected by upstream urban and agricultural activities that influence water temperature and quality. Local governments plan to dispose of a modest amount of effluent through land application, but the majority of effluent will continue to be discharged to the river in compliance with EPA discharge standards under the Clean Water Act. There had been controversy over one-time plans for large-scale land application because treated effluent would no longer be returned to the Truckee River, resulting in decreased river flows. By the terms of the 1994 Unappropriated Water Agreement, the parties agreed that whenever effluent is not returned to the river it must be substituted with fresh water specifically to maintain downstream flows, however when effluent is groundwater originated, it may be stored and used for flow augmentation at a later time.

In 1996, the Department of Interior (Interior), the cities and Washoe County concluded Water Quality Agreement to acquire additional water rights to dilute their discharges of effluent into the Truckee River. The federal government will assist in securing storage space for those rights.¹¹ Benefits are anticipated to include reduced nitrogen and phosphorus concentrations, as river water rights stored under a new water reuse program will replace the treated effluent that was previously discharged from the Truckee Meadows Water Treatment Facility.

1.3 Natural Resources

Both the Truckee and the Carson rivers flow into the arid Great Basin to form once vast marshes before disappearing into the region's granitic alluvial sands. Within this relatively short and closed system, over thousands of years, plant and animal species have evolved unique natural histories. Desert ecosystems are often characterized by low species diversity and specialized adaptations for survival in a highly variable environment. Typically, fragile ecological relationships emerge whereby even subtle changes to the system's most important physical element, the availability of water, can have a dramatic effect on its biotic dependents.

With the advent of the Newlands Project, the diversion of a large part of the Truckee's flow into the Carson and the diversion of the Carson below Lahontan dam, the effects on both river's ecosystems have been profound, particularly in their terminal lakes or sinks. The development of the Newlands project has also created a conflict between the two ecosystems which continues to the present. In the Truckee basin, fish have been endangered or gone extinct, waterbirds have been affected and one terminal lake has dried up entirely (although it would have been dry in some years in any case); in the Carson basin, wetland habitats and their dependent waterbird populations have dramatically declined.

Carson River Ecosystem

As Ancient Lake Lahontan receded, a series of shallow lakes, marshes and wet meadows formed in Lahontan Valley, a basin at the terminus of the Carson River within Churchill County in west-central Nevada. During this period, waterfowl, marsh birds, shorebirds, and other wetland-dependent wildlife used the Lahontan Valley for migratory stopovers and as wintering, foraging, and breeding grounds.

Lahontan Valley, a remnant of the ancient lake bed, is characterized by sedimentary soils with old river channel and lake deposits, sand dunes, wetlands and playas. The Stillwater Marsh, Carson Lake and Pasture, and Carson Playa are large terminal wetlands created where the Carson discharges in the valley. These terminal wetlands have supported a diversity of wildlife for at least 4,000 years. They are representative of the Great Basin wetlands ecosystem, where a continuous shrinking and swelling of wetland areas occurs, both seasonally and over geologic time. The Lahontan Valley wetlands are unique in that they are located in the second driest inland desert in North America.¹²

Wetlands once covered vast areas of Lahontan Valley, but since the early 1900s, both the quality and quantity of wetland habitat in Lahontan Valley has been reduced dramatically. Historically, the Carson River sustained an average of about 150,000 wetland acres in the Carson Lake, Stillwater, and Carson Playa marshes. But since the turn of the century, more than 82% of the wetland habitat in western Nevada has been lost.¹³

Lahontan Valley wetlands functions and values (or at least the appearance of them) are said to be quickly recovered when water is provided,¹⁴ leading to a wide range of estimates in the overall reduction of Lahontan Valley wetlands

acreage from historic conditions,¹⁵ depending on year-to-year variability in water supply. Nevertheless, it is clear that what once was the dominant landscape feature of the Lahontan Valley has been nearly eliminated. As recently as 1992, the Lahontan Valley wetlands recorded a low of fewer than 2,000 acres of wetlands habitat.¹⁶

The Lahontan Valley lies on the eastern edge of the Pacific Flyway for migrating birds. These migratory birds and their habitat are protected under treaty between the United States and Canada.¹⁷ A vital stop-over for migrant shorebirds, in 1988 it was designated as a Western Hemisphere Shorebird Reserve—one of four such sites in the United States and 17 in the entire hemisphere.

Once vast and productive, the wetlands of the Carson Sink were some of the most productive wildlife habitat in North America: 30,000 feeding white pelicans, 13,000 geese, 12,000 tundra swans, and an annual average of more than 250,000 migrant ducks (particularly northern pintail, green-winged teal, northern shoveler and up to 50% of the canvasbacks in the entire Pacific Flyway) have been counted there. At times 90% of the snow geese in Nevada were on these wetlands. In many years, up to 70% of the State's migratory waterfowl pass through and feed there. Waterbird such as black-necked stilts and American avocets nest here; there are egrets and marsh birds, including the world's largest colony of white-faced ibises. Bald eagles and other raptors often congregate there during their winter migrations. However, waterfowl use has declined by more than 40% between 1975 and 1989.¹⁸

Shallow waters and abundant food supplies are key elements that attract these large numbers of waterfowl to Lahontan Valley wetlands. Most of the waterfowl use occurs on Stillwater National Wildlife Refuge and Carson Lake and Pasture, where more than 80% of the wetland habitat has been less than 18 inches deep. Shallow waters provide quality feeding habitat.¹⁹

Lahontan Valley wetlands are not only important for migrating waterfowl, they are one of the most important duck breeding grounds in Nevada. The numerous small islands, combined with a good ratio of emergent vegetation to open water, make many of the valley wetlands highly attractive to nesting ducks. As with waterfowl use, nesting has also declined substantially over the past 25 years.²⁰

In recognition of these values, a number of attempts have been made over the years to formally recognize and preserve the lands which support these productive systems. These include:

- ! Carson Lake and Pasture
- ! Fallon National Wildlife Refuge
- ! Stillwater Wildlife Management Area
- Stillwater National Wildlife Refuge
- Winnemucca Lake National Wildlife Refuge

Of these, only two have a viable future (Carson Lake and Pasture and the Stillwater National Wildlife Refuge). All are discussed in brief below.

The Bureau of Reclamation created the Carson Lake and Pasture in about 1919 to provide a community grazing area for livestock. Revenues from rents were intended to help repay the Newlands Project costs. In 1928, TCID took over operation of the pasture and entered into an agreement with Greenhead Hunting Club to manage it for wetland development and migratory bird hunting. In the late 1970s, TCID set aside the central portion of Carson Lake as a wildlife area and dedicated more than 7,500 acres of the 22,220 acres for management of wildlife. The area not so dedicated is still used by local ranchers for grazing. In the 1980 Fleischmann Agreement between TCID and Nevada Department of Wildlife (NDOW), the two agencies agreed to jointly manage the wetlands and to create a Carson Lake Advisory Board with members representing the agencies, hunting club and grazing permittees. Under Subsection 206(e) of P.L. 101-618, the Secretary of Interior is authorized to convey Carson Lake and Pasture to the State of Nevada for use as a wildlife refuge, to be managed by NDOW as a component of the Western Hemisphere Shorebird Reserve Network.²¹ Like the SNWR, Carson Lake and Pasture has been diked into individual management units.

In 1931, 18,000 acres were set aside as Fallon National Wildlife Refuge, the first Fish & Wildlife Service refuge in the valley. Today, water remains only in the wettest years and contains salts in concentrations well beyond the tolerance of most species that used the area just a few decades before.

Four years later, in 1935, TCID approached the Bureau of Biological Survey proposing to establish a wildlife management area encompassing the Stillwater marsh areas and portions of the Carson desert. In 1948 TCID, the U.S. Fish and Wildlife Service (FWS) and the Nevada State Board of Fish and Game Commissioners (now NDOW) agreed to manage some 163,000 acres of public lands which had been withdrawn by Reclamation for the irrigation

project. The area, known as the Stillwater Wildlife Management Area (SWMA)²² is managed under a three-way, fifty-year plan that expires in November 1998. The SWMA will cease to exist on that date.

Subsection 206(b) of Public Law 101-618 created the Stillwater National Wildlife Refuge (SNWR) in 1991 as part of the overall negotiated settlement in the Truckee-Carson basins (see discussion below). Approximately 77,250 acres of public land within the original SWMA were transferred from Reclamation's jurisdiction to FWS to create the refuge. Today, the SNWR includes a variety of habitats, from freshwater sloughs and marshes to brackish-water marshes and alkali flats.²³ The refuge includes Lead Lake and Stillwater Point Reservoir.

The difficulty with all but the most recent of the agreements that established these management areas has been that the water rights necessary to sustain them were not also provided. Following Newlands Project construction, the water that reached valley wetlands consisted of excess irrigation water delivered to but not utilized by crops, water that seeped out of irrigation canals, and spills from Lahontan Reservoir. This "lost" water, referred to as drain water or return flows, plus water released for winter hydropower generation and spills, was collected by a system of drains that flowed to the Stillwater Marsh and Carson Lake and Pasture wetlands. The FWS has determined that this source offers inadequate inflow volume to meet long-term wetland objectives.²⁴

Diversion flows from the Truckee have been diminished as a result of lawsuits filed by the Pyramid Lake Paiute Tribe to protect threatened and endangered fish in the lake (see below). In 1966, a federal court directed Reclamation to develop more stringent criteria to improve the efficiency of the Newlands Project with respect to diversions from the Truckee and operations of the Project. Wetlands acreage began to diminish markedly in the late 1960s, directly after TCID halted winter diversions solely for power generation. In conjunction with the most severe and extended drought on record and the growth of other upstream uses, these factors reduced the primary wetlands to less than 6,000 acres by 1990, and as low as 845 acres in 1992.

Between 1988 and 1993, an annual average of only about 10,000 acres of primary and secondary wetlands within Lahontan Valley were sustained.²⁵ To relieve these stresses on both the Truckee and the Carson River ecosystems, wildlife interests are turning to the market to obtain rights denied by early adjudications and subsequent reallocations. Section 206 of P.L. 101-

618 authorizes and directs the Secretary of Interior, in conjunction with actions by the State of Nevada, to acquire water and water rights to sustain, on a long-term average, approximately 25,000 acres of primary wetland habitat in four designated Lahontan Valley wetlands. To meet this objective, the FWS has calculated that an annual average of five acre-feet of water is needed per acre of primary wetland habitat, based on historical water operations data for Lahontan Valley, evaporation rates, and water requirements for palustrine marsh habitat.²⁶ Thus, a total of 125,000 acre-feet of water is needed to meet the goal of sustaining 25,000 acres of wetland habitat. From this, the FWS subtracts the amount of expected return flow from the irrigation project and the amount of projected usable spill water from Lahontan Reservoir to determine the acquisition need. The selected option in the Record of Decision specifies a goal of 75,000 acre-feet of project water to be acquired from the Carson Division (of which about 20,000 acre-feet have been acquired to date), with the remainder to come from the Carson River upstream of Lahontan Reservoir, Carson Division leasing and groundwater pumping.

Interior states that a part of this water will come from the Truckee River. Presumably these will be in the form of purchased existing water rights, as new diversions would be contrary to P.L. 101-618, federal trust responsibilities, the Endangered Species Act and common sense.

In September 1996 the FWS published a Final Environmental Impact Statement (FEIS) for the Lahontan Valley wetlands water rights acquisition program. The designated Lahontan Valley wetland areas identified in P.L. 101-618 and evaluated in the FEIS, together with their respective wetlands goals, are:

- ! Stillwater NWR and SWMA, 14,000 acres
- ! Carson Lake and Pasture, 10,200 acres
- ! Tribal wetlands, 800 acres

The last of these, the tribal wetlands, are a by-product of irrigation of Indian lands served by the Newlands Project under agreements with Interior. The lands identified as tribal wetlands were, in the past, sporadically flooded with drain water or irrigation water to facilitate grazing and waterfowl hunting. Because the area had a high water table, irrigation saturated the soils, creating wetland habitat. Bureau of Indian Affairs authorized the construction of the TJ Drain in 1983 to drain the waterlogged fields.²⁷

Truckee River Ecosystem

The Truckee and Carson river ecosystems are interconnected in subtle ways by the diversion of water from the one river to the other. Anaho Island, surrounded by Pyramid Lake some sixty miles northwest of the Carson marshes, is the nesting site of one of the nation's largest breeding colony of white pelicans. Double-breasted cormorants, California gulls and other birds also nest on Anaho. This island, which covered 248 acres before the water began to recede, has been a federal wildlife sanctuary since 1913. Because Pyramid Lake presents few suitable foraging opportunities (according to Fish and Wildlife Service comments received on the draft report, they do at times feed on tui chub that spawn in Pyramid Lake as well as on cui-ui that accumulate at the delta in their attempt to move up the Truckee River to spawn), the nesting pelicans often forage elsewhere. In earlier times they had a short flight to Winnemucca Lake; with that source dried up, they now often fly 60 miles each way to the Stillwater refuge. With flights totaling about 800 miles a week, food gathering costs the pelicans much more energy than it did before. Concentrated toxics in agricultural drain water and the diminished productivity of the Carson Sink marshes themselves add to the strain.

The loss of Winnemucca Lake (described above) from the Truckee River Basin parallels the Carson Basin's loss of important wetland habitat. As Truckee River flows to Pyramid Lake diminished and all flows into Winnemucca Lake were eliminated, an effort to rescue Winnemucca Lake and its resources was undertaken by President Franklin D. Roosevelt. In 1936, Roosevelt issued an executive order creating a 61,500 acre Winnemucca Lake National Wildlife Refuge. Nevertheless the lake became completely dry within two years and was stripped of its refuge designation in 1962, becoming the first national wildlife refuge to be abandoned due to lack of water.

Among the resources lost in the drying up of Winnemucca Lake were a unique population of giant cutthroat trout. These Lahontan trout were also found in Pyramid Lake together with a large lake sucker called cui-ui. Population declines in these two fish species provided the basis for the Pyramid Lake Tribe, decades later, to challenge water allocations under the Endangered Species Act and effect a reallocation of water among users in the two basins.

One of three related fish species, the cui-ui (*Chasmistes cujus*) once occurred (up to 5,000 years ago) in the many ancient lakes that covered much of northwest and west-central Nevada. Cui-ui, listed since 1967 as an

endangered species under the Endangered Species Act (and its predecessors), remained in the deepest (Pyramid) of the many ancient lakes that dried up due to long-term climatic changes. Over time, only fragmented lakes remained and the species became isolated. Following the loss of the Winnemucca Lake in the 1930s, cui-ui were eliminated from all former habitat except Pyramid Lake.

Historically, huge numbers of cui-ui spawned in the lower Truckee River; biologists have determined that their eggs cannot survive in the highly saline water of Pyramid Lake. Sometimes reaching a length of two feet, the species was traditionally exploited as an abundant seasonal food source by Native Americans for hundreds of years. Today, Pyramid Lake is some 50 feet below its level at the turn of the century and a delta has formed that can inhibit spawning migrations.

Biologists determined that in the thirty years between 1950 and 1980, only in 1950 and 1969 were major year-classes of cui-ui produced. Only in these exceedingly wet years did conditions permit a spawning run. Successful spawning runs have occurred in eleven of the sixteen years since 1980, however (1982-87 and 1993-97), a span that includes an eight-year drought that was the most extended and severe on record. The 1997 cui-ui run is underway at the time of this report and marks the fifth consecutive year with a spawning run. It is no longer true that spawning runs can occur only in exceedingly wet years, due to the availability of Stampede Reservoir water.

Fortunately for the cui-ui, their longevity (living 30+ years) and ability to survive despite extended periods between spawning years, no doubt saved the species from extinction. This same characteristic has provided a measure of flexibility in negotiations among competing water interests in the basin; for example, the Pyramid Lake Paiute Tribe recently negotiated an agreement with Sierra Pacific Power Company allowing the water purveyor to take water stored in Stampede Reservoir during certain dry years because the species does not need to spawn in every year.²⁸

In addition to the delta formed by the lowering of Pyramid Lake, Marble Bluff and Numana dams present structural impediments to fish passage. In need of protection to avoid extinction, cui-ui were reared by hatchery operations at Pyramid Lake. Unfortunately, the fishway and fish facility at Marble Bluff suffer from design imperfections and fewer than hoped cui-ui pass through. Problems include providing sufficient attraction flows, fish kills due to dissolved oxygen depletion, and a limited capacity to handle the volumes of fish needed for recovery. The U.S. Army Corps of Engineers

(COE) is cooperating in designing a bypass meander channel; a short pilot channel was tested in 1996 and demonstrated that the concept is feasible, subject to a number of details that remain to be worked out. Reclamation is beginning modification of the Marble Bluff fish facility (developed in consultation with the U.S. Fish and Wildlife Service, the Cui-ui Recovery Team, the Pyramid Lake Paiute Tribe and the COE), which is anticipated to increase the fish passage ability by a factor of more than ten. The work is scheduled to be completed before the 1998 spawning run begins. Overall, hatchery efforts have proved successful as a remedial action to avoid extinction, but the future of the cui-ui remains uncertain.

A Cui-ui Recovery Plan was approved in 1992 which outlines the steps necessary for the species' recovery and long-term management. The core management recommendations that will ensure recovery and delisting are dependent upon securing water upstream from Pyramid Lake. The objective of the Recovery Plan is to improve the status of cui-ui so that the species has at least a 95 percent probability of persisting for 200 years—and may be delisted by 2016 if all conservation measures are successfully implemented. Part of this objective may be achieved by securing and maintaining additional spawning and rearing habitat for cui-ui in the lower Truckee River and Pyramid Lake. According to the recovery plan, sufficient habitat would be provided if Truckee River inflow to Pyramid Lake was supplemented with up to 110,000 acre-feet of water per year. Equivalent habitat benefits could be generated by implementing a variety of other water management measures and habitat improvement strategies:

- ! Reducing Truckee River diversions to the Newlands Project by implementing Reclamation's revised bench and bottom land map, modifying operational criteria and procedures (called OCAP, discussed further below), improving structural and operational delivery facilities, reducing annual carryover storage in project reservoirs, conserving irrigation water on Fallon Naval Air Station, and reducing irrigation demand in the upper portions of the Carson River;
- ! Rehabilitating the lower Truckee River;
- ! Improving fish passage over the Truckee River delta;
- ! Implementing the Truckee River Operating Agreement;
- ! Acquiring water rights; and/or

! Recouping excess water from the Newlands Project.

The FWS is at various stages in implementing the measures, and it is too early to determine the exact amount of water or benefits to the species that have been secured or achieved.

A similar scenario to that of the cui-ui surrounds the Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), an inland subspecies of cutthroat endemic to the Lahontan Basin of northern Nevada, eastern California, and southern Oregon. This threatened species now occupies less than 1% of its historical lake habitat and about 10% of its historical stream habitat. It was federally listed as an endangered species in 1970 and reclassified as threatened in 1975. The factors associated with the species' demise are more diverse than those of the cui-ui. Pollution, over-harvesting, grazing impacts to riparian vegetation, and the introduction of non-native trout species have contributed greatly to the species' decline, which has been widespread. In the case of the Pyramid Lake strain, which was extinct by 1944, water diversions from the Truckee River at Derby Dam for the Newlands Project may have been the most significant factor. Stream flows were usually inadequate for the trout to swim upstream to spawn; when flows were adequate, the fish could not pass Derby Dam because it had no suitable fish ladder. Hatchery stocking began in 1967 and effectively reestablished the species in Pyramid Lake; a successful recreational fishery exists, and the hatchery program is now integral to perpetuating the species throughout much of its remaining suitable habitat. The original Pyramid Lake strain of Lahontan cutthroat trout lived 10 years or longer and grew to 40 to 60 pounds; current hatchery stocks in the lake seldom grow over 15 pounds.

Like the cui-ui, the Lahontan cutthroat trout is an obligatory stream spawner. Returning Lahontan cutthroat trout to the Truckee River and other streams is a primary objective of the recovery effort, since viable self-sustaining populations can only occur in stream habitats. Unfortunately, for natural spawning by cutthroat to be reestablished in the lower Truckee River, flow conditions must greatly exceed those required by the cui-ui and they need to occur throughout most of the year. Numerous biological problems have surfaced as obstacles to the full recovery of Lahontan cutthroat trout; not all are related simply to water availability. The decline and fragmentation of the species began thousands of years ago as Lake Lahontan began to dry up. Some genetic diversity has been permanently lost and the recovery process will be a complex one.

The Final Recovery Plan for Lahontan cutthroat trout was approved in early 1995 and provides for separate delisting of three population subgroups, protection and management of all existing populations to prevent the species from declining irreversibly, securing and maintaining habitat to sustain viable populations, and reintroduction of the trout to some sites within its historic range.

Recovery objectives are proposed to maintain and enhance 155 stream populations and two self-perpetuating lake populations. Pyramid Lake is identified as an area for population viability research and ecosystem planning for recovery of lake-dwelling stocks. The FWS plans to complete population modeling to determine whether sufficient numbers of viable populations of the trout are being maintained.

1.4 Socioeconomic Setting

The Truckee-Carson River basins encompasses a diversified regional economy ranging from highly developed urban areas, to sparsely populated ranch lands and irrigated farms, to remote, unpopulated wetlands and wildlife habitat. The urban areas are characterized by high population growth, resulting in pressures to acquire more water for urban uses.

The basins contain adequate economic diversity so that transfers of water from irrigation to urban growth, fisheries and wetlands need not negatively impact the region's overall economic vitality. Agriculture accounts for only a small percentage of jobs and personal income, and transfers to new uses will support thriving urban and recreation-based economic sectors creating jobs in those areas. Limited water supplies have constrained economic development in the Lake Tahoe area and eventually may limit urban growth in the Reno-Sparks area. For the next several decades, however, areas served by Sierra Pacific have adequate supplies for growth due to innovative agreements concerning water storage and reservoir operations, continuing water acquisitions, and urban conservation efforts.

In California, the Truckee watershed includes portions of Sierra, Nevada, Placer and El Dorado counties; in Nevada, most of the watershed is in Washoe County. The upper Truckee watershed does not have extensive urban development; most is around Lake Tahoe, Truckee, or in several small recreational communities. Tourism is key to the economy in the upper basin. Most of the basins' population is concentrated in the rapidly growing metropolitan Truckee Meadows area (the cities of Reno and Sparks, Nevada).

These urban demands dominate the upper Truckee River water use. By 1992, half of the original agricultural use in the Truckee Meadows had been converted to municipal and industrial use. Remnant agricultural lands include pasture and alfalfa. Communities outside Truckee Meadows and the surrounding area include Fernley, the center of the Truckee Division of the Newlands Project, and several small communities on the Pyramid Lake Indian Reservation.

Reno/Sparks grew by 31-33 percent in the decade between 1980 and 1990 (CRA:50). Urban areas in the Carson watershed kept pace: the Carson City grew 26% over the same period and Fallon grew by 51%. This rapid growth has driven increased municipal demand stress on scarce water resources. Over the past 10 years, the growth rate in the Reno-Sparks area has ameliorated, averaging 2-3% per year.²⁹

The upper Carson watershed, in Alpine County, California, is sparsely populated. With a population of 1,113 in the 1990 census, Alpine is California's least-populated county. The lower watershed, in Nevada, includes parts of Douglas, Carson City³⁰, Lyon, Pershing, Storey, and Churchill counties. Agriculture and logging, the historic land uses in the upper Carson after the mining boom ceased, are practiced on a smaller scale today. Most agricultural activities, primarily cattle grazing, occur on the only large area of private land remaining in this part of Alpine County—Diamond Valley, at the head of the larger Carson Valley.

Most rural communities in the region rely on a mix of economic activities to support community economic vitality, with agriculture ranking third or fourth in the list of economic sectors that provide jobs and income in Churchill and Lyon Counties. Even so, buyouts of irrigated land will force businesses linked to agriculture to downsize, or to adapt to serve the increasingly non-agricultural clientele moving into the Lahontan Valley. Outside of the Reno-Sparks urban area, the primary sources of employment are the services sector (which includes gaming and tourism), government (particularly in Carson City and Fallon), manufacturing, and retail trade. Although most land ownership in the upper watershed of both basins is in federal forest lands, logging has diminished from its historical role as a significant component of the local economies of the upper watersheds. Mining is an element in the economic climate of northern Nevada as a whole; the state is a leader in gold mining (CRA:57) and there are several mines for commodities used in the construction and manufacturing trades in the lower Carson basin (CRA:50).

Nevada has few major farming areas, due to the state's arid nature. The area served by the Newlands Project is one of the state's most important agricultural regions. However, despite this and despite the fact that agriculture is a dominant land use in much of the lower Carson basin, agriculture (including farming and agricultural service businesses) accounts for a small portion of overall jobs and earnings in the basin (less than 4%), but is important to some communities. In Churchill and Lyon Counties, farming and agricultural services account for 10–12 percent of jobs and personal income, with agriculture ranking below services, mining, government, and wholesale and retail trade as a component of the counties' economies³¹. Most acreage is devoted to alfalfa and irrigated pasture for livestock production; grains and truck crops are produced in lesser amounts.

Land ownership in agriculture is typified by a mix of large and small farms, some of which could be characterized as suburban ranchettes with little commercial agricultural function. Figures supplied to Congress in conjunction with 1994 hearings on P.L. 101-618 indicated that, in 1990, out of a total of 3,130 farms in the Newlands Project, the number of farms of less than 10 acres was 2,373 and those farms averaged 1.7 acres. However, they totaled only about 5% of the total farm acreage on the project. (Since this data was based on County parcel units without analysis of ownership, the conclusions drawn from the data must be qualified.)

In contrast, there were 162 farms of 100 acres or larger. These averaged 305 acres and accounted for 65% of the acreage and, presumably, about that percentage of water rights. There were 595 farms in the 10 to 100 acre range with an average acreage of 38 acres, constituting 30% of the farm acreage.

While Churchill County's irrigated agriculture is likely to be significantly affected by water acquisitions for wetlands restoration, only about ten percent of the irrigated acreage in Lyon County is located in areas relevant for water acquisitions to restore wetlands. Consequently, Churchill County has been the focus of concerns over economic effects of water acquisition programs and is the geographic scope for the recently completed Final EIS for such acquisitions.³²

The Fallon Naval Air Station (Fallon NAS) accounts for 27 percent of jobs in Churchill County; the NAS together with nature-based recreation and farming have been the traditional mainstays of the Churchill County economy. Given the rapid growth in the Reno-Sparks corridor, Churchill County also is beginning to serve as a bedroom area for commuters into the cities.³³

Land outside the urban areas, small rural communities and areas developed for natural resources (such as agriculture, mining or logging) could be characterized as high cold desert. Outdoor recreation associated with wetlands such as hunting, fishing, hiking, and birdwatching) is another important component of the economy of some communities in the basin and can be expected to become more significant as wetland acreage improves in quality and size.³⁴

1.5 Public Lands and Public Trust Resources

Historically, it is often difficult to distinguish between public and private land management. Public lands have been available for mining and timber harvest. Ownership of these lands was less important than the right to use the land for extractive purposes.³⁵

In the middle of the nineteenth century the federal government seeking to fill the territories of the new states fostered land settlement. Much of the federal land was available for homesteading; federal programs required certain land improvements within a given time frame in order to have the land title transferred to a private party. Early settlers in the Truckee-Carson Water Basin region could not afford the cost of transportation and water supply infrastructure. Thus, these large capital projects were developed by governmental financing schemes including: 1) granting federal lands for rail corridor development; and 2) the federal reclamation program providing major public works projects to benefit local homesteaders at a forgiving payback rate.

These actions influenced land management by regulating basin-wide water resources so that farmers could grow irrigated crops in an otherwise unfavorable climate. Rail access enabled the farmers to participate in commerce in a much wider region.

The most important government policy shaping land management has been that regarding water rights. Paradoxically, western land management is wedded to water availability, yet water resource management has been divorced from consideration of the effects of different kinds of land uses until quite recently.

Common law provides for landowners adjacent to watercourses to have reasonable rights to instream water, known as riparian rights. However, early mining activities depended on appropriating water from natural

channels to engineered conveyances for transfer of water some distance from natural drainage to the mining site. These activities were codified as appropriated water rights.

Past public land management has been for mineral extraction, timber harvest, agricultural development, rail transportation (granting of federal lands) and homesteading for settlement purposes. The following is a brief and incomplete survey of the public lands within the Truckee-Carson River Basin. Further investigation should be conducted for school lands and their management, for specific Bureau of Land Management lands and their opportunities and constraints for basin or watershed management.

Carson River Watershed

California.—More than 95 percent of the California watershed for Carson River is owned by the federal government (CRA:49). The Toiyabe National Forest includes portions of two wilderness areas—Mokelumne and Carson Iceberg wilderness areas. Historic uses include mining, agriculture and logging. Most agricultural activities, primarily cattle grazing, are generally confined to private lands. The forest lands are used for a variety of recreational activities including hiking, camping and skiing in addition to logging.

Rafting is possible on the East Fork during the spring snowmelt period when high flows are available in normal to wet years. A portion of the East Fork from Markleeville downstream to stateline has been added to California's Wild and Scenic River System. Federal reservoirs and water facilities in the watershed are described above. Several undeveloped hot springs are located on public lands accessible to hikers or off-road vehicles.

Potential residential and recreational development on private agricultural lands due to growth pressures from Lake Tahoe was a catalyst for groups interested in preserving open space to take action. Mountain meadows supporting low-value grazing have been targeted for land acquisition through options or purchases to be transferred to the Forest Service.

Carson River supports a popular recreational trout fishery in the upper watershed in California. Department of Fish and Game stock the East Fork with hatchery trout; other segments are designated as wild trout waters from which hatchery fish are prohibited and special fishing regulations apply.

Heenan Lake, on Monitor Creek tributary to the East Fork is used by DFG for raising Lahontan cutthroat trout to stock other Sierra locations.

Other public lands, such as the waterways of the rivers were historically managed by water diversion to provide water for private land activities.

Nevada.—Similar to the California portion of Carson Watershed, land ownership in Nevada's Carson Sink is dominated by federal land ownership. Some of this ownership is characterized by a "checkerboard" pattern of alternating private and federal sections. This pattern was created when the federal government granted lands to railroad companies as incentive to build the transcontinental rail. The Bureau of Land Management administers most of the federal land in the Nevada portion of the Carson watershed; the remainder are managed by the Bureau of Reclamation, Fish and Wildlife Service and the military.

Reclamation has developed an interpretive area at Grimes Point, on the sink's eastern edge, where extensive traces of prehistoric inhabitants have been found. The Hidden Cave area is a cluster of caves used by early hunter-gatherers. Public land management of the Lahontan Valley wetlands is described above.

Truckee River Watershed

California.—The watershed in California includes portions of Sierra, Nevada, Placer, and El Dorado counties and a very slim portion of Alpine County. The largest landowner is the federal government, managed by the forest service for Tahoe or El Dorado National Forest. Only the fringe of land around Lake Tahoe is in private ownership. According to the DWR Truckee River Atlas, the federal government owns at least 50 percent of the California portion of the watershed.

U.S. Forest Lands are managed largely for recreational uses including campgrounds, portions of ski areas, and hiking trails. During the mining years, the watershed forest was cut for wood to build flumes, mills and habitable structures. The forest as represented by second growth trees and logging is greatly diminished as witnessed by the closure of the last large lumber mill in Truckee by the year 1991. The dominant uses today for watershed lands in federal ownership are water-based recreation, and appreciation of the scenic values.

Lake Tahoe is a major recreation destination for boating, hiking, camping, and fishing. The federal reservoirs provide facilities for various uses. The Truckee River supports rafting on a short stretch below Lake Tahoe Dam with certain flows.

Nevada.—Washoe County in Nevada is the most populous county in the Truckee watershed. Other counties include portions of Storey, Pershing, Lyon, Douglas, Churchill, and Carson City. At least half of the total land area is owned by the federal government, particularly to the north and east of the City of Reno and Sparks area. The U.S. Bureau of Land Management manages most of the federal land not including the Indian reservation for dry land grazing and mining uses. The U.S. Forest Service manages a small portion of the Toiyabe National Forest which is within the Nevada portion of the watershed.

Pyramid Lake is managed by the Pyramid Lake Paiute Tribe, including a Lahontan cutthroat fishery. The lake is the site of Anaho Island National Wildlife Refuge (described above), home of the American white pelicans, and the only National Wildlife Refuge in the Truckee Watershed. Federal water facilities in the watershed are described above.

1.6 Institutional Setting

The Truckee-Carson River basin negotiations, settlement, and ongoing issues involve a complex array of institutions, including diverse and layered agencies of federal, state, and regional government, cities and counties, nonprofit environmental organizations, and two Indian tribes. For example, there are no fewer than eight agencies within the U.S. Department of Interior involved. The following provides a reference resource, briefly identifying each institution and its role (water purveyors are covered in Chapter 2 below).

Federal Agencies

The federal government has been deeply involved in the development of water in the Truckee-Carson River Basins from the beginning of the Newlands Project (Bureau of Reclamation) and in the tribal issues (Bureau of Indian Affairs) and fish and wildlife issues (U.S. Fish & Wildlife Service) associated with water development. The diversity of voices and perspectives

issuing from these branches of the federal government led the Office of the Secretary of the Department of Interior to establish a Truckee-Carson Coordination Office, to provide local coordination on the ground and help these Interior agencies to speak with one voice. In addition, several agencies of the departments of Agriculture, Army and Navy are involved. Following is a list of some of the more prominent agencies:

Department of Interior.—

- ! Truckee-Carson Coordination Office
- ! Bureau of Reclamation
- ! Fish & Wildlife Service
- ! Bureau of Indian Affairs
- ! Bureau of Land Management
- ! Geological Survey

Department of Army.—

- ! Army Corps of Engineers

Department of Navy.—

Fallon Naval Air Station.—The Fallon Naval Air Station (NAS), located in the Carson River Basin near Fallon, in the Newlands Project area, is one of the largest employers in Churchill County. The NAS became important to the Settlement Agreement due to water rights it owns and uses to grow crops adjacent to runways to control dust and foreign objects and suppress aircraft-caused brush and grass fires. Under the Settlement Agreement, the NAS was required to prepare a modified land management plan and implement water conservation measures. Paragraph 206(c)(3) of the Agreement states:

All water no longer used and water rights no longer exercised by the Secretary of the Navy as a result of the implementation of the modified land management plan or measures specified by this subsection shall be managed by the Secretary for the benefit of fish and wildlife resources referenced in sections 206 and 207 of this title.

These waters and water rights are to be managed primarily for the conservation of Pyramid Lake resources, with some water rights to be used

for the benefit of Lahontan Valley wetlands. The FWS and the Navy have signed a Memorandum of Agreement that calls for the irrigation water saved or conserved at the NAS in the future to be used for fish and wildlife, primarily cui-ui, and secondarily wetlands protection. Based on the provisions of the MOA, about 2,300 acre-feet per year could be available from the Navy under this agreement.

Department of Agriculture.—

- ! Forest Service
- ! Natural Resources Conservation Service

State Agencies

Two states, Nevada and California, share an interest in the waters of the Truckee-Carson River Basins. Their pursuit of an interstate compact to allocate and regulate these waters is described in Chapter 3 below. Following is a list of some of the key agencies involved in both states:

California.—

- ! Department of Water Resources
- ! State Water Resources Control Board
- ! Department of Fish and Game
- ! Interstate Compact Commission

Nevada.—

- ! Department of Conservation and Natural Resources
- ! Division of Environmental Protection
- ! Division of Water Planning
- ! State Engineer
- ! Department of Wildlife
- ! Interstate Compact Commission
- ! Cooperative Extension Service

Regional Agencies

Several regional agencies also have roles in the watersheds or basins of the Truckee-Carson, including the interstate Tahoe Regional Planning Agency

(TRPA) which regulates development and coordinates planning on both the California and Nevada sides of the Lake Tahoe watershed:

- ! Regional Water Planning Commission of Reno-Sparks and Washoe County
- ! Regional Planning Governing Board (Reno, Sparks, Washoe County)
- ! Tahoe Regional Planning Agency

Comments by the California Department of Water Resources drew attention to TRPA as the type of innovative governance alternative that other river basins can learn from. TRPA was created by interstate compact adopted by the legislatures of each state and subsequently ratified by Congress. In coordination with other state and local agencies in the basin, TRPA acts to control growth and regulate land use planning and development. TRPA has imposed stringent controls on basin development, with a key focus being actions to preserve the pristine water quality which has made Lake Tahoe special.

Cities and Counties

There are five California counties and seven Nevada counties within the Truckee-Carson River basins, and about 15 cities and towns. Particularly noteworthy are the cities of Reno and Sparks and Washoe County, Nevada, for their growing municipal water demands; and Churchill County, Nevada, together with the towns of Fallon and Fernley, which are rural agricultural communities which have served as town centers for Newlands Project irrigators for decades and which will bear the brunt of the impact with changing water allocations.

The City of Fallon, in response to the draft report, provided the following history and context: “The City of Fallon [was in incorporated in] 1908 and is situated near the geographic center of the county. The City owns surface water rights served by the Newlands Project. However, much more importantly, the City has a municipal water system which supplies drinking water to many thousands of Nevadans, and this system is affected by Newlands Project water deliveries. The City’s municipal system is fully permitted under Nevada law and its appropriated underground Nevada water rights utilize the basalt aquifer, recharged at least in part by the surface irrigation practices of owners of decreed water rights served by the

Newlands Project. Protection of the quality and quantity of its residents' drinking water supply is a paramount and nondiscretionary responsibility of the City." The City believes that its interests and "the drinking water upon which its residents rely for health and safety are jeopardized by the current implementation of the mandates set in motion by P.L. 101-618."

Native American Tribes

Native Americans seek water rights to preserve their cultural heritage and to sustain themselves economically. Native Americans have had unique water rights since 1908 but the rights were difficult to exercise and did not always recognize tribal needs. The original purpose of granting Indian Tribes water rights was to transform nomadic tribes to pastoral peoples. Many Native Americans consider this purpose incomplete at best and seek water for traditional uses as well as for irrigation and M&I uses. In the past decade, tribes and other Native American groups have been able to gain unprecedented power to reallocate water process through federal environmental and tribal laws.

Pyramid Lake Paiute Tribe.—The Pyramid Lake Indian Reservation, ancestral home of the Pyramid Lake Paiute Tribe, was established in 1859 and occupies 640,815 acres surrounding Pyramid Lake. As described above, the lake provides critical habitat for the cui-ui, an endangered fish, and Lahontan cutthroat trout, a threatened fish. Both this unique high desert lake and the fish are of special cultural significance to the Tribe. The Tribe derives most of its livelihood from the Lahontan cutthroat trout fishery by selling use permits for fishing, boating and camping. Many families residing on the Reservation are employed by the fisheries, with the balance employed in tribal administration, private enterprise, cattle operations, and off-Reservation employment in nearby Reno. The Tribe has a total membership of about 2,400 people, of which about 1,500 reside on the Reservation.

Water is a major component of the Tribe's identity and way of life, which integrates the people, the lake, and the fish. From the Tribe's perspective, these three are inseparable; one does not exist without the other. Thus, the Tribe and its way of life were deeply affected by the Newlands Project diversions, together with the federal decision, in negotiating water rights on the Tribe's behalf in the first half of this century, that it was the purpose of the Tribe to be farmers.

The Pyramid Lake Tribe has long claimed additional flows to improve the quality, quantity and timing of flows into Pyramid Lake. Under the Winters Doctrine, the tribe is entitled to sufficient water to serve all the purposes for which the reservation was established. However, under the Orr Ditch decree, although it received water for irrigation with the first priority, the tribe received no water for maintenance of the lake for traditional subsistence fishing and spiritual culture. There is no provision for purposes other than irrigation; neither Pyramid Lake nor the fishery were recognized purposes. The Orr Ditch Decree (described elsewhere), awarded water rights for the irrigation of approximately 5,800 acres on the Pyramid Lake Reservation with a 1859 priority date (the year in which the reservation was created).

The Tribe felt its way of life imperiled after the Truckee Canal diverted about one-half of the flow of the Truckee River to the Carson basin, causing the lake level to drop precipitously. After a long period of protest with the Bureau of Indian Affairs, the tribe turned to litigation to restore the Truckee flows. In the 1960s the tribe began to challenge the Orr Ditch decree. Although the U.S. Supreme Court ultimately affirmed the finality of the decree, the tribe's objections have rendered the Newlands Project's rights more uncertain in the past two decades.

The tribe pursued three strategies: (1) modify the operation of the Newlands Project, (2) reopen the Orr Ditch decree, and (3) use the Endangered Species Act to control unallocated blocks of water. The first and third strategies were successful. The Newlands Project controls the major available pool of water open to reallocation. In a major decision, a federal district court held in 1973 that the tribe was owed a trust duty and ordered Interior to modify the operation of the Newlands Project.³⁶

Interior was directed to supply the Newlands Project with sufficient water to serve water rights, but not more than was necessary to serve those rights. The reasoning behind this was that the United States must meet its trust obligation to the Tribe by letting all water not needed to fully meet Newlands water rights flow to the reservation and Pyramid Lake. Interior states that “in so holding, the court required a standard for federal actions affecting trust responsibilities that has been consistently upheld by the courts: the trust responsibility must be met unless overridden by specific federal law, contract, rights, etc. Beyond that, responsibilities and opportunities can be balanced. The court further mandated implementation of a specific OCAP [see discussion below] and the same legal requirement drives the OCAP.”

In response to this decision, Interior has issued progressively more stringent sets of Operating Criteria and Procedures (OCAP) for the Newlands Project, which is described further below. The tribe tried to reopen the *Orr Ditch* decree on the grounds that Interior's representation of both the tribe and the Newlands Project landowners in the adjudication constituted a conflict of interest. The U.S. Supreme Court held that the Orr Ditch Decree was settled law. The tribe then sued on grounds that it had not been adequately represented and settled out of court.³⁷

Despite its setbacks, the tribe has been able to assert its traditional water uses to achieve results through the Endangered Species Act. After the cui-ui was listed as endangered and the Lahontan cutthroat as threatened, the Ninth Circuit Court of Appeals held that Stampede Reservoir, built in the 1960s to supplement Reno's water supply, had to be managed to maintain the fish species instead of for municipal and industrial uses. This decision has given the Pyramid Lake Tribe great leverage with upstream users, to complement the leverage that the earlier decision gave it with the Newlands Project. The Truckee and Carson river users were forced to negotiate a legislative settlement. Under the Truckee-Carson-Pyramid Lake Water Rights Settlement Act (P.L. 101-618) and the Preliminary Settlement Agreement with Sierra Pacific, the Pyramid Lake Tribe has sought to protect its gains while supporting a workable compromise with other river users.

Fallon Paiute Shoshone Tribe.—Most of the attention has been focused on the Pyramid Lake Tribe, but another small band seeks more traditional Winter rights. The Fallon Indian Reservation on the eastern edge of the Newlands Projects has been characterized as the "forgotten tribe" in this mix.³⁸ In 1890, under the provisions of the General Allotment Act of 1887, fifty 160-acre allotments of land were awarded to the tribe, followed by an additional allotment of 146 160-acre parcels of land in 1894, for a total of more than 31,000 acres. Most of this acreage was initially located in what later became the Newlands Project Area.

Following the authorization and implementation of the Newlands Act of 1902, the national government entered into contracts with the tribe, whereby 186 individual tribe members gave up their 160-acre tracts of land (for the Newlands Project) in exchange for 10-acre allotments with fully-irrigable water rights attached thereto, to be served by the Newlands Project. Thus 30,000 acres were carved out of the Indians' reservation to make way for the Newlands Project. In exchange, these tribal members received 4,640 acres with water rights attached, to be given to the tribes in perpetuity at no cost.

Additional acreage was later added to the reservation, bringing the total amount of acreage up to 5,400, again with attached water rights. However in 1978, by passing Public Law 95-337, Congress recognized the failure of the government to meet its contractual responsibilities to the Indians. It also recognized tribal growth, and therefore increased the size of their reservation by 2,700 acres. The mandate of the 1978 Act, however, also was not carried out.³⁹

In 1990, the tribe achieved partial satisfaction on its claim for breach of trust under the Settlement Act which created a fund from which monies may be used to purchase up to 8,453 acre-feet per year and for improvement of the existing irrigation system. Total tribal water use is limited to 10,568 acre-feet per year.

Washoe Tribe.—This tribe occupies lands in the upper Carson River basin.

Environmental Community

Environmental interests were first organized in about 1988 into the Lahontan Wetlands Coalition (which included the Environmental Defense Fund [EDF], Nevada Waterfowl Association, and about 20 other members concerned with the environmental issues of the Truckee-Carson River basins.

In 1989, The Nature and Conservancy (TNC) joined EDF in a joint venture to represent environmental issues. The joint venture was particularly active after the 1990 Settlement Act, and hired Dr. Graham Chisholm in 1992 to coordinate their activities. TNC became a key player in assisting FWS acquire water rights for the Lahontan wetlands, consistent with its role elsewhere.

TNC and EDF later joined the Wetlands Coalition to form a “Conservation Caucus” representing environmental interests at the second generation negotiations in 1994-95.

Lahontan Valley Environmental Alliance

Fallon and Fernley residents formed the Lahontan Valley Environmental Alliance (LVEA) in October 1993. The LVEA represented an inter-local agreement between the City of Fallon, Town of Fernley, Churchill County, Truckee-Carson Irrigation District, Lahontan Conservation District, and the Stillwater Conservation District. LVEA represented a more community-wide effort to negotiate a settlement to outstanding water issues and to maintain a viable agricultural industry in the region.⁴⁰

Newlands Water Protective Association

The non-profit Newlands Water Protective Association (NWPA) was formed to protect the rights of Newlands water rights owners in Lyon and Churchill counties. According to comments submitted on the draft Truckee-Carson Basin Study, the NWPA was organized in response to the Tribe's decision to file about 2,200 petitions in Federal District Court against certain Newlands Project water rights and has participated in several of the negotiations involving Newlands water since then.

Truckee-Carson Leasing Authority

The Truckee-Carson Leasing Authority (TCLA) became incorporated in Nevada in 1993 as a non-profit organization. TCLA's organizers created the agency to encourage TCID farmers to lease their water rather than sell it, as a means to satisfy upstream urban demands, wetland and wildlife needs, and other uses while retaining ownership of the right. It was feared that if water right holders in the Newlands Project sold their water rights outright, it would soon become too expensive and inefficient to operate the project's extensive irrigation system for those who wished to remain in agriculture. Under TCLA's organizational plan, members were to pay a \$125 membership fee and then give ten percent of any profits derived from leasing to TCLA for operating costs. After an investigation by the U.S. Department of Justice, TCLA agreed that no more than 25 percent of the water-righted acreage in the Newlands Project would be involved at any one time in leasing.⁴¹

2. Water Use and Rights

This section presents a summary of water use and rights in the Truckee-Carson river basins, including a survey of the major uses and users; the agreements, decrees and doctrines governing use of the rivers; the water purveyors and water operations; and the regional water transfer market. The major features of the water storage and delivery system were reviewed in Chapter 1 in conjunction with the discussion of basin hydrologies.

2.1 Water Use

Although most water development has occurred in California, almost all of the water is used downstream, in arid western Nevada. Most available surface water supplies are appropriated by adjudications begun in the reclamation era. There are substantial reallocation pressures as urban areas grow, irrigated agriculture continues to decline, and environmental values become recognized. Municipal and industrial uses, irrigated agriculture (including both Indian and non-Indian irrigators), aboriginal Indian fisheries, wetland maintenance, and migratory waterfowl compete for some 750,000 acre-feet per year of decreed rights. The major water-using competitors include

- ! Truckee meadows urban area
- ! Newlands Project irrigated agriculture
- ! Pyramid Lake endangered fish
- ! Lahontan Valley wetlands
- ! Upper Carson River farms and urban areas

Municipal Use

Litigation enabled the Pyramid Lake Tribe to influence water use throughout the Truckee-Carson system. This created substantial problems for water suppliers and developers in the Truckee meadows area; they had neither secure access to federal reservoirs nor clear access to alternative supplies. Interstate ground water use remains uncertain. To accommodate the continued rapid growth in the Reno-Sparks areas, water suppliers and developers have had to acquire existing irrigation rights. Most of the existing water rights have now been acquired by the water supply division of Sierra Pacific. The third party effects of these reallocations on downstream users who may be entitled to return flows are considered by Sierra Pacific to be potentially beneficial, in that net flows to downstream users have increased as the Truckee Meadows has urbanized (comments received on draft report).

Municipal water use in the California portion of the basin located downstream of Lake Tahoe is 5,000–6,000 acre-feet per year, supplied almost entirely by groundwater. Under the interstate allocation provisions of

PL 101-618 to be implemented by TROA, use by the developed areas in California and Nevada that surround Lake Tahoe would be capped at 34,000 acre-feet from the lake, streams, springs, and groundwater. Strict growth control measures around Lake Tahoe are based on a water availability of 34,000 acre-feet—an amount negotiated as a part of the 1990 water settlement TRA:75–76). In the early 1990s, Truckee River municipal diversions below stateline ranged from about 49,000 to 63,000 acre-feet per year (TRA:77)

Nevada is not only the driest state in the nation, it has the fastest growth rate in the nation as well. Washoe County, which includes Reno and Sparks (regional centers for commerce and tourism), has a metropolitan area population of about 300,000 and an average growth rate during the 1980s of 2–4 percent.⁴² The vast majority of urban residents and industry receive gas, water, and electrical service from the Sierra Pacific Power Company (Sierra Pacific), a privately owned utility. Most of the municipal demand in the region occurs near the cities of Reno and Sparks, where Sierra Pacific served about 63,000 acre-feet per year to its retail customers in 1994 (TRA:77).⁴³

Sierra Pacific projects that the population it serves (which is about seventy-four percent of the total Washoe County population) will grow to about 300,000 by the year 2015. Per capita use has ranged from 333 gallons per day in 1985 to a low of 249 gallons per day in 1993, during a severe drought with water use restrictions imposed. In 1994, per capita use had risen to 268 gallons per day. The utility expects a total water demand of about 70,000 acre-feet per year in the year 2015, incorporating its metering program and other conservation measures along with population growth.

The utility expects to have adequate firm water supplies to serve its projected demands well beyond the year 2015 due to successful acquisition of additional surface water and groundwater to serve new development, and to a multi-party agreement which gives the utility firmer dry year supplies. In 1994, Sierra Pacific negotiated a 25 year agreement with other basin interests to augment its supplies through leasing additional reservoir storage, through refining reservoir management to better accommodate both endangered fishery needs and urban demands, and through implementing additional municipal conservation programs.⁴⁴ The agreement reiterates the utility's obligation to implement its metering program (described below) and obligates it to expend a specific amount of money each year on public water conservation education programs, leak detection and repair, distribution of water saving devices, and monitoring of outdoor watering in its service area.⁴⁵

Residential water use in the Reno-Sparks area is largely unmetered, although meters are being installed gradually to under agreements made with Sierra Pacific. The Nevada state legislature reversed its historic no water metering stance with new legislation in 1989. Per capita use generally has been high compared to other western cities, over 300 gallons per day, with notable decreases during drought years when residents altered their water use habits. Most residential water users pay a flat rate for water service. Residential use, which accounts for about 60% of urban area use, is split evenly between indoor and outdoor uses.⁴⁶

Sierra Pacific is implementing conservation measures, including a plan for financing and installing water meters and an inverted block rate water structure. With funds collected from developers seeking water service, the utility has begun a meter installation program. The program's goal is installation of 44,000 meters over the next decade. Two thousand meters had been installed by mid-1996. Households must volunteer to switch from a flat water bill of \$43/month for a typical household to metered water rates which will result in lower monthly water bills. The metered water rates are based on a two-tiered increasing block structure, with the lowest price block set at 6,000 gallons per month (gpm) for a single family residence to accommodate typical indoor residential use. Once 90% of customers that formerly paid flat water rates are metered, then metered water rates become mandatory. New residential and commercial customers have been required to be metered since mid-1988. In addition to metering, the utility has implemented limits on outdoor watering, leak detection and repair, public education, and other conservation measures.⁴⁷ In 1996, the Pyramid Lake Paiute Tribe formally agreed that the actions taken by Sierra Pacific have satisfied the conditions laid out in the Settlement Act.⁴⁸

Water used by Reno historically has been returned to the stream as treated effluent. The problem is that these discharges have been in violation of the Clean Water Act, and Reno and Sparks are seriously considering land disposal as a treatment alternative. The new Water Quality Agreement (discussed elsewhere in this report) is intended to provide clean flows, allow land application of treated effluent, and avoid concerns about reduced return flows. All western states have struggled with how to allocate the entitlements to treated sewage, and this represents an innovative solution.

The Washoe County Public Works Department provides some water service to outlying communities in the Reno-Sparks area. Nonagricultural water users located outside of the service area of water purveyors generally have to rely on local groundwater supplies to meet their water demands.

Groundwater basins in northwestern Nevada are closed to additional appropriation, so new groundwater users generally need to acquire water rights from existing users.

Sierra Pacific, the cities, and Washoe County typify growing areas of the West in their search for water supplies that will support new residents in the style to which immigrating urban dwellers are accustomed. Lawns, fountains, pools, and verdant landscaping belie the desert surroundings and attract newcomers. In addition to pursuing water for new growth, water providers also urgently seek supplies that are reliable during the droughts to which the region is susceptible.

Agricultural Use

By far the largest agricultural water use in the Truckee-Carson River basins occurs in the Newlands Project. According to the *Newlands Project Efficiency Study*, the Newlands Project has over 73,700 acres of water-righted lands, although historically a maximum of about 65,000 acres have been irrigated. There are two divisions to the Newlands Project, the Truckee Division and the Carson Division. The Carson Division is the larger of the two. Quoting from the 1994 *Efficiency Study*:

Truckee Division lands comprise about 5,900 water-righted acres, eight percent of project lands; approximately 4,300 acres are under cultivation and are supplied with water directly from the 31.2 mile-long Truckee Canal. Beginning in 1905, water was diverted from the Truckee River at Derby Dam for agricultural use. Most of the division lands are located near the town of Fernley in the Truckee River watershed. All but 7.5 acres of Truckee Division lands are currently classified as bench lands, entitled to 4.5 acre-feet/acre of water annually. If Reclamation's proposed bench/bottom criteria are approved, bottom lands will increase to 228.1 acres.

Carson Division lands are in the Carson River watershed near the town of Fallon. The Division consists of about 67,820 acres, of which about 52,900 acres are currently irrigated, which comprise the bulk of the project lands and are supplied with water by releases from Lahontan Reservoir and a small amount from the Rock Dam Ditch. Since the flow of the Carson River alone was not sufficient to irrigate the entire acreage estimated to be arable, the Truckee Canal was designed to divert a substantial amount of Truckee River water south to augment the Carson's flow at Lahontan Dam. Over 75% of Carson

Division lands are classified as bottom lands, entitled to 3.5 acre-feet/acre annually; the remainder are mostly bench lands, with a small amount of pasture lands which have a maximum entitlement of 1.5 acre-feet per acre.

Over the past 20 years, in an average water year, TCID diverted 172,380 acre-feet of water from the Truckee River to the Truckee Canal, as measured at Wadsworth gage. Of this amount, 23,000 acre-feet is used in the Truckee Division of the Newlands Project (which includes Fernley, Hazen and Swingle Bench) and about 20,000 acre-feet is Truckee Canal loss. The remaining 129,000 acre-feet flowed into Lahontan Reservoir, for use in the Carson Division of the Newlands Project. According to the *Efficiency Study*, USGS water gage records over a 26 year period (1967-1993) show that about 62% of the 375,100 acre-feet diverted annually to the Carson Division was supplied by the Carson River, with the remainder diverted from the Truckee River. According to the Draft EA for the proposed Adjusted OCAP (see discussion below), more recent modeling results now indicate that the Carson River supplies an average of more than 80% of inflow to Lahontan Reservoir.

Under the 1988 OCAP, the Project is entitled to divert from the Truckee River to serve water right entitlements in the Truckee Division and to meet Lahontan Reservoir storage targets (e.g., 215,000 acre-feet at the end of June). The Final OCAP EIS projected that Newlands diversions from the Truckee River would average 121,400 acre-feet per year assuming that diversions from the Truckee Canal to the Truckee Division and releases from Lahontan Reservoir to the Carson Division would total 320,000 acre-feet per year. It also projected an average Truckee Canal inflow to Lahontan Reservoir of about 80,000 acre-feet per year.

Over the years, various crops have been grown, including the famous Heart of Gold Fallon cantaloupe, but the most successful money-making crop in the Project remains the production of alfalfa and alfalfa pellets for California's growing domestic horse population. The irrigated agriculture of the Project represented about 10% of the Fallon economy, or \$50 million in gross income, in 1992.⁴⁹

A total of 232,000 acres were originally proposed to be irrigated; the amount actually irrigated varies from year to year (as quoted above, the 1994 *Efficiency Study* estimated total irrigation at about 57,100 acres. Interior estimated in 1985 that 63,100 acres were irrigated and that of these only 57,518 acres held project water rights.⁵⁰

Unlike most irrigation projects, Newlands' irrigators do not buy water; each acre of water-righted land is entitled to a court-decreed amount of water per acre annually, depending on the classification of the land, measured at the farm headgate. The Alpine Decree granted property owners in the Newlands Project the right of ownership of their water rights ("...Each such landowner is the owner of an appurtenant water right for the patented land. . .") as opposed to ownership by the federal government (Reclamation).⁵¹ This action has important implications with respect to the federal government's ability to cancel, restrict, or re-acquire these water rights from individual owners. Thus, water rights on the Newlands Project are associated with specific parcels of land.

Irrigation water use is now governed by the Operating Criteria and Procedures (OCAP) for the Newlands Project, and the 1944 Orr Ditch Decree and 1980 Alpine Decree, all of which are described in more detail below. The two decrees specify the water duty assigned to those lands designated as "bench and bottom" lands. With respect to waters diverted from the Truckee River and applied to lands within the Newlands Irrigation Project, the Orr Ditch Decree established a maximum irrigation water duty of 4.5 acre-feet per acre per year for water-righted bench land and 3.5 acre-feet per acre per year for bottom lands. While the Alpine Decree established water duties for bench and bottom lands, it made no identification of those lands.⁵² The water duties would apply to all irrigated lands within the Newlands Project and therefore affect allowable diversions from the Truckee River as well. Both decrees declare that the water is appurtenant to the land once it is put to beneficial use under state water law.

Irrigators in the Truckee Meadows also hold individual decrees for water in the Truckee River which is distributed to them by private ditch companies. A number of ditch companies once provided Truckee River water to irrigators in the Truckee Meadows. Many of these companies are now inactive because the lands within their service areas have been developed and their water rights transferred to Sierra Pacific.

Agricultural water use in the Truckee Meadows area has declined steadily as irrigated lands have been urbanized. In the early 1990s, about 10,000 acres remained as irrigated agriculture (TRA:72). Limited irrigation occurs in the Sierra Valley of California, where Little Truckee River water is diverted for irrigating high mountain pasture and alfalfa (TRA:74). Higher up in the Carson Basin, about 47,000 acres are irrigated in one of the oldest farming areas in Nevada (CRA:88–91).

The Carson Valley in the upper Carson River Basin has about 47,000 irrigated acres (CRA:91). This valley is one of Nevada's oldest agricultural areas and has some very early water rights priorities. Agricultural water supply in the valley comes from a combination of direct diversion of surface water from an extensive system of privately owned ditches and from stored water in the upper alpine reservoirs. Some ground water extraction occurs.

California's Diamond Valley, adjoining the upper end of Carson Valley, also has a concentration of irrigated acreage. About 24,000 acre-feet per year of decreed irrigation rights were held in 1991 (CRA:93). A few scattered areas in the upper Carson River watershed receive a small irrigation supply from the export of Lake Tahoe basin waste water, described elsewhere in this report. Decreed irrigation rights in the upper watershed are gradually being converted to municipal use.

A small amount of irrigated acreage (about 1000 acres irrigated of a total right of about 6,545 acres) exists on the Pyramid Lake Paiute Tribe Reservation, and about 2,900 of 5,440 acres of irrigation right are irrigated on the Fallon Paiute Shoshone Reservation.

Hydroelectric Use

The Truckee River General Electric Company (predecessor of the present-day Sierra Pacific Power Company of Reno, Nevada) obtained title to the Lake Tahoe Dam at Tahoe City and surrounding land for the price of \$40,000. This acquisition allowed the power company to effectively control the flow of the Truckee River. In the early 1900s, four industrial users of water power built plants on the river: (1) Floriston Pulp and Paper Company; (2) Truckee River General Electric Company; (3) Washoe Power and Development Company; and (4) Reno Power, Light and Water Company. All these water users held superior rights (prior appropriations) to the river which had to be satisfied before the Reclamation could begin to store irrigation water in Lake Tahoe for the Newlands Project.

Limited hydroelectric use on the river remains today, the legacy of these early plants. They include the Farad (1901, 2.6 MW), Washoe (1904, 2.5 MW), Fleish (1905, 2.5 MW), and Verdi (1911, 2.5 MW) plants. In addition, Reclamation completed construction of a hydropower facility of 3.65 MW at Stampede Reservoir in 1988.

Truckee River water diverted out of the watershed is also used for power generation. Pacific Gas and Electric Company claims pre-1914 rights to water diverted from Echo Lake in the Tahoe basin, into South Fork American River. This diversion, initiated in 1876, amounts to up to 2,000 acre-feet per year.

Water diverted to the Newlands Project via the Truckee Canal also can be used for hydropower generation incidental to operation of the Project. The power plant is located immediately below the dam. The first hydro plant adjacent to Lahontan Dam, installed in 1915, had a capacity of 1.92 MW. TCID later constructed another small plant on one of the Project's canals and a new power plant in 1989 with Synergics next to the old plant.

Environmental Use

Environmental water uses are described in detail in Chapter 1 above. The major upstream storage reservoirs in the Truckee River Basin are operated to provide specified minimum instream releases for fish. Some reservoirs, such as Prosser Creek and Stampede are operated in substantial part to provide fish flows. Most attention has focused on the listed fish species (cui-ui and Lahontan cutthroat trout), described above. Pyramid Lake levels were closely watched to protect nesting white pelicans on Anaho Island during the period when Pyramid Lake reached its historic low (1967). Today, the elevation level of the lake is high enough to avoid concern regarding the potential to form a land bridge and is project to rise with the current OCAP to still higher levels. In the Carson Basin, environmental water use focuses on the Lahontan wetlands, again described above.

Use of environmental amenities for recreation purposes is centered on Lake Tahoe. About 1,000 acre-feet per year is used in the California part of the Truckee Basin for snow-making at ski resorts.

2.2 Water Purveyors

Sierra Pacific Power Company/WestPac Utilities

Sierra Pacific Power Company (Sierra Pacific) is both a water retailer and a water wholesaler—it supplies water directly to most users but also wholesales water to several of the small purveyors. Sierra Pacific meets most of its needs from surface water—direct diversion of unstored water from the Truckee River and its tributaries (e.g., Hunter Creek in Nevada) and use of stored water from Donner and Independence lakes (and, under

certain conditions, from Stampede Reservoir). Sierra Pacific also owns a minor amount of storage capacity in Boca Reservoir (TRA:77).

Sierra Pacific holds direct diversion rights on the river, a right to divert 40 cfs throughout the year, subject only to the Pyramid Lake Paiute Tribe's rights for its reservation. The seniority of this right was negotiated between the parties to the 1935 Truckee River Agreement and is a subject of the TROA negotiations. The relative seniority of this direct diversion right means that water is physically available for diversion in all but the driest years (TRA:77).

Over time, Sierra Pacific has also acquired former Truckee Meadows irrigation water rights; in 1991 these were reported to have a face value of about 35,000 acre-feet (TRA:77). The actual dry period yield of these rights is much less, however, since their priorities are generally more junior, even though they are generally the most senior in the Truckee Meadows. In a drought year, the natural flow of the Truckee River near Farad can drop to as little as about 50 cfs, so the supply to virtually all irrigation rights can be shot off shortly after storage water to maintain Floriston rates is depleted.

After the loss of Stampede Reservoir storage priority to fish flows, Sierra focused on securing drought supplies to avoid a moratorium on new hook-ups. Agreements negotiated with the Pyramid Lake Paiute Tribe and through the Truckee-Carson settlement process will provide backup for the continued conversion of Truckee Meadows agricultural water rights to municipal use for about 60 years of growth at 2.5% per year, assuming the TROA is consummated in its present form.

Truckee-Carson Irrigation District

In 1918, the Truckee-Carson Irrigation District (TCID) was organized by a group of Newlands irrigators, with the initial purpose of solving the area's irrigation drainage problems. Between 1921-28, drains were constructed to lower the water table in the valley. Since 1926, TCID has operated the Newlands Project for the Bureau of Reclamation under both long-term and temporary (interim) contracts.

The Newlands Project is so named after pioneer reclamation advocate Senator Francis G. Newlands, who is credited with drafting the Reclamation Act of 1902. The Newlands Project was one of the first authorized after passage of the Act. Water rights for lands irrigated by the Newlands Projects are held by the landowners, not TCID. TCID is responsible for delivering the

appropriate water duty to each farmer, as defined under the Orr Ditch and Alpine decrees.

Carson-Truckee Water Conservancy District

This is a Nevada agency that was created to contract with the Bureau of Reclamation for the water from Stampede Reservoir, at the time it was to serve primarily municipal and industrial use.

Washoe County Water Conservancy District

This conservancy district represents irrigators in the Truckee Meadows area. It includes ditch companies and private individuals. WCWCD operates Boca Reservoir.

Carson Water Subconservancy District

This subconservancy district represents the various water users with rights to reservoir storage in the many small high alpine lakes and reservoirs in the upper Carson River watershed. It was originally formed as the Nevada water district that would contract with Reclamation for the construction of Watasheamu Dam and Reservoir and other planned Washoe Project facilities on the upper Carson River in Douglas County. This reservoir was deauthorized by PL 101-618. The 1989 Nevada legislature expanded the district to include Carson City and the portion of Lyon County in the Carson River basin, and created a funding mechanism for local and regional water projects.

Small Purveyors

On the California side of the Lake Tahoe Basin much of the water service is provided by three public utility districts—North Tahoe PUD, South Tahoe PUD, and Tahoe City PUD—that have, over time, assumed operation of some of the small systems. Other small purveyors include the Sierra Valley Water Company and Donner Lake Company.

As described elsewhere, the PUDs also handle sewage treatment and transfer of effluent out of the Lake Tahoe Basin. These entities service the sewage collection needs of the west side of Lake Tahoe north to the California-Nevada state line at Crystal Bay, Nevada. Sewage is transported to the Tahoe-Truckee Sewage Treatment Plant at Truckee, California where it receives advanced tertiary treatment and then is infiltrated into the ground.

2.3 Water Operations in the Truckee-Carson Basin

The following summary draws extensively upon the Nevada Division of Water Planning *Truckee River Chronology* (November 1996 update) and *Carson River Chronology*, (October 1996 update), both prepared by Gary Horton. Figures 2-1 through 2-3 are flow schematics for the upper and lower Truckee River and the Carson River, taken from the chronologies (originally from USGS annual water data reports).

Principal Storage Facilities of the Truckee River Basin

Major storage facilities of the Truckee River Basin (excluding the basin's terminus, Pyramid Lake), along with their characteristics, capacities, and operating requirements, are detailed below. Table 2-1 provides statistics for the major reservoirs in the watershed.⁵³ River flows and water releases from these lakes and reservoirs are controlled by the Federal Water Master in Reno, Nevada, in accordance with specific operating criteria, specifically, the 1944 Orr Ditch Decree and its incorporated 1935 Truckee River Agreement and the Floriston Rates (see discussion below).

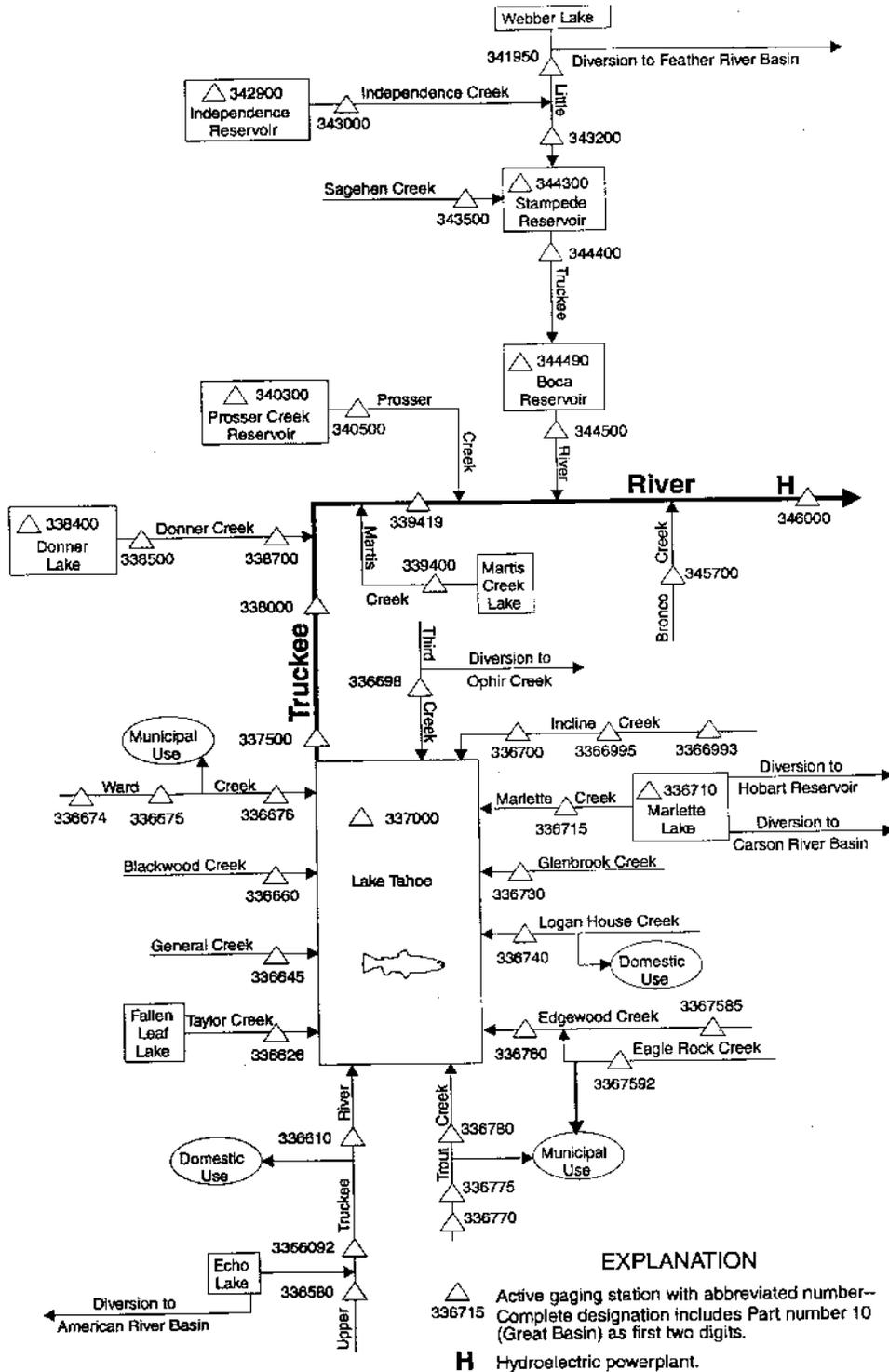


Figure 2-1.—Lake Tahoe and Upper Truckee River Flow Schematic
 Lake Tahoe and Truckee River Basins Listing of USGS Gaging Stations.

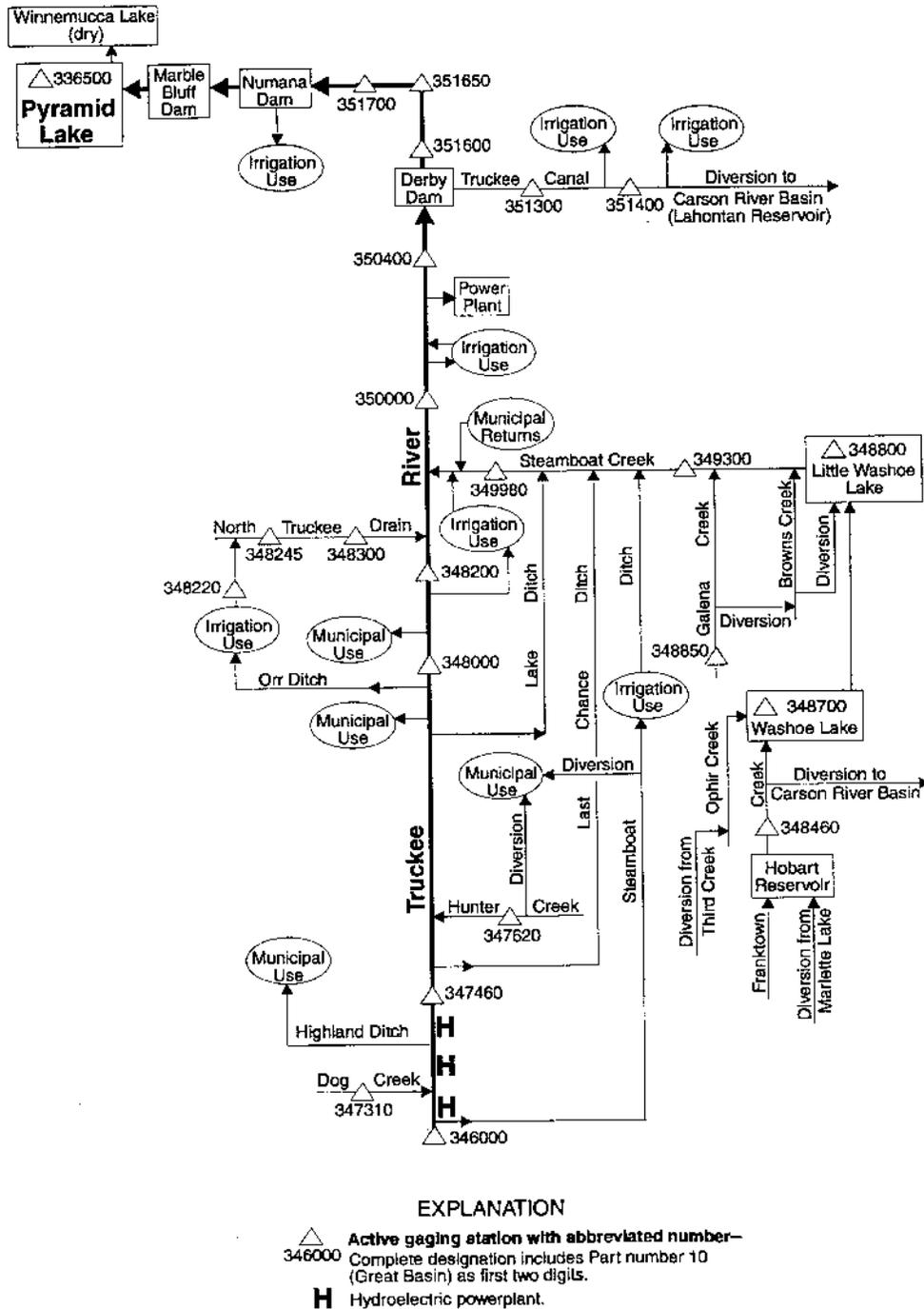


Figure 2-2.—Lower Truckee River Flow Schematic
Truckee River Basin Listing of USGS Gaging Stations.

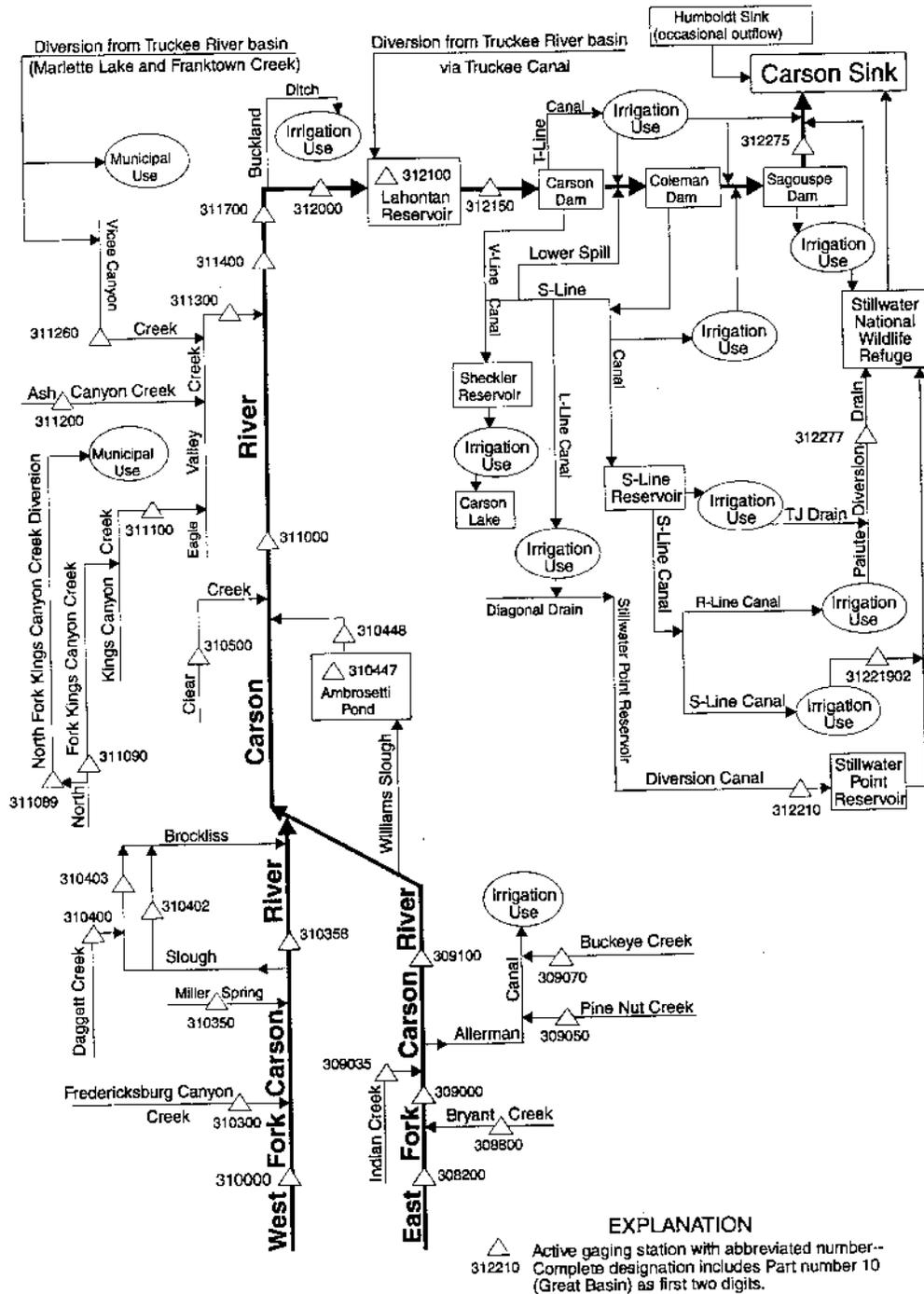


Figure 2-3.—Carson River Flow Schematic
Carson River Basin Listing of USGS Gaging Stations. 00

Table 2-1.—Statistics for major reservoirs in Truckee River Watershed

Reservoir name	Dam owner	Dam operator	Usable storage (acre-feet)	Construction date	Dam height (feet)	Drainage area (square miles)
Lake Tahoe	Sierra Pacific Power Company ¹	Truckee-Carson Irrigation District	744,600	1913	18	506
Donner Lake	Sierra Pacific Power Company/Truckee-Carson Irrigation District	Sierra Pacific Power Company	9,500	1930s	14	14
Martis Creek	U.S. Army Corps of Engineers	U.S. Army Corps of Engineers	² 20,400	1971	113	40
Prosser Creek	U.S. Bureau of Reclamation	U.S. Bureau of Reclamation	29,800	1962	163	50
Independence Lake	Sierra Pacific Power Company	Sierra Pacific Power Company	17,500	1939	31	8
Stampede Reservoir	U.S. Bureau of Reclamation	U.S. Bureau of Reclamation	226,500	1970	239	136
Boca Reservoir	U.S. Bureau of Reclamation	Washoe County Water Conservation District	41,100	1937	116	172

¹ U.S. Bureau of Reclamation controls the dam under easement from Sierra Pacific Power Company.

² Flood control storage only.

Lake Tahoe.—Storage capacity is used to supplement Floriston Rates in conjunction with natural runoff of other tributaries and Boca Dam releases. An easement to Lake Tahoe Dam is owned by Reclamation and operated under agreement by the TCID for the Newlands Project in Churchill County, Nevada. Lake Tahoe's storage capacity is not considered part of the COE flood control system. Lake Tahoe waters may be "exchanged" for water from Prosser Creek Reservoir (the Tahoe-Prosser Exchange Agreement) in order to maintain a live stream below the Lake Tahoe Dam without adversely affecting Nevada water users' storage. Whenever possible, Lake Tahoe releases must be sufficient to maintain a minimum instream flow of 50-70 cubic feet per second (cfs) downstream from the dam (varies with season).

Donner Lake.—The first dam on Donner Lake was built in 1877, while the current dam was constructed in the 1930s, and provides for 9,500 acre-feet of storage capacity. Donner Lake drains an area of only approximately 14 square miles. Water in Donner Lake is privately owned by Sierra Pacific and TCID, and is not required to be used to meet Floriston Rates. The dam is jointly owned and operated by Sierra Pacific and TCID. The Sierra Pacific portion of the stored water is used to supplement Reno-Sparks municipal and industrial water use in the Truckee Meadows; the TCID portion is used to supplement Newlands Project irrigation water requirements. After Donner Lake fills, lake inflows are passed through to supplement Floriston Rates. Lake storage is not part of COE flood control system. California requires a minimum flow of 2-3 cfs downstream from the dam for maintaining fish habitat.

Martis Creek Reservoir.—The Martis Creek Dam was constructed by the COE in 1971 and was intended to store waters from a 40 square mile drainage area to include not only Martis Creek, but the East, West, and Central Martis Creeks as well. In accordance with COE requirements, this reservoir, with a total storage capacity of 20,400 acre-feet, serves only flood control purposes. While legislation allows for other uses, only temporary storage is currently permitted due to an unsafe, leaking dam. Except during flood storage, reservoir outflows are set to equal inflows.

Prosser Creek Reservoir.—The Prosser Creek Reservoir was constructed by Reclamation in 1962 to store waters from a 50 square mile drainage area beginning 11 miles to the west at Warren Lake. The reservoir, with a total capacity of 29,800 acre-feet, is owned and operated by Reclamation for three purposes: (a) as part of the COE Truckee River flood control program; (b) the storage of water under the terms of the Tahoe-Prosser Exchange Agreement (which provides that a portion of this water, when available, may be used to meet Floriston Rates in lieu of making such releases from Lake Tahoe); and (c) to meet the spawning flow needs of Pyramid Lake's endangered cui-ui fish species and its threatened Lahontan cutthroat trout, or for other federal purposes. California generally requires a minimum of natural flow or 5 cfs, whichever is less, downstream from the dam for maintaining fish habitat.

Independence Lake.—The original Independence Lake Dam was constructed in 1879 and created a storage capacity of 3,000 acre-feet. After Sierra Pacific acquired ownership of the lake and dam in 1937, the dam was enlarged in 1939 to its present size with a total storage capacity of 17,500 acre-feet. Independence Lake drains an area of only eight square

miles. Like Donner Lake water, the waters of Independence Lake are privately owned and are not required to be used to meet Floriston Rates; the stored waters are owned by Sierra Pacific and supplement the company's water supply for the Reno-Sparks municipal and industrial water use during droughts. The lake's first storage priority is for 3,000 acre-feet of (original) storage; an additional 14,500 acre-feet of storage is permitted after Boca Reservoir is full and the Floriston Rates and Truckee River diversion rights (Orr Ditch Decree rights) are satisfied. California requires a minimum flow of 2 cfs downstream from the dam for maintaining fish habitat.

Stampede Reservoir.—Stampede Dam and Reservoir, constructed by Reclamation in 1970, drains an area of some 136 square miles and has a total capacity of 226,000 acre-feet. Water must be used primarily for spawning flows for the endangered cui-ui fish species and the threatened Lahontan cutthroat trout of Pyramid Lake. Storage space is also part of COE flood control plan. Water may be stored in Stampede Reservoir only after: (1) Floriston Rates and Truckee River diversion rights have been satisfied; (2) Boca Reservoir (below Stampede Reservoir) is full; and (3) Independence Lake (above Stampede Reservoir) is full. Due to its relatively junior water rights, this reservoir fills only about 25% of the time in the spring and has been targeted as a prime storage location for Reno-Sparks municipal water as part of the negotiated settlement (Public Law 101-618) and the implementation of a new Truckee River Operating Agreement (TROA). California requires a minimum flow of 30 cfs downstream from the dam for maintaining fish habitat (although this agreement has expired, the rates of flow have been maintained).

Boca Reservoir.—The original Boca dam was built around 1868 for ice harvesting. The present, much larger dam, was constructed just upstream in 1937 and created a reservoir with a total capacity of 41,100 acre-feet and a drainage area, including the entire Little Truckee River Basin (including both Independence Lake and Stampede Reservoir) of some 172 square miles. Title to stored water is held by Reclamation and the dam is operated by the Washoe County Water Conservation District (WCWCD). The reservoir's water is used in conjunction with Lake Tahoe water to maintain Floriston Rates and to provide part of the required COE flood control capacity. Up to 25,000 acre-feet of water may be stored in Boca Reservoir only after Floriston Rates are satisfied and Independence Lake's first storage priority of 3,000 acre-feet has been satisfied. The balance may not be filled unless the Newlands Project diversion right at Derby Dam (on the lower Truckee River) has been satisfied. Sierra Pacific stores a small portion (800 acre-feet)

of its privately owned stored water rights here. There are no minimum downstream flow requirement associated with Boca Reservoir.

Derby Dam/Truckee Canal.—Derby Dam, which is located approximately 11 miles upstream from Wadsworth, Nevada, is the regulating device by which Truckee River waters are diverted into the Truckee Canal for use within the Truckee Division of the Newlands Project and for storage in Lahontan Reservoir in the Carson River Basin for use within the Carson Division of the Newlands Project. The dam, originally named the Truckee River Diversion Dam, was completed by the U.S. Reclamation Service in June 1905, whereas the Truckee Canal was not completed through to the Carson River until August 1906.

Diversions and releases are conducted in accordance with the Truckee River Agreement, the Orr Ditch Decree, and Newlands Project Operating Criteria and Procedures (OCAP), which allow for a maximum diversion of up to 1,500 cfs (Orr Ditch Decree right, although current canal nominal capacity is only 900 cfs) from: (a) remainder of Floriston Rates and return flows from upstream diversions; (b) right to Truckee River tributary water; and © any water bypassed or released to obtain space to store flood waters in reservoirs if water right holder did not identify a use for the release. Under the more recent project OCAP determination method implemented in 1988, the quantity of water which may be diverted from the Truckee River at Derby Dam varies with the irrigation entitlement each year (water-righted acreage actually to be irrigated and the appropriate water duty for bench and bottom lands) and the predicted runoff from the Carson River and water in storage in Lahontan Reservoir.

The Washoe Project.—Prosser and Stampede are facilities of the Washoe Project, operated by Reclamation. Authorization of the Washoe Project provided a forum for a series of water negotiations in the late 1940s and 1950s that ultimately helped bring Nevada and California together to discuss other interstate water issues. The most recent facilities of the project include Marble Bluff Dam and the Pyramid Lake fishway, completed in 1975.

Principal Storage Facilities of the Carson River Basin

Upper Basin Lakes and Reservoirs.—The storage facilities of the upper Carson River Basin, stretching from the Carson Valley to the headwaters of the East and West forks, , including their capacity, priority dates and water sources, are detailed in the Carson River Atlas. These 19 small reservoirs in Alpine and Douglas counties run as small as 31 acre-feet in capacity, but

most are in the 100-500 acre-foot range. Mud Lake (2,383 acre-feet) and Heenan Lake (2,948 acre-feet) are the only larger ones. River flows and water releases from these lakes and reservoirs are controlled by the federal Water Master in Reno, Nevada (through a deputy Water Master in Carson City), in accordance with specific operating criteria contained in the 1980 Alpine Decree.⁵⁴

Lahontan Reservoir.—Lahontan Reservoir stores Carson River water for use in the Carson Division of the Newlands Projects, which is supplemented by Truckee River waters diverted at Derby Dam on the lower Truckee River and conveyed through the Truckee Canal to Lahontan Reservoir. The reservoir was not completed until 1915, at which time the Truckee Canal's outlet was re-routed slightly upstream so as to enter Lahontan Reservoir instead of flowing directly into the Carson River.

Diversions at Derby Dam on the lower Truckee River, which flow into Lahontan Reservoir via the Truckee Canal, are also controlled by the federal Water Master in accordance with the 1944 Orr Ditch Decree and its incorporated 1935 Truckee River Agreement and 1915 Floriston Rates.⁵⁵ In the lower Carson River Basin, releases of stored Carson River and Truckee River waters from Lahontan Reservoir and their diversion at the Carson Diversion Dam are controlled by TCID in accordance with the current OCAP.

Current Diversions from the Truckee River and Lake Tahoe Basins

There currently exist seven (7) recognized water diversions from the Truckee River Basin and/or the Lake Tahoe Basin (as part of the Truckee River Basin) as listed below:

Lake Tahoe Basin.—There are a number of diversions of Lake Tahoe's waters out of the Lake Tahoe Basin for domestic uses, including by Sierra Pacific, TCID and the Donner Lake Company; however, only three result in waters actually leaving the Truckee River Basin entirely. First, Harvey Place Reservoir, located in Alpine County, California, in the Carson River Basin, receives advanced secondary treated effluent from the South Tahoe Public Utility District (STPUD) in the Lake Tahoe Basin (Truckee River Basin). Effluent exports, amounting to approximately 5,000 acre-feet per year (4.5 million gallons per day),⁵⁶ are routed from the southern end of Lake Tahoe through a pipeline, generally following the route of the Upper Truckee River, over Luther Pass from El Dorado County, California, into Alpine County, California, and the Carson River Basin. These effluent exports began in 1968 when Indian Creek Reservoir was constructed by the South Tahoe Public Utility District. Beginning in 1989, exports were re-routed to

Harvey Place Reservoir and Indian Creek Reservoir was turned into a freshwater recreational area managed by the Bureau of Land Management (BLM).

The other two diversions are to Carson Valley, located in the Carson River Basin in Douglas County, Nevada, which receives the treated effluent from the Incline Village (Nevada) General Improvement District (IVGID) and the Douglas County Sewer Improvement District (DCSID). Together these utilities cover the wastewater treatment of the Nevada portion of the Lake Tahoe Basin (Truckee River Basin), located in Washoe County, Carson City, and Douglas County. The IVGID pumps approximately 1,700 acre-feet per year (1.5 million gallons per day) of treated waste water from its Incline Village treatment plant, along the east side of the lake to Spooner Summit, then down Clear Creek Valley to wetlands located in the northeastern portion of the Carson Valley. The DCSID handles sewage collection and treatment on the Nevada side of Lake Tahoe from Glenbrook to the Nevada-California state line at South Lake Tahoe. It pumps approximately 2,600 acre-feet per year (2.3 million gallons per day) of treated effluent over the Kingsbury Grade (Haines Canyon) and then to a storage reservoir on the east side of the Carson Valley in the Pine Nut Range, where it receives winter storage. During the irrigation season, these stored waters are then pumped back across the Carson Valley and used for supplemental irrigation purposes. According to the California-Nevada Interstate Compact as ratified in the Settlement Act, Nevada's gross diversions of the waters of Lake Tahoe are set at a maximum of 11,000 acre-feet per year, while California's diversions of Lake Tahoe's waters cannot exceed 23,000 acre-feet per year.

Echo Lake.—Pacific Gas and Electric Company (PG&E) diverts waters from the Lake Tahoe Basin at Echo Lake to the upper South Fork of the American River. This diversion out of the Lake Tahoe Basin totals approximately 1,500 acre-feet per year and is used for hydroelectric power generation at their El Dorado Power Plant.

Third Creek.—Water diversions from Third Creek constitute an intrabasin diversion from a tributary of Lake Tahoe into Washoe Valley of 5.5 cubic feet per second. The Third Creek diversion actually takes water from the Lake Tahoe Basin only, as the water remains within the Truckee River Basin. Third Creek is located on the west (Lake Tahoe) side of the Mount Rose highway summit. A portion of its waters are diverted down the east side of the Carson Range by means of Ophir Creek and then into Washoe Lake, then to Steamboat Creek and eventually to the Truckee River below Reno near the Truckee Meadows Water Reclamation Facility.

Marlette Lake.—Water in this lake, which is owned by the State of Nevada, is diverted from the Lake Tahoe Basin, pumped over the Carson Range to Hobart Creek Reservoir, enters Franktown Creek below the reservoir, and is sometimes sold for delivery to the Hobart Storage System for use by Virginia City (after being piped across Washoe Valley to Five-Mile Reservoir) and Carson City, both of which lie within the Carson River Basin. These water users have generally replaced such demands from other sources within the Carson River Basin. Diversions total approximately 3,000 acre-feet per year.

Franktown Creek/Hobart Creek Reservoir.—A tributary of Washoe Lake, which eventually flows into the Truckee River through Steamboat Creek, Franktown Creek is the outlet stream for Hobart Creek Reservoir which is fed from Hobart Creek. [Hobart Creek Reservoir waters are also supplemented by Marlette Lake water. See Marlette Lake diversions, above.] Waters from Franktown Creek are piped into the Hobart Storage System for use by Virginia City (Five-Mile Reservoir) and Carson City, both of which are in the Carson River Basin.

Sierra Valley.—Water is diverted by canal from the Little Truckee River, a primary tributary of the Truckee River, into Webber Creek for the Sierra Valley Water Company for supplemental irrigation use in the Sierra Valley. These waters eventually flow into the Feather River Basin in California. The maximum diversion rate is 60 cubic feet per second during the growing season (March 15th through September 30th) with a priority date of 1870. As a supplemental supply of irrigation water, these interbasin water diversions vary from 1,500 acre-feet per year to 10,000 acre-feet per year and have typically averaged approximately 5,700 acre-feet per year.

Lower Truckee River Diversion (Derby Dam).—Waters are taken out of the lower Truckee River at Derby Dam and transported to the Newlands Project Truckee Division and to Lahontan Reservoir in the Carson River Basin via the Truckee Canal.

TCID, representing the Newlands Project farmers, originally contracted with the Reclamation in 1926 for a firm supply, when available, of 406,000 acre-feet per year to be delivered to the Lahontan Reservoir outlet works and to canal headings using waters from both the Carson and Truckee rivers. Diversions at Derby Dam on the lower Truckee River have averaged approximately 183,160 acre-feet per year over the 1967-1994 period of record and 172,380 acre-feet per year over the more recent 1973-1994 period of record.⁵⁷ Diversion records show that over the period of 1910-1966, when Truckee River waters were also used for power generation at Lahontan Dam

and on the "V" canal below the Carson Diversion Dam, these diversions averaged a considerably greater 240,000 acre-feet per year.⁵⁸

Historical diversions from the Truckee River to the Newlands Project are not representative of current conditions however, because they do not show the effect of the Operating Criteria and Procedures. In addition, the period 1988 through 1994 is not representative of current conditions, since this period comprised the most severe drought in this century. OCAP call for the maximum use of Carson River waters whenever possible. Because of the limited number of years with the current OCAP in place, the current diversion level from the Truckee River should be estimated with the use of a model. Based on 1901-1980 hydrology, according to comments received from Reclamation and the OCAP Final EIS, Newlands Project diversions from the Truckee River are projected to average 121,400 acre-feet per year. (This assumes that diversions from the Truckee Canal to the Truckee Division and releases from Lahontan Reservoir to the Carson Division would total 320,000 acre-feet per year. The annual diversions to the Truckee and Carson divisions have been less than 320,000 acre-feet since 1992.)

These projected diversions represent about 22 percent of the average annual flow of 548,200 acre-feet (1973-1994 period of record) of Truckee River water crossing the California-Nevada border and recorded at the Farad gaging station.

Current Diversions into the Carson River Basin

Currently there are no diversions of water outside of the Carson River Basin. In fact, Article VII of the California-Nevada Interstate Compact specifically prohibits waters of the Carson River from being used in areas outside the Carson River Basin.⁵⁹ While this compact has never been ratified by Congress, its provisions have been accepted through a "gentleman's agreement" and individual state legislation.⁶⁰

While no waters are diverted out of the Carson River Basin, this basin receives waters diverted from the Truckee River Basin.⁶¹ The basin is also the recipient of natural, high-water year inflows from the Humboldt River Basin via the Humboldt Sink and Humboldt Slough, and infrequent flows from the Walker River Basin via Adrian Valley. The following is a list of the known current diversions into the Carson River Basin. All these diversions have as their source either the Lake Tahoe Basin or, ultimately, the Truckee River Basin.

Marlette Lake, Franktown Creek, and Hobart Creek Reservoir.—The Marlette Lake water system, originally constructed in 1873, was intended to meet the growing needs of Virginia City during the Comstock era. This water system, which at one time consisted of flumes, a tunnel, and over 21 miles of an inverted suction pipeline, first ran from just below Hobart Creek Reservoir (which is fed by Hobart Creek) on Franktown Creek, which drains into Washoe Valley and Washoe Lake, then across Washoe Valley to Five-Mile Reservoir in the Virginia City range on the east side of Washoe Valley. A second pipeline from Franktown Creek was completed in 1875. A third pipeline (originally consisting of a flume and tunnel system), this time tapping the waters of Marlette Lake, which drains directly into Lake Tahoe, was completed in 1887. The current system pumps water directly from Marlette Lake to Hobart Creek Reservoir. Total diversion from this source is approximately 3,000 acre-feet per year.

Harvey Place Reservoir.—Located in Alpine County, California, this reservoir receives advanced secondary treated effluent from the South Tahoe Public Utility District (STPUD) in the Lake Tahoe Basin (Truckee River Basin). Effluent exports, amounting to approximately 5,000 acre-feet per year (4.5 million gallons per day),⁶² are routed from the southern end of Lake Tahoe through a pipeline running generally along the course of the Upper Truckee River and over Luther Pass from El Dorado County, California, into Alpine County and the Carson River Basin. These effluent exports began in 1968 when Indian Creek Reservoir was constructed by STPUD. Beginning in 1989, exports were re-routed to Harvey Place Reservoir and Indian Creek Reservoir was turned into a freshwater recreational area managed by the Bureau of Land Management (BLM).

Carson Valley.—Located in Douglas County, Nevada, Carson Valley receives the treated effluent from the Incline Village (Nevada) General Improvement District (IVGID) and the Douglas County Sewer Improvement District (DCSID), which together cover the municipal water uses of the Nevada portion of the Lake Tahoe Basin (as part of the Truckee River Basin). The IVGID pumps approximately 1,700 acre-feet per year (1.5 million gallons per day) of treated waste water from its Incline Village treatment plant, along the east side of the lake to Spooner Summit, then down Clear Creek Valley to wetlands located in the northeastern portion of Carson Valley. The DCSID handles sewage collection and treatment on the Nevada side of Lake Tahoe from Glenbrook to the Nevada-California state line at South Lake Tahoe. It pumps approximately 2,600 acre-feet (2.3 million gallons per day) of treated effluent over the Kingsbury Grade

(Haines Canyon) and then to the east side of Carson Valley in the Pine Nut Range where it receives winter storage. During the irrigation season, these stored waters are then pumped back across Carson Valley and used for supplemental irrigation.

Derby Dam and the Truckee Canal.—These facilities, the first components constructed under the Truckee-Carson Irrigation Project in 1905-1906 (later renamed the Newlands Project), constitute the most significant means of diversion and conveyance of water from the lower Truckee River to the lower Carson River. For the water years 1967-1995, on the average, approximately 181,720 acre-feet of water flowed each year into the Truckee Canal at Derby Dam on the lower Truckee River. Truckee River waters flow through the 32.5-mile long Truckee Canal, first paralleling the river, then running along the western side of Lahontan Valley and into Lahontan Reservoir on the lower Carson River just above the project farmlands. Of this annual average 181,720 acre-feet of water diverted at Derby Dam, about 135,380 acre-feet per year, or nearly 75 percent of the total diverted amount, has actually flowed into Lahontan Reservoir.⁶³

Agreements, Decrees and Doctrines Governing the Allocation of Water in the Truckee-Carson River Basins

The Truckee-Carson basins are regulated by a number of agreements, decrees, and river operating requirements extending as far back as the turn of the century. These are monitored and enforced by a Federal Water Master, first appointed in 1926 as a result of the original Orr Ditch lawsuit filed by Reclamation to adjudicate waters in the two basins. The most critical to present-day river operations include:

- ! The 1908 Floriston Rates (Truckee River);
- ! The 1915 Truckee River General Electric Decree;
- ! The 1935 Truckee River Agreement;
- ! The 1944 Orr Ditch Decree (Truckee River);
- ! The OCAP, first instituted in 1967;
- ! The 1980 Alpine Decree (Carson River); and
- ! The 1996 Water Quality Agreement.

Over time, each subsequent agreement or operating criteria has incorporated those established river operating requirements in effect before it. Specifically, the Floriston Rates were incorporated into the Truckee River General Electric Decree, which was subsequently incorporated into the Truckee River

Agreement which, in turn, became the river operating component of the Orr Ditch Decree.

The waters of the Truckee and Carson rivers were appropriated in the late nineteenth and early twentieth centuries, and this allocation remained relatively constant until the Pyramid Lake Tribe was able to challenge it in the 1970s. Initially, the allocation of the Truckee was determined by a series of agreements going back to 1903 that fixed the flow rates in the Truckee to maximize the beneficial use of the river for hydroelectric power generation.

Subsequently, the available supply of the Truckee River was adjudicated, as was the Carson River. The first dam at the mouth of the Truckee at Lake Tahoe was built in 1870; Truckee River flows, referred to as the Floriston Rates, were first established in 1908. In 1915 the Bureau of Reclamation acquired the Lake Tahoe Dam in a consent decree that settled a condemnation suit. This decree gave the United States the right to raise the level of Lake Tahoe and obligated it to maintain the Floriston Rates.

Adjudication of the Truckee began in 1913, shortly after the California Conservation Commission recommended that the state seek an equitable apportionment of the Truckee and Lake Tahoe. Truckee River water use is controlled by the *Orr Ditch decree (United States of America v. Orr Water Ditch Company, 1944)*, the establishment of minimum levels for Lake Tahoe, and the Truckee River Agreement of 1935. The decree was not made final until 1944 and was not protected against collateral attack by the Pyramid Lake Tribe until 1983. This decree is administered by a federal water master; his basic task is to maintain a minimum flow at the California-Nevada state line relative to the level of Lake Tahoe.

The Carson River use is allocated by the *Alpine decree (United States v. Alpine Land and Reservoir Co., 1980)*. It defines the water rights differently from the *Orr Ditch Decree*. The *Orr Ditch* decree defines rights as claimed appropriations, whereas the *Alpine* decree defines the rights in terms of maximum consumptive use. The *Alpine* Decree provides that Project water would be distributed pursuant to Nevada State water law.

Lake Tahoe storage is limited to 744,000 acre-feet and withdrawals from the storage pool are controlled by the Truckee River Agreement, in which Interior modified the original Floriston Rates to allow additional flood storage. Minimum flows of 400 cfs are required during the winter months and 500 cfs during the summer months. Lower winter flows are allowed when the level of the lake is between 6,226.0 and 6,225.25 feet.

In addition several new agreements have been recently negotiated or are in the final stages of negotiation. When and if implemented, these will profoundly affect river basin operations. These include:

- ! The Preliminary Settlement Agreement between the Pyramid Lake Paiute Tribe and Sierra Pacific Power Company (to be incorporated in TROA) and the Settlement Agreement embodied in Public Law 101-618
- ! The new Truckee River Operating Agreement (TROA)
- ! The Water Quality Agreement between several parties (also incorporated in TROA)

Details of these and other rate agreements, decrees, and operating criteria are presented below, or in the following chapter.

The Public Trust Doctrine.—A common law little used until the middle of the twentieth century, the "Public Trust Doctrine" is important in governing water use in California. There is some dispute about the historical origin of the public trust doctrine.⁶⁴ Popular convention believes the public trust doctrine derived from roman Justinian times and was brought to England during the Roman occupation. It became established as English common law that certain resources were available in common to all humankind; among those common resources were "the air, running water, the sea and consequently the shores of the sea." Navigable waterways were declared to be "common highways, forever free". This English common law came to North America with the English settlers and was modified to include non-tidal waters.

The public trust doctrine is applied in this country through both federal and state law. It is common to all states which enter the union. The "equal footing doctrine" accords equivalent status to all states in the Union. The federal government holds the beds of navigable rivers in territories in trust for future states which upon statehood are transferred in title to the state. The doctrine "illustrates a fascinating and significant intersection of property rights and constitutional concepts. It provides a dramatic example of how common heritage natural resources, given constitutional protection, can inspire a unique property rights regime"⁶⁵The breadth of the state's authority to regulate public trust lands is directly related to the public interests which the doctrine is intended to protect.⁶⁶

In California, the doctrine applies to lands underlying tidelands, bays and estuaries, swamp and overflow lands, navigable rivers and lakes. Public trust lands are determined by the last natural channel at the time of entry into the Union. Last natural channel can be determined based on historical records, maps and surveys up to the time the last natural channel was altered, such as in dam construction or channelization.

These lands underlying waterways are characterized as sovereign lands or lands with fee interest held by the people and managed in trust for the people by the state. Some public trust lands were sold. Case law holds those lands must be managed in a manner not inconsistent with the public trust. It is important to understand the "bundle of sticks" of fee interest or property ownership does not extinguish public trust characteristic of the land. In other words, if the lands are sold or granted, such granting is for most of the interest in the land, but not for the public trust. Those formerly sovereign lands held by a private party are still impressed with the public trust although in every other respect the lands are owned in fee.

In Nevada, at the time of statehood, the state asserted its ownership to bed and banks of navigable rivers and lakes to hold in Trust for the people. Unlike California, the doctrine is not in the Nevada constitution and has never been the subject of court cases⁶⁷.

California has well established public trust law, indeed recently settled in the *Audubon* case regarding Mono Lake. Other cases laid the foundation for the Court's holding that public trust doctrine is ". . .an affirmation of the duty of the state to protect the people's common heritage of streams, lakes, marshlands and tidelands, surrendering the right of protection only in rare cases when the abandonment of that right is consistent with the purposes of the trust." *Audubon* also stated the principle that the state has "an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible."

The vigor of the California Public Trust Doctrine is matched by the absence of this common law in Nevada water resource management. Nevada's "public interest" policy could be compared to the public interest standard in a water right proceeding in Idaho and other California cases. The public trust and public interest serve to help resolve conflicts between the public, which believes that it has a right to have waters left in place for navigation, fishery, environmental quality and other public uses, and appropriators who believe that they have a right to extract these same waters for irrigation, municipal

and industrial purposes. The principle of public trust or interest focus resource management from local needs to basin wide issues.

Few places in Nevada show the need for water resource management more than the Truckee-Carson basins. Legendary legal disputes, discussed elsewhere in this report, chronicle the quarrels about whose water it is and how should it be used. Extensive impacts to natural resources, described above, illustrate how, without a common law to guide resource management, public trust values can be severely affected. The importance of maintaining irreplaceable public trust resources was eloquently expressed by the Oregon Court of Appeals:

The severe restriction upon the power of the state as trustee to modify water resources is predicated not only upon the importance of the public use of such waters and lands, but upon the exhaustible and irreplaceable nature of the resources and its fundamental importance to our society and to our environmental. These resources, after all, can only be spent once. Therefore, the law has historically and consistently recognized that rivers and estuaries once destroyed or diminished may never be restored to the public and, accordingly, has required the highest degree of protection from the public trustee.⁶⁸

The Public Trust Doctrine protects the rights of the public to use water courses for commerce, navigation, fisheries, recreation, open space, preservation of ecological units in their natural state, and similar uses for which those lands are uniquely suited. There is debate about conflicting uses. One school of thought holds that the basic resource of waterways is the corpus of the trust and cannot be fouled or spent to bankruptcy. The other school of thought is that the public trust resources must be balanced with public trust uses even if such uses adversely affect the public trust resource.

As Professor Sax noted in 1970, "[o]f all the concepts known to American law, only the public trust doctrine seems to have the breadth and substantive content which might make it useful as a tool of general application for citizens seeking to develop a comprehensive legal approach to resource management problems".

Truckee River General Electric Decree and Floriston Rates.—Floriston Rates currently represent the primary operational criteria of the Truckee River between its source (Lake Tahoe) and its terminus (Pyramid Lake). These river flow rates date back to a 1908 agreement among the Truckee River General Electric Company (predecessor to Sierra Pacific), the Floriston Land and Power Company, and the Floriston Pulp and Paper Company. This agreement required that ". . .*there shall be maintained a flow of water in the said Truckee River at Floriston [California] of not less than 500 cubic feet per second from the First day of March to the 30th day of September inclusive, in each year, and of not less than 400 cubic feet per second from the 1st day of October to the last day of February, inclusive, in each year.*" The Floriston Rates were subsequently incorporated into the 1915 Truckee River General Electric Decree.

The Truckee River General Electric Decree represented the resolution, through a 1915 federal court consent decree, of a lengthy series of conflicts, litigation, and negotiations between the U.S. Reclamation Service (USRS) and the Truckee River General Electric Company. In 1902, the Truckee River General Electric Company, through a complicated series of real estate transactions, had obtained title to the Lake Tahoe Dam, surrounding lands, and the hydropower plants on the Truckee River. The USRS was in desperate need of Lake Tahoe water for the Newlands Project, then nearing completion near Fallon in Churchill County, Nevada. This decree granted the USRS an easement, for a purchase price of \$139,500, to the Lake Tahoe Dam and surrounding property owned by the power company. On its part, the USRS was required to provide certain year-round flow rates (the 1908 Floriston Rates), measured at a stream gage near the state line, to support hydropower generation. While the Truckee River General Electric Decree dictated how the Lake Tahoe Dam would be operated, it did little to solve the concerns of residents of the lake and lessen California's concerns over the apportionment of Lake Tahoe's waters.

Truckee River Agreement.—The Truckee River Agreement, finalized in 1935, represents the current basis for the operation of the Truckee River, including its tributaries and diversions, between its source (Lake Tahoe) and its terminus (Pyramid Lake). Parties to this agreement included the Bureau of Reclamation; TCID, serving the irrigation rights of agricultural water users of the Newlands Project in Churchill County, Nevada; Sierra Pacific Power Company, serving primarily the municipal and industrial water needs of the cities of Reno and Sparks, Nevada; and the Washoe County Water

Conservation District, serving the agricultural water users in the Truckee Meadows.

Article XI of the Truckee River Agreement provided the basis of the Pyramid Lake Paiute Tribe's irrigation rights under the Orr Ditch Decree. One of the purposes of the agreement was to "raise and stabilize the mean elevation of the water surface of [Lake Tahoe], in order that [the parties] and the owners of lands bordering on or in the vicinity of [the lake]." The construction of Boca Reservoir and the implementation of reduced Floriston rates, together with the establishment of a maximum lake level at elevation 6229.1 feet resulted in a higher and more stable lake level, benefitting water users in Nevada and property owners at Lake Tahoe.

Under the Agreement, operation of upstream reservoirs is under the supervision of a Federal Water Master in Reno, who administers court-imposed requirements under the 1944 Orr Ditch Decree to supply water to achieve Floriston Rates (mandated river flow rates) at the California-Nevada border (currently measured at the Farad gaging station). The Truckee River Agreement provides for the operation of storage facilities, especially Lake Tahoe, to satisfy these rights and required the building of Boca Dam and Reservoir. The Floriston Rates essentially constitute a minimum instream flow in the river, as long as water is physically available in Lake Tahoe and Boca Reservoir to support the rates. Water may be stored in Lake Tahoe and Boca Reservoir only when rates are met. The precise definition for the Floriston Rates contained in the Truckee River Agreement is as follows:

! **Floriston Rates** means the rate of flow in the Truckee River at the head of the diversion penstock at Floriston, California, measured at the Iceland gage [currently the Farad gage] consisting of an average flow of 500 cubic feet of water per second each day during the period commencing March 1 and ending September 30 of any year, and an average flow of 400 cubic feet per second each day during the period commencing October 1 and ending the last day of the next following February of any year.

! **Reduced Floriston Rates** reduce the Truckee River's minimum allowable rate of flow at the Farad gaging station from 350 cfs (Orr Ditch Decree rights) to 300 cfs during the period commencing November 1 and ending the next following March 31 of each year, determined as follows:

(a) 350 cubic feet per second whenever the elevation of the water surface of Lake Tahoe is below 6,226.0 feet above sea level and not below 6,225.25 feet above sea level; and

(b) 300 cubic feet per second whenever the water surface elevation of Lake Tahoe is below 6,225.25 feet above sea level.

In addition to crucial operating criteria for Truckee River operations, the 1935 Truckee River Agreement further contained language intended to settle the long-standing disputes over pumping Lake Tahoe when it fell below its natural rim of 6,223.0 feet by:

- ! Establishing the natural conditions in the bed and banks of Lake Tahoe and of the Truckee River near Tahoe City, Placer County, California, and prohibiting any alteration of such natural conditions without the approval of the Attorney General of the State of California, and, in fact, allowing parties to the agreement the right to restore these areas to their natural condition, as necessary;
- ! Prohibiting the creation of any other outlet of Lake Tahoe in addition to the present and natural outlet at the head of the Truckee River;
- ! Prohibiting the removal of water from Lake Tahoe for irrigation or power uses by any means other than gravity except upon the declaration of the U.S. Secretary of the Interior; and
- ! Prohibiting the removal of water from Lake Tahoe for sanitary or domestic uses by any means other than gravity, except upon the condition that the Departments of Health of the States of Nevada and California, or other officers exercising similar authority, shall first have made and filed with the Attorney General of the State of Nevada and the Attorney General of the State of California certificates showing that a necessity for such pumping of Lake Tahoe exists (TRA:54).

Orr Ditch Decree (Truckee River).—The 1944 Orr Ditch Decree, which incorporates the Truckee River Agreement, affirmed numerous individual water rights (both municipal and industrial and agricultural), including Truckee River diversion rights earlier than 1939. This decree represented a tabulation or adjudication of water rights for the Truckee River *within* Nevada and its tributaries regulated through a series of reservoirs and irrigation canals, administered by the U.S. District Court Federal Water Master in Reno, Nevada. The Orr Ditch Decree represented the culmination of a "friendly suit" (*U.S. v. Orr Ditch Water Company, et al.*) filed in 1913 by the USRS to quantify water rights on the Truckee River in Nevada in order to secure Truckee River water rights for its Truckee-Carson (Newlands)

Irrigation Project. In combination with the Truckee River Agreement and the Floriston Rates, the Orr Ditch Decree currently represents the basis for operation of the Truckee River between its source (Lake Tahoe) and its terminus (Pyramid Lake). The Orr Ditch Decree incorporates the provisions of the Truckee River Agreement, which provides for operation of storage facilities, especially Lake Tahoe, to satisfy Truckee River water rights. The Floriston Rates constitute the chief operational objective on the Truckee River today and originated as a turn-of-the-century flow requirement for original run-of-the-river users--hydropower and a pulp and paper mill. While the Orr Ditch Decree establishes water rights for entities within Nevada using the Truckee River's waters, the Truckee River Agreement, as part of that Decree, determines the operational mechanisms to satisfy those rights.

Sierra Valley Decree (Little Truckee River) .—The 1958 Sierra Valley Decree (precipitated from *U.S. v. Sierra Valley Water Company, et al.*) allows the Sierra Valley Water Company to divert a portion of the Little Truckee River in California into the Feather River Basin for use as supplemental irrigation in the Sierra Valley (TRA:60). The maximum allowable diversion is 60 cubic feet per second between March 15th and September 30th of each year. The amount varies with the flow of Bonta Creek, averaging approximately 5,700 acre-feet per year (although as a supplemental water source, diversions typically vary between 1,500 acre-feet to 10,000 acre-feet). The priority date of this water right was set at 1870.⁽¹⁶¹⁾

Tahoe-Prosser Exchange Agreement.—The Tahoe-Prosser Exchange Agreement ("Agreement for Water Exchange Operations of Lake Tahoe and Prosser Creek Reservoir") was finalized in June 1959 and designated certain waters in Prosser Reservoir as "Tahoe Exchange Water." By this agreement, when waters are to be released from Lake Tahoe for a minimum instream flow (50 cfs winter; 70 cfs summer) and when such releases from Lake Tahoe are not necessary for Floriston Rates due to normal flows elsewhere in the river, then an equal amount of water (exchange water) may be stored in Prosser Reservoir and used for releases at other times.⁶⁹ The agreement provides for release of water from Prosser Creek Reservoir for the purpose of maintaining Floriston Rates in exchange for prior releases from Lake Tahoe needed to sustain the Truckee River fishery immediately below the lake for longer periods.

Alpine Decree (Carson River).—The Alpine Decree is the Federal Court adjudication of the relative water rights on the Carson River which is the primary regulatory control of Carson River operations today. The decree is

administered in the field by a Water Master appointed by the federal district court. The decree, finally issued on October 28, 1980 after initial litigation was begun in 1935, established the respective water rights (to surface water only) of the parties to the original lawsuit, both in California and Nevada, to Carson River water. The decree did not make an interstate allocation of the Carson River between California and Nevada; it only quantified individual water rights. Neither state was a party to the decree.

In addition to Carson River surface water rights, the Alpine Decree also established the rights to reservoir storage in the many small high alpine lakes and reservoirs in the upper Carson River watershed. The decree confirmed the historical practice of operating the river on rotation, so that irrigators with more junior priorities could be served as long as possible. These upper alpine reservoirs were permitted to fill out of priority order, in accordance with historical practice, because snow melt at this high elevation comes late enough into the summer that flows are already beginning to diminish in the valley below. The decree also allows the historical practice of refilling reservoirs more than once during the runoff season.

The decree also specifically recognized riparian water rights in California (as distinguished from the quantified appropriative water rights used in Nevada). For purposes of water distribution, the Carson River and its east and west forks, were divided into eight segments and when the river went into regulation (i.e., there was not enough water in the Upper Carson River to serve the most junior priority) each segment of the river was to be administered autonomously.

Duties of water were set forth for various locations according to bench land and bottom land designations. For lands in the Newlands Irrigation Project (i.e., below Lahontan Dam) in Churchill County near Fallon, the Alpine Decree provided for an annual net consumptive use values for water that can be transferred when there is a change in use from irrigation to any other purpose. A total of 2.99 acre-feet per acre can be transferred and a maximum water duty of 4.5 acre-feet per acre for water-righted bench lands and 3.5 acre-feet per acre for water-righted bottom lands *delivered to the land*. For lands above the Newlands Project (i.e., above Lahontan Reservoir), the net consumptive water use that can be transferred was set at 2.5 acre-feet per acre with water duties of 4.5 acre-feet per acre *diverted to the canal* for bottom lands, 6.0 acre-feet per acre diverted to the canal for the alluvial fan lands and 9.0 acre-feet per acre diverted to the canal for the bench lands. This annual net consumptive use, or crop water requirement, was based on the water duty of alfalfa, as it is a dominant and the highest water-using crop

grown in Nevada. While the Alpine Decree established water duties for bench and bottom lands throughout the Carson River Basin, it made no identification of those lands. The decree also granted landowners on the Newlands Project an appurtenant water right for the patented lands, effectively transferring water rights to these land holders individually.

Preliminary Settlement Agreement⁷⁰.—In May 1989 a Preliminary Settlement Agreement (PSA) was negotiated between the Pyramid Lake Paiute Tribe of Indians and Sierra Pacific. The PSA was later incorporated into Public Law 101-618 by reference and was mandated to be incorporated in the new Truckee River Operating Agreement mandated under the Settlement Act.

In this agreement, Sierra Pacific agreed to waive the hydroelectric water rights that it had been granted in the Truckee River General Electric Decree and the Orr Ditch Decree. Sierra Pacific also waived its claim to unappropriated water in favor of the Tribe. Another requirement of the PSA, was that the Reno-Sparks metropolitan area would be required to implement conservation measures reducing water use by about ten percent.⁷¹ In exchange, Sierra Pacific was permitted to utilize unused storage capacity in Truckee River Reservoirs, where it will store water from its Donner and Independence Lakes reservoirs and from its agricultural rights. The PSA provides Sierra Pacific the ability to store up to 39,500 acre-feet of water covered by a portion of its water rights at times when it was not needed for municipal and industrial water supply in the Reno-Sparks metropolitan area. This water is to be used to meet M&I needs during drought years. On April 1 of non-drought years, a portion of Sierra Pacific's previously stored water is given to the fish.

The PSA exchange allows the water that would normally have been used to maintain Floriston Rates for hydroelectric power generation by Sierra Pacific enabling better timing of flows to benefit spawning for the fishery at Pyramid Lake. This is water that would have eventually gone into Pyramid Lake anyway. Under the PSA, however, instead of releasing that water year-round to maintain Floriston Rates for Sierra Pacific, it is stored as "Fish Credit Water" and released as needed for spawning. Since the Stampede Reservoir, where much of the new storage capacity for Sierra Pacific was to be located, was exclusively managed to benefit the Pyramid Lake fishery, the Pyramid Lake Tribe needed to agree to this provision.

In comments to the draft report, the Tribe submitted the following background on the PSA:

Since the turn of the century, the federal reservoirs on the Truckee River have been operated to meet specific rates of flow measured at the state line (Floriston Rates) primarily to generate hydroelectric power in the upper portion of the basin and to serve agricultural uses in the Truckee Meadows (around Reno and Sparks) and the Newlands Project. By 1990, the significance of the hydroelectric power produced by the four small run-of-the-river plants had declined to the point where they produced less than 0.5% of the power supplied by Sierra Pacific Power Company (Sierra). The amount of irrigated land in the Truckee Meadows had been reduced by more than 50% and Truckee River diversions to the Newlands Project had been cut by more than 60%. During this period, the population of the Reno-Sparks metropolitan area grew substantially and the Truckee River/ Pyramid Lake ecosystem deteriorated, jeopardizing Pyramid Lake's protected species and their critical habitat.

Notwithstanding all of these major changes and developments, the operation of the Truckee River system appeared to be frozen in time. Water required to meet the Floriston Rates had to be released by virtue of court decrees even if the water was not needed at the time and even if its retention and subsequent release would have improved the health and well-being of Pyramid Lake's protected fish. There was no incentive for urban conservation because, regardless of the M&I demand, the same amount of water would be released from the reservoirs and flow past Reno and Sparks. New reservoirs were added to the system, Boca in the 1940s, Prosser Creek in 1959 and Stampede in 1970, but all of the reservoirs were operated in a piecemeal, uncoordinated and inefficient manner. Maintenance of instream flows and reservoir recreation levels were ignored as were the frequent violations of the Truckee River's water quality standards. In short, the situation clearly cried out for a major overhaul but the inflexible system in place seemed embedded in concrete and resistant to change.

This was the backdrop to the negotiations which commenced in earnest in 1988 between the Tribe and Sierra under the auspices and guidance of Nevada Senator Harry Reid.⁷² Sierra needed a secure drought water supply for its M&I customers. It had long planned on utilizing Stampede Reservoir for that purpose but the courts had ruled that the first priority of the water stored in Stampede was for spawning flows

for Pyramid Lake's protected species. Sierra brought several valuable assets to the table, most notably ownership and control of a significant portion of the water released to satisfy the Floriston Rates (which was used solely to generate hydroelectric power and then returned to the River), Truckee River water rights (many of which were formerly used for agricultural purposes) substantially in excess of the quantity necessary to meet the needs of its customers in most years and privately owned and stored water (POSW) in Donner and Independence lakes. The POSW was burdened with several constraints which severely limited its value to Sierra. The Tribe's major negotiating leverage was Stampede Reservoir.

This mixture gave birth to the breakthrough PSA. The Tribe agreed that Sierra could use the excess space in Stampede Reservoir to store and carry over the consumptive use portion of its excess water rights and its POSW for a M&I drought water supply. Sierra agreed: (i) to turn over to the Pyramid Lake fishery in non-drought years its drought water in excess of specified amounts; (ii) to allow Floriston Rate water to be retained in storage for the benefit of the Pyramid Lake fishery to the extent the water that would have been released would have been diverted solely for the generation of hydroelectric power and would have flowed to Pyramid Lake; and (iii) to undertake significant water conservation measures including a program estimated to cost approximately \$25 million to install water meters on all residences within its service area.⁷³

The PSA benefitted Sierra by significantly enhancing its drought water supply. The major advantage to the Tribe was the modification of the Floriston rate regime to augment substantially the spawning flows in the lower Truckee River during the spring and summer months. The PSA was not intended to increase the total volume of inflow to Pyramid Lake. OCAP and the Water Quality Agreement achieve that goal.

It is very important to note that Sierra paid a price in the form of water, a waiver of hydroelectric rights and expensive conservation measures for the use of space in federal reservoirs. The reservoirs were used, in effect, as leverage to redress the historic imbalance in the allocation and management of Truckee River water resources. Space in the federal reservoirs was made available to Sierra in return for measures that would benefit the Pyramid Lake fishery. This policy fulfilled both endangered species and Indian trust obligations. This

critically important precedent, that the benefit of additional storage in federal reservoirs would be provided in return for measures that would contribute to the recovery of Pyramid Lake's protected species, was subsequently carried over to other parties in the TROA.

The PSA also demonstrated to the Reno/Sparks community and to other interested parties that mutually acceptable and beneficial solutions could be found for the area's water problems. Prior to the PSA, there was a general feeling that Indian rights and endangered species obligations were inherently and inevitably at odds with all other water related interests in the Truckee and Carson basins except perhaps for environmental interests. The new attitude engendered by the PSA led to the Tribe being asked in 1994 to appoint a tribal representative to sit as a voting member of a regional water planning commission formed by Reno, Sparks and Washoe County [the Water Planning Commission of Washoe County]. The local community decided on its own that it was better to work with the Tribe from the outset and to try to find ways of addressing water issues that would benefit the system as a whole, or failing that, at least would not harm the downstream interests of the Tribe, than to proceed on its own and risk more adversarial encounters.⁷⁴ [We are] not aware of any similar arrangement between local governmental entities and an Indian tribe.

There is one other aspect of the PSA that deserves mention. . . . Section 28 was included in the PSA to insure that all holders of water rights under the Truckee River (Orr Ditch) decree, including those on the Newlands Reclamation Project, would continue to receive the amount of water to which they are entitled and that they would not be injured by the Floriston Rate modifications authorized in the PSA. This provision in the first step of the settlement process clearly shows that the Tribe, Sierra and the federal government (which later ratified the PSA) had no intention of interfering with the rights of Newlands Project irrigators.

Interim Storage Contract.—In November 1995, by means of an interim agreement between Sierra Pacific and the Pyramid Lake Paiute Tribe, the federal Water Master dropped the Truckee River's minimum allowable rate of flow at the Farad gaging station from 350 cfs (Orr Ditch Decree rights) to 300 cfs. The difference in flow will allow an estimated twenty to thirty thousand acre-feet to be stored in Stampede Reservoir and used during the next spring's spawning run for Pyramid Lake's endangered cui-ui sucker

fish.⁷⁵ Sierra is required under the terms of the Interim Storage Contract to waive its single-purpose hydroelectric right for 15 years in exchange (among other things) for the ability to store water in federal reservoirs until TROA is effective. Sierra Pacific's maximum amounts of "base storage" will only be reached at the full implementation of the negotiated settlement, about 50 years in the future.

Water Quality Agreement.—*[Note: the following discussion is extracted from comments to the draft report submitted by the Tribe.]* In the 1980s, water quality lawsuits were filed by Reno and Sparks against the Tribe and by the Tribe against Reno, Sparks, the Federal Environmental Protection Administration (EPA) and the Nevada Division of Environmental Protection. The lawsuits involved the validity of an EPA grant for the expansion of the Reno/Sparks Sewage Treatment Plant. EPA had issued the grant even though the Fish and Wildlife Service had concluded in its biological opinion issued under Section 7 of the Endangered Species Act that the grant would jeopardize the continued existence of Pyramid Lake's protected species.

The Settlement Act (section 210(a)(1)) requires as a condition of the effectiveness of several of its major provisions that five listed lawsuits be dismissed with prejudice or otherwise finally resolved. The water quality lawsuits were not included on that list because at that time the parties did not know of any mutually acceptable negotiated solution. They wanted to proceed to resolve the issues they were confident could be settled and not risk losing everything because of being unable to find a solution to the water quality lawsuits.

The 1996 water quality settlement grew out of the 1994-95 facilitated, "second generation" negotiations. During these negotiations, Reno, Sparks, Washoe County, the Tribe and the federal government reached an agreement in principle under which the water quality lawsuits would be dismissed. The federal government and the Truckee Meadows interests would each contribute \$12 million, for a total of \$24 million, toward the purchase of water rights to be used to improve water quality in the Truckee River, from the California/Nevada state line to Pyramid Lake, and in Pyramid Lake. A significant portion of the acquired water rights would be stored upstream in federal reservoirs under the provisions of TROA and would be released primarily during low flow periods in the summer months to improve water quality conditions. The water rights to be acquired with the \$24 million would be used solely for instream flows; they could not be diverted for M&I use or for any other purpose.

The Water Quality Settlement Agreement embodies these principles. Among other things, it includes a provision stating that no water rights from the Carson Division of the Newlands Project would be acquired pursuant to the Water Quality Agreement. It is anticipated that water rights from the Truckee Division along the Truckee Canal will be acquired under that agreement.

The augmentation of Truckee River instream flows primarily during low flow periods in the summer months was deemed to be the best, most practical and most cost effective way of improving water quality conditions in the Truckee River by experts from the Tribe, the State of Nevada, the Truckee Meadows urban interests, EPA, the Fish and Wildlife Service and the Bureau of Indian Affairs. Those increased flows also will improve the riparian habitat along the River which will eventually further improve water quality by increasing the shade canopy and thereby reducing water temperatures. At the same time, the increased flows into Pyramid Lake will raise its level, improve its water quality and increase recruitment of fish to the lake by facilitating the passage of larger numbers of cui-ui and Lahontan cutthroat trout spawners through the delta at the mouth of the Truckee River.

The Water Quality Agreement provides substantial benefits to the Truckee Meadows urban interests in addition to the settlement of the lawsuits. The Truckee River flows through the heart of downtown Reno. A healthy and vibrant river corridor helps attract visitors which are vital to the local tourist/gaming based economy. Reno is now planning a major redevelopment effort along the river featuring cafés, bars, restaurants and shops. The river also is important to the residents of Reno and Sparks. The community's dependence on the river was heightened during the recent severe drought in the late 1980s and early 1990s when the river frequently dried up during the summer months and wildlife dependent on the river suffered severely.

The Water Quality Agreement also contributes significantly to environmental values further upstream in California. The water quality water released from upstream reservoirs during low flow periods will help meet the minimum and preferred flows in the upstream portion of the river and its tributaries. The additional water held in storage will improve recreation levels.

In short, the Water Quality Agreement benefits everyone on the Truckee River from Lake Tahoe to Pyramid Lake. It will contribute substantially to meeting the water quality standards of the Clean Water Act and inflow stream requirements in California, Nevada and the Pyramid Lake Indian

Reservations. It will also go a long way toward implementing the objectives of the cui-ui recovery plan. There will be a further reduction in irrigated agriculture, but that would likely happen in any event and the owners of the acquired water rights will receive fair compensation, i.e., their rights will not be “taken” through regulation.

The parties to the Water Quality Agreement recognize that the interests of the Town of Fernley are affected by the proposed purchases of water rights from the Truckee Division of the Newlands Project and that it is desirable to reach an accommodation with Fernley. Fernley is located in close proximity to the Town of Wadsworth which is within the Pyramid Lake Indian Reservation. Wadsworth and Fernley share some of the same resources, problems, interests and concerns. Hopefully, an agreement with the Town of Fernley will be the next step in the process of changing the operation, management and distribution of the waters of the Truckee River to meet the needs of the 21st century and beyond.

Truckee River Operating Agreement.—Under the provisions of P.L. 101-618, the Secretary of Interior was ordered to negotiate an operating agreement with the State of Nevada and the State of California, for the operation of the Truckee River and the Newlands Project (the Truckee River Operating Agreement, or TROA). Under the terms of this law, the TROA must:

- ! Provide for the operation of the Truckee River reservoirs to satisfy dam safety and flood requirements;
- ! Provide for the enhancement of spawning flows available in the Lower Truckee River for the Pyramid Lake fishery (in order to meet the requirements of the Endangered Species Act);
- ! Carry out the terms of the Preliminary Settlement Agreement; and
- ! Ensure that water is stored and released from Truckee River reservoirs to satisfy the exercise of water rights in conformance with the Orr Ditch and Truckee River General Electric Decree, except where those rights have been modified by the Preliminary Settlement Agreement—or which are transferred pursuant to State law (Sec. 205(a)).

The TROA must also minimize the costs associated with the operation and maintenance of Stampede Reservoir. In order for the TROA to enter into effect, it must be signed by the States of Nevada and California, the Secretary of Interior, Sierra Pacific Power Company, and the Pyramid Lake

Paiute Tribe (the latter two signatories are required as a function of the Preliminary Settlement Agreement). The TROA also has to be approved by both the Orr Ditch and Truckee River General Agreement (TRGA) courts.

Other affected parties will be provided the opportunity to sign the agreement, although this is not mandated by P.L. 101-618. Nine additional signatures are sought, in an attempt to go before the Orr Ditch and TRGA courts for approval with no protest. These nine include the Truckee-Carson Irrigation District; Washoe and Churchill counties; the cities of Sparks, Reno and Fernley; and Washoe County Water Conservation District, among others.

Under TROA, reservoir operations and stream flows in the Truckee River basin would be managed by a combination of new operating procedures, an allocation of Lake Tahoe water and Truckee River water between the States of Nevada and California, and many elements of existing court decrees, agreements and regulations. The TROA provides a water management tool for making effective and more efficient use of existing federal and non-federal reservoirs, and for improving the timing and magnitude of river flows. It would contain procedures intended to achieve the following primary benefits:

- ! Increasing the municipal and industrial (M&I) drought water supply for the Truckee Meadows area;
- ! Enhancing spawning flows for Pyramid Lake fish;
- ! Enhancing instream flows and water quality;
- ! Sustaining reservoir storage to serve recreational uses

These benefits would be realized by modifying several of the present water storage and release practices. TROA would not alter or conflict with presently exercised water rights or interfere with flood control and dam safety criteria. There are two key elements of TROA:

- ! Retain in storage, under new water categories, pooled water that would have been released and/or runoff water that would have been passed through federal reservoirs to achieve Floriston Rates, if not needed to immediately satisfy the exercise of Orr Ditch Decree affirmed water rights.

- ! Exchange stored water among Truckee River reservoirs. TROA will facilitate and encourage coordination of scheduled releases and exchanges of water among reservoirs. This will allow a scheduled release from one reservoir to be substituted for a release from another, with water accounts in the two reservoirs credited or debited. Water would not necessarily need to be physically moved between reservoirs under this arrangement and releases of stored water for a single purpose could be coordinated to derive multiple benefits. Thus, existing water and storage rights will be served while enhancing instream flows and recreation pools and possibly retaining water that would otherwise spill in storage elsewhere.

These river reoperation provisions coordinate empty space in five federal reservoirs (Tahoe, Prosser Creek, Martis Creek, Stampede, and Boca) for use as if it were a new reservoir. Water is moved around within the system via exchanges and credits, to place water for a particular use in the location where it best serves the need. In addition, California would be allocated space for M&I supply and allowed to temporarily use designated waters for enhancing instream flows and recreational pools.

Credit Water is a new category of stored water that would be created by TROA. Storage of M&I or fish credit water would be accomplished by retaining in Truckee River Reservoirs certain stored or runoff water that would otherwise have been released to achieve Floriston Rates and by exchanging or restoring certain privately owned water. Among the categories of storage and credit water would be:

- ! Pooled Water
- ! M&I Credit Water
- ! Fish Water and Fish Credit Water
- ! Tahoe-Prosser Exchange Water
- ! Water Quality Water (under the Water Quality Agreement)
- ! Sierra Pacific privately owned water
- ! California M&I Storage
- ! Joint Program Fish Credit Water (for use in California)
- ! Other Stored Water

Exchanges would be the main procedure for moving (physically or administratively) water categories among the reservoirs to conserve storage, enhance instream flows, and maintain reservoir recreational pools. Exchanges could be made between any water categories. Exchange

procedures would vary with reservoir, water category, and hydrologic conditions. Exchanges could be made by:

- ! Trading (administratively) water in one reservoir for that in another;
- ! Releasing water from one reservoir in lieu of another; or
- ! Moving water from an upstream water to a downstream reservoir.

In comments to the draft report, the Tribe submitted the following additional background on TROA:

TROA is still a work in progress. It implements and builds on the foundation provided by the PSA. Among other things, in its current form it provides for further modifications in Floriston Rates and additional credit storage to improve instream flows in the Truckee River and its tributaries in California, enhance recreation levels in the federal and non-federal reservoirs in California, enhance instream flows and improve water quality in the Truckee River in Nevada, particularly in the lower river below Derby Dam, and provide storage for additional water rights acquired by the Tribe and/or the federal government for fish purposes and for an M&I water supply for use in California. TROA also eventually may include storage for an M&I water supply for the Town of Fernley.

There is much to be said and written about the TROA negotiation and implementation process. . . . All of the major interested parties, from the top of the Truckee River watershed in California to its terminus on the Pyramid Lake Indian Reservation, with the sole exception of the Lahontan Valley irrigation and M&I interests, have achieved an unprecedented degree of cooperation. The federal government has participated in a responsive and constructive manner, frequently advancing creative proposals to resolve differences or to satisfy the needs of one party without harming the interests of any other party. All of the participants are now viewing the issues and the alternatives not just from the standpoints of their own interests, but from the broader perspective of the watershed as a whole.⁷⁶ [The Tribe is] not aware of any other place in the West where integration, consultation, and coordination to this extent has occurred within an entire watershed. This state of affairs is all the more remarkable because in the mid- 1980s there was probably more conflict and litigation on the Truckee River than any other stream in the West. This striking change for the better deserves more than just passing mention. . . .

Army Corps Flood Control Criteria.—The COE flood control criteria govern operation of the federal reservoirs, except Lake Tahoe, for flood control during winter months. Lake Tahoe is monitored and, if factors such as snowpack water content and precipitation suggest that lake levels would rise above the maximum permitted storage elevation, water is released from the lake so as not to exceed an elevation of 6,229.1 feet. Flood releases are monitored as well to ensure that damages downstream are minimized.

COE flood control procedures govern the combined operation of Martis Creek, Stampede, Boca and Prosser Creek reservoirs for downstream flood protection in the winter. Up to 65,000 acre-feet of capacity in the four reservoirs combined is held in reserve to accommodate potential flood flows (see the *Truckee River Atlas*, Chapter 7 for further details). All of Martis's capacity is available for this use; the remaining space is allocated among the other reservoir and inflows that encroach into the flood control reservation must be released.

During a flood, releases are made to limit (to the extent possible) flows in the Reno area to the channel capacity of 14,000 cfs. When possible, flows are limited to 6,000 cfs, which is the nominal channel capacity in the Truckee Meadows below Reno (TRA:92). Flood protection improvements in this area are planned to increase channel capacity to 14,000 cfs throughout Truckee Meadows.

Lake Tahoe Wastewater Agreements.—Disposal of treated wastewater is banned within the Lake Tahoe basin to help protect the lake's famous clarity. Local agencies responsible for treatment are required to export wastewater from the basin. Wastewater is exported either to the Truckee River watershed downstream, or to the Carson watershed. The largest export to the Carson comes from South Tahoe PUD over Luther Pass into Alpine County. This export began in the 1960s and was delivered to Indian Creek Reservoir, constructed especially for that purpose. Today, effluent exports amounting to 4,000 to 5,000 acre-feet per year are sent to Harvey Place Reservoir; Indian Creek is used for freshwater recreation. The wastewater is delivered from the reservoir to selected agricultural users for irrigation in specified areas.

Operating Criteria and Procedures

Background.—In 1964, the Secretary of Interior formed a task force to study and report on Newlands Project operations and management and to resolve conflicts among various users regarding the right-of-use of available

water. Subsequently, a task force was established to formulate Operating Criteria and Procedures (OCAP) for the project.

OCAP were first instituted by the Secretary on October 1, 1967, to provide for coordinated operation of the Truckee and Carson Rivers while making diversions for irrigation use. These OCAP were reinstated annually through 1972 and specified that maximum use would be made of Carson River water, while diversions from the Truckee River would be minimized, “to make as much water available to Pyramid Lake as possible.” An OCAP with an annual diversion limit from both rivers of 378,000 acre-feet was approved by the Secretary of Interior in 1972 but subsequently rejected and a court order was issued directing the Secretary to revise the OCAP to, among other things, “give proper weight to the maximum farm headgate entitlements of both the *Orr Ditch* and *Alpine* decrees.” The Secretary submitted an OCAP with a diversion limit of 358,000 acre-feet, together with a lengthy explanation of why this diversion limit was based solely on the *Orr Ditch* decree bottom and benchland water duties (3.5 and 4.5 acre-feet per acre, respectively) and did not use the duty of 2.92 acre-feet per acre specified in 1949 and 1950 temporary restraining orders in the *Alpine* case. The diversion limit of 358,000 acre-feet was based on 60,500 acres in irrigation, an average water duty of 3.473 acre-feet per acre, and a conveyance efficiency of 58.7%. The court found that the Secretary’s amended OCAP did not conform to his order and ordered the Pyramid Lake Paiute Tribe to submit an OCAP that would comply. The Tribe submitted an OCAP with a diversion limit of 288,129 acre-feet, based on 55,210 acres, an average water duty of 3.200 acre-feet per acre, and a conveyance efficiency of 61.3%. The Tribe’s calculation assumed the *Alpine* water duty was applicable to three-fourths of the Carson Division, and the *Orr Ditch* bottom land duty was applicable to the remainder of the division. On February 20, 1973, the Federal District Court found that Newlands Project water diverted for use by TCID was inefficiently used. (The Project uses flood irrigation and its pre-OCAP delivery systems were highly inefficient by current standards. Approximately 40% of the water did not reach the crops it was diverted to irrigate.) The court ordered the implementation of an OCAP which limited the combined annual project diversion from the Carson and Truckee Rivers to 350,000 acre feet in 1973 and 288,129 acre-feet in 1974. The use of water for single-purpose power generation was no longer allowed, and diversion criteria were implemented to limit storage in Lahontan Reservoir and thereby reduce reservoir spills and evaporation.

In a second important case,⁷⁷ the Secretary of the Interior was *required* to deliver all water to Pyramid Lake not otherwise obligated by court decrees or

contracts. The court further ordered the Secretary to enforce the 1973 OCAP; if the provisions of the OCAP were violated further, the court asserted, the 1926 Newlands contract with TCID was to be terminated. The Secretary terminated the contract, as directed,⁷⁸ and TCID brought suit. The central issue in the litigation was whether or not the Secretary's compliance with the court order on OCAP was legal. Interior put TCID on notice that any water diverted in excess of the court-ordered OCAP would be recouped. TCID continued diverting above the amount to which it was entitled under OCAP, an action that neither Reclamation nor the federal Water Master prevented. From 1973, Reclamation issued an interim OCAP each year, pending the outcome of the case. The case concluded in 1985 with the courts upholding the United States. Interim OCAP with approved modifications continued to be issued through 1987, when the 1988 OCAP were adopted.

1988 OCAP.—In April 1988, the Federal District Court in Reno, Nevada preliminarily approved a new OCAP until objections could be ruled upon, and the Secretary of the Interior adopted the OCAP for the Newlands Project with respect to allowable water diversions.

The OCAP expressly state that they are designed to achieve compliance with the Truckee (*Orr Ditch*) and Carson (*Alpine*) decrees. It is the federal government's position that they provide for and are predicated on the delivery of the legal entitlements to the farm headgates for all irrigated water-righted land within the Project. The irrigators, as discussed below, believe that they constitute a "taking" of property rights.

The 1988 OCAP stated nine guiding principles, as follows:

- ! Provide water deliveries sufficient to meet the water right entitlements of project water users;
- ! Meet the requirements of the Endangered Species Act as they specifically relate to the Truckee River/Pyramid Lake cui-ui
- ! Fulfill federal trust responsibilities to the Fallon Paiute-Shoshone Indian Tribe;
- ! Fulfill federal trust responsibilities to the Pyramid Lake Paiute Indian Tribe;

- ! Conserve wetland and wildlife values in both the Truckee and Carson River basins;
- ! Give cognizance to the State laws affecting water rights and water uses;
- ! Provide for stable economies and improve quality of life in the region to the extent it is influenced by Interior-managed resources and facilities;
- ! Allow local control and initiative to the maximum extent possible; and
- ! Provide stability and predictability through straightforward operation based on actual versus forecast conditions.

The preamble to the 1988 OCAP states that it “relies on both rules and incentives.” Procedures are included to monitor water use and Project operations and to enforce the OCAP. The introduction states that Interior believes the OCAP efficiency targets are reasonable because they are “achievable,” “without significant capital expenditures”, and “are within the range of efficiencies achieved in comparable systems.” The OCAP are designed “to produce a long term average effect, recognizing that each year will necessarily be different.”

There are three basic elements, according to the 1988 OCAP introduction: (1) monitoring headgate deliveries against the acreage eligible to receive Project water multiplied by court-decreed water duty; (2) efficiency targets coupled with incentives for more efficient operation and disincentives (water debits) for less efficient operations; and (3) a maximum allowable diversion (MAD) limit for irrigation and a maximum efficiency deficit (MED). The latter limits are set with the intent of providing a cushion for TCID operations, but “neither limit is expected to ever be encountered in actual operation.”

Under the 1988 OCAP, in any given year, the Project's maximum water allotment determined by the MAD is based on actual project water-righted *and* irrigated acreage, bench and bottom lands designations, and the water duties specified under the Orr Ditch and Alpine decrees. The MAD may vary from year to year and is comprised of the sum of maximum headgate entitlements plus distribution and operation losses. The 1988 OCAP states that, potentially, 73,000 acres of Project land could be irrigated and included in the MAD. However, the maximum acreage has never been irrigated. The acreage projected to be irrigated in 1988 through 1992, as shown in the 1988 OCAP, ranges from 61,630 acres (1988) to 64,850 acres (1992). The MAD in

1996 was based on 59,689.44 acres, of which about 4,000 acres are located in the Truckee Division, fed directly from the Truckee Canal (Truckee River waters only), and the remainder in the Carson Division, fed from Lahontan Reservoir (Carson and Truckee River waters).⁷⁹

The MED “is a fixed number set equal to the operating cushion” and represents “the limit on how much accumulated storage can be borrowed from the future to satisfy a less efficient operation.” The OCAP state that, if the MED is exceeded and an acceptable plan to reduce the MED is not furnished by TCID, allocations will be reduced by the amount in excess of the MED plus one-half of the MED (13,000 acre-feet). The OCAP state “Nominally this will mean a forced reduction of approximately 5% of entitlements. . . . Liabilities arising from shortages occasioned by operation of this provision shall be the responsibility of the District or individual water users.”

The 1988 OCAP uses diversion criteria to limit diversions from the Truckee River to Lahontan Reservoir. It is based on models projecting average annual diversions to TCID from the combined Carson-Truckee system of about 320,000 acre-feet/year. The 320,000 acre-foot limit does not appear directly in the OCAP itself (except in an example table showing the MAD at various percent entitlement delivered), however the OCAP has the effect of reducing annual diversions from all sources to satisfy Project irrigation rights from 370,000 to 320,000 acre-feet (at the corresponding entitlement delivery level).

The 1988 OCAP also suggests possible conservation measures to improve project efficiency, and provides for incentives and penalties to encourage the Project operator to achieve efficiency improvements. Efficiency levels were phased in over a five-year period and beginning in 1992, the maximum required Project efficiency was set at 68.4% if all eligible Project lands received their maximum headgate entitlements. Efficiency is defined as maximum headgate entitlement divided by the MAD; in practice, it is measured as the quantity of water delivered at the farm headgates divided by the total diversions to the Project. The 1988 OCAP sets a range of efficiency targets depending on the percent of maximum headgate entitlements used by the irrigators as a whole. In 1992 and beyond (the end of the phase-in period), these range from 64% (at 75% of entitlements) to 68.4% (at 100%). The irrigators typically use 90% to 95% of their entitlements; if so, their efficiency target would range between 65.5% and 67.5%. If the target is not reached, a water penalty is imposed the next year; if exceeded, a water credit is given in the following year. The conservation criteria apply only to the irrigation system efficiency in delivery canals and

laterals; they do not apply to Lahontan Reservoir and the Truckee Canal, nor do they apply on the farms.

Functionally, the OCAP works as follows: Truckee River diversions to the Carson Division are governed by end-of-month storage target levels in Lahontan Reservoir. When Truckee River water is available at Derby Dam (i.e., when not required to meet more senior water rights), water is diverted from the Truckee River through the Truckee Canal to Lahontan Reservoir each month. Truckee River diversions to the Carson Division are limited to supplementing Carson River flows to the extent that such flows are insufficient to meet at Lahontan Reservoir end-of-month storage targets. The storage target for June, for instance, is 215,000 acre-feet. If Carson River flows and previous diversions from the Truckee River are insufficient to reach that target and water is available in the Truckee River (beyond that required to meet more senior water rights), then water is diverted from the Truckee to Lahontan Reservoir. The monthly targets are intended to be adequate to serve all Carson Division water rights in full water years and many drought years at 100% of demand, given operation of the project at target efficiency. Monthly storage objectives are based on NRCS forecasts; a formula for calculating the monthly storage objective is defined in the OCAP.

If the reservoir is above the target levels, water may not be diverted. If the project exceeds its target efficiency level based on the amount of water rights served, it gets a water credit; if it is below the efficiency level it gets a debit. If the following year is a water-short year (i.e., a drought), the debit is written off to the extent it is offset by drought shortage, however an additional shortage over and above that caused by drought may be required if the drought shortage is less than the debit shortage. For example, if a debit of 20,000 acre-feet exists and drought causes a shortage of 15,000 acre-feet, the 15,000 acre-feet of drought shortage is written off the debit, but 5,000 acre-feet of debit remain. TCID is able to employ any method it chooses to achieve the efficiency targets and was given five years to achieve them (from the 1988 OCAP).

Notwithstanding the OCAP's stated protection of water rights, certain restrictions on Truckee River diversions are incorporated to protect the river's vulnerable resources. These include a prohibition on canal diversions which would reduce river flows below Derby Dam by more than 20% in a 24-hour period when the Truckee River flow (measured at the gage below Derby Dam) is less than 100 cfs, and a requirement to coordinate with releases from Stampede Reservoir to minimize fluctuations in the Truckee

River below Derby Dam to meet annual flow regimes established by FWS for listed species in the lower Truckee River.

In comments received on draft report, the Tribe cites the following OCAP measures as key to conserving water for Pyramid Lake:

- ! Halting the practice of diverting and releasing water solely for the generation of hydroelectric power at and below Lahontan Dam during the non-irrigation season;
- ! Maximizing the use of Carson River water in the Carson Division of the Newlands Project and minimizing the diversion of Truckee River water and reducing spills, evaporation and conveyance losses by establishing monthly target storage levels for Lahontan Reservoir which constrain the amount and alter the timing of the Truckee River diversions;
- ! Requiring the Truckee-Carson Irrigation District (TCID) to keep track of the amount of actually irrigated land with water rights;
- ! Enforcing the maximum farm headgate delivery limitations of the Truckee (*Orr Ditch*) and Carson (*Alpine*) River decrees;
- ! Prohibiting the irrigation of non-water righted land; and
- ! Requiring TCID to minimize operational losses through enforcement of specified distribution system efficiencies for the Truckee and Carson Divisions.

Allowable diversions to the Truckee Canal can be stored in Stampede Reservoir and released to TCID as part of the reservoir credit allowed under the 1988 OCAP. TCID is entitled to a storage credit to the extent that the storage credit and actual Lahontan storage does not exceed the Lahontan target storage. Further litigation has established that Interior need not carry over the credit from year to year.⁸⁰

Newlands Project Efficiency Study.—Reclamation completed a *Newlands Project Efficiency Study* in January 1994 to fulfill requirements of P.L. 101-618 (Section 209(c)), which state the Secretary shall study the feasibility of improving the conveyance efficiency of Newlands Project facilities, as defined under applicable OCAP, to an average level of 75% or greater by November 16, 2002. The Secretary is also directed to consider the

impacts of the measures needed to attain this efficiency level on groundwater resources and wetlands in the Project area.

The *Efficiency Study* notes that “the Act does not require the Project to be operated at a 75% efficiency level but is meant to furnish a comprehensive plan to maximize the efficiency of the Newlands Project so that additional water is available to meet the increased demand for project water for other purposes [such as assisting with the recovery of the endangered cui-ui and the threatened Lahontan cutthroat trout], while protecting the viability of the Project.” (Again, “Project efficiency” in this context is actually the Newlands conveyance system efficiency and does not include on-farm efficiency.)

Two alternatives were developed and discussed in the *Efficiency Study*:

- ! The Least Cost Alternative relies on acquisition of water rights from targeted areas, transferring them to the wetlands, installing measuring devices at 49% of the turnouts, and lining the first 5.9 miles of the V-line Canal with concrete.
- ! The Structural Improvement Alternative relies on acquisition of water rights from targeted areas, installing measuring devices at 50% of the turnouts and lining 44.9 miles of major canals with concrete.

The *Efficiency Study* notes that “by setting efficiency targets, the OCAP sought to eliminate any wasteful operations and make any water savings available for competing uses particularly as they relate to Endangered Species Act requirements,” however neither the OCAP nor the *Efficiency Study* define “waste.” The OCAP does state that the key to the target efficiencies “is the application of ‘reasonable’,” and states that “reasonable” was defined in terms of current operating experience, the experience of other irrigation systems, economics, and environmental impacts, but provides no documentation as to how these things established the range considered “reasonable.”

Approximately 40% of the water that is diverted to service irrigated agriculture in the Newlands Project area does not make it to the fields. Part of this loss is due to seepage and evaporation (the diversionary ditches and canals are currently both unlined and uncovered) and some is due to operational spills. The Project has about 326 miles of canals running through uncompacted earth; only 7% of these are lined. The water balance reported in the Newlands Project Efficiency Study shows operational losses of 8,100

acre-feet and canal seepage (distribution system) losses of 81,300 acre-feet, in addition to 6,000 acre-feet of evaporation losses and 13,370 acre-feet of regulating reservoir seepage and evaporation losses. Seepage and evaporation are by far the major components of Newlands Project losses.

The *Efficiency Study* concludes that “a 75% efficiency level can be achieved on the Newlands Project through some combination of structural improvements and operational changes. Increasing the efficiency is likely to have significant impacts on both area groundwater and wetlands. Improved efficiency will lessen the volume of flow through the Project and consequently decrease recharge of the area aquifers which supply local municipal and well water. Agricultural return flows, which have been the major source of water for area wetlands in the past, are likely to decrease substantially as efficiency increases.” The economic feasibility of achieving such an efficiency level remains open to question, however. At issue is what measures are “reasonable” for the irrigators to undertake to achieve higher efficiencies.

According to testimony at the 1994 hearing on P.L. 101-618, activities to improve efficiency might include a combination of improved measurement of irrigation deliveries, lining of some canals, and targeting acquisition of blocks of Project land. In addition, testimony stated that FWS/Nevada acquisitions of Project water rights to transfer to wetlands, if well-targeted, could increase Project efficiency as well. The *Efficiency Study* notes, however, that the conservation estimates associated with measures listed in the 1988 OCAP were overstated and that some of the measures would not produce savings. It also notes that its findings must be tempered by the fact that data gathering occurred at the close of the most severe drought experienced in most of Nevada.

Proposed Adjusted OCAP.—Public Law 101-618 (Section 209(j)), enacted on November 16, 1990, requires that the current (1988) OCAP remain in effect at least through December 31, 1997, unless the Secretary decides, in his sole discretion, that changes are needed to comply with his obligations, including those under the Endangered Species Act, as amended. In December 1990, the District Court remanded the OCAP case to the Secretary for reconsideration because of the possible effect of recent Ninth Circuit Court opinions and Public Law 101-618 on the OCAP.

The summary to the proposed rule states that “adjustments are proposed to the Project efficiency requirements, maximum allowable diversion calculations, and Lahontan Reservoir storage targets in the 1988 OCAP to reflect current irrigated acreage and court decrees which have lowered the

water duty applicable to certain Project lands. To better manage diversions from the Truckee River to the Project, additional proposed adjustments to the 1988 OCAP provide flexibility in using snowpack and runoff forecasts and extending the time frame for storing water in Truckee River reservoirs in lieu of diversions to the Project from the Truckee River.” The background statement further elaborates “The Department is proposing at this time to make a number of revisions to the 1988 OCAP to adjust for changes in use of water rights, to increase flexibility, and to clarify and fine-tune the language of the OCAP based on experience gained in administering the 1988 OCAP through eight irrigation seasons.”

The proposed rule notes the following general differences between the 1992 projections of the 1988 OCAP, and the 1995 experience which are the stated basis for the proposed adjustments:

- ! *Acreage*: the anticipated increase in irrigated acreage has not materialized. It was projected to reach 64,850 acres in 1992, but actual irrigation in 1995 was 59,023 acres. (No mention is made of water-righted acreage idled through the transfer litigation.)
- ! *Average water duty*: as a result of the so-called “bench/bottom litigation”, some Project lands have been reclassified, resulting in a reduced demand of about 5,000 acre-feet of water (assuming certain levels of use of entitlements).
- ! *Average use of entitlement*: the proposed rule increases the estimated percent use of entitlement and notes several factors affecting use of entitlements (the percent use will be determined based on actual experience and used in calculating the expected irrigation diversion for each irrigation season).
- ! *Efficiency*: within the same size project, more irrigated acreage results in greater efficiency; with less irrigated acreage lower efficiencies are expected. For that reason, efficiency targets are reduced slightly. (The rule cites the ongoing water acquisition program and states “efficiencies should improve stemming from the concentration of deliveries through the system” but does not explain why acquisitions might not leave a more scattered pattern of irrigators, possibly decreasing efficiencies.) Adjustments do not take into consideration the fact, as reported in the *Efficiency Study*, that the measures identified in the 1988 OCAP as possible means to achieve the targeted efficiencies and that have been implemented by TCID have not yielded the anticipated savings. The

reduced efficiencies in the Adjusted OCAP are based solely on the reduced acreage.

In response to less acreage and varying water demand, Interior proposes to calculate the annual Project water budget for each irrigation season in accordance with the Newlands Project Water Budget table of the Adjusted OCAP. The intent is clearly to allow the Project water budget to accommodate anticipated changes in Project characteristics. This would appear to benefit irrigators by not subjecting them to an inflexible rule regardless of actual conditions, but it raises the potential for an annual debate on assumptions and projections, possibly increasing the irrigators' feeling of being micro-managed.

As noted above, Truckee River diversions to the Carson Division are governed by end-of-month storage targets at Lahontan Reservoir, and the formula calculating the allowable diversion relies in part on the runoff forecast for the Carson River. The imprecision inherent in such forecasting can lead to more Truckee River water being diverted than is needed to serve the Project and, on occasion, to spills or precautionary drawdowns at Lahontan Reservoir. Spilled water that cannot be transported to water-righted lands or Lahontan Valley wetlands flows into the Carson Sink, failing to serve any of the priority uses in the lower Carson Basin. The rule concludes that the current storage targets permit unnecessary diversions from the Truckee River and proposes Adjusted OCAP storage targets based on lower Carson Division demand and reducing water loss to seepage and evaporation. The critical end-of-June storage target is reduced from 215,000 acre-feet to 174,000 acre-feet.

The proposed Adjusted OCAP further proposes to fine-tune the Truckee River system by allowing retention of Truckee River water in upstream storage earlier in the year, so that the degree to which Carson River runoff will fill Lahontan Reservoir can be better ascertained before diverting Truckee River water. It notes that the limited window allowed for storage retention contributed to an unnecessary diversion of 70,000 acre-feet of water to Lahontan Reservoir before March 31 in 1995, which later had to be spilled. The rule proposes allowing credit storage as early as January, but not carrying over such storage credit from year to year.

Proposed Revised OCAP.—In addition to pursuing the proposed Adjusted OCAP, Interior has issued a Notice of Intent (NOI) to do an EIS to evaluate, among other things, options to substantially revise OCAP. The proposed

Adjusted OCAP are considered an interim measure until Interior is able to conduct an in-depth evaluation of OCAP.

Unappropriated Water

In 1930, TCID filed an application for 100,000 acre-feet per year of additional (unappropriated) Truckee River water (Application 9330).⁸¹ At issue in TCID's 1930 filing are the Truckee River's excess (unallocated, i.e., flood) flows (averaging nearly 400 TAF/yr). In a wet water year, unappropriated flows can amount to as much as 1,890,000 acre-feet of water. The Pyramid Tribe has filed a claim for this water and Sierra Pacific has opted to support that claim, subject to TROA entering into effect.

Hearings before the Nevada State Engineer on the TCID request were not held until May 1994, at which time Interior categorically stated their objection to TCID's request. The Assistant Secretary of Water and Science of Interior, wrote a letter to the Nevada State Engineer, R. Michael Turnipseed, stating that even if TCID's request was approved, Interior would not allow federal facilities to be used for the conveyance, storage, or delivery of Truckee River water appropriated pursuant to that application. Ms. Rieke stated that such approval was contrary to section 210(a)(2)(B) of the Truckee-Carson-Pyramid Lake Water Rights Settlement Act (Public Law 101-618).

Based on this "threshold issue" alone, on May 31, 1994, the State Engineer denied TCID's application without ruling on whether there exists unappropriated water, whether this application would interfere with existing rights, or whether the application would threaten to prove detrimental to the public interest.⁸²

Subsequently, a Newlands irrigator motioned to intervene and the court remanded the case back to the State Engineer for a re-hearing so additional evidence and testimony could be presented. The court determined that the real party in interest under Application 9330 for unappropriated water was not the TCID but the individuals who hold water rights within the Newlands Project, and that the TCID was an agent through contract with the United States. The City of Fallon, Churchill County and the Town of Fernley have all intervened and been granted interested party status. Hearings were held in early 1996 and the State Engineer has yet to issue a ruling on the matter. These are waters which the Pyramid Lake Paiute Indian Tribe would prefer

to see flow into Pyramid Lake. All other parties have agreed not to object to the tribe being granted unappropriated waters.

According to comments received from the tribe's attorney, "the Tribe expects to obtain all of the unappropriated water allocated to Nevada by virtue of section 210(a)(2)(B) of the Settlement Act, the Tribe's 1993 Memorandum of Understanding with the State of Nevada and the Tribe's agreement with the Sierra Pacific Power Company, Reno, Sparks and Washoe County under which those entities agreed to relinquish their claims to the unappropriated water and withdraw their protests of the Tribe's applications. The Tribe has made clear that there will not be a settlement if it does not obtain all of Nevada's unappropriated water."

Churchill County officials has also filed a request with the Reclamation for supplemental Truckee River water rights under the Orr Ditch Decree (Claim No. 3),⁸³ and the TCID 1930 request for unappropriated (flood) flows of the Truckee River.⁸⁴

2.4 Water Transfer Markets

In the Reno-Sparks area, new water demands for urban growth and Truckee River/Pyramid Lake fisheries have been accommodated through a long-standing program of water rights acquisition and through innovative multi-party agreements regarding river operations. The newly-recognized demand for water to support Lahontan Valley wetlands has not yet been satisfied and it may take another decade before the success of the voluntary transfer program can be evaluated.

Historical Development of the Regional Water Market

Historically, transfers of water in the Truckee River Basin were confined mainly to the Truckee Meadows, with a small number of groundwater transfers occurring in some nearby valleys. Much of the market activity in this study area has involved Sierra Pacific, which began purchasing irrigation rights to supplement its original Truckee River appropriations in the mid-1940s.⁸⁵ Figure 2-4 summarizes water rights prices in this region over the period 1960 to 1990. All transactions reported prior to 1980 were Sierra Pacific acquisitions. Other buyers did not enter the market until the 1980s.

The water market began to change during the late 1970s when Interior decided not to provide water and storage rights in Stampede Reservoir for municipal and industrial purposes. Sierra Pacific had been counting on

receiving additional water rights and regulatory storage space in the reservoir for a low cost of about \$17 per acre-foot per year. The utility's rate

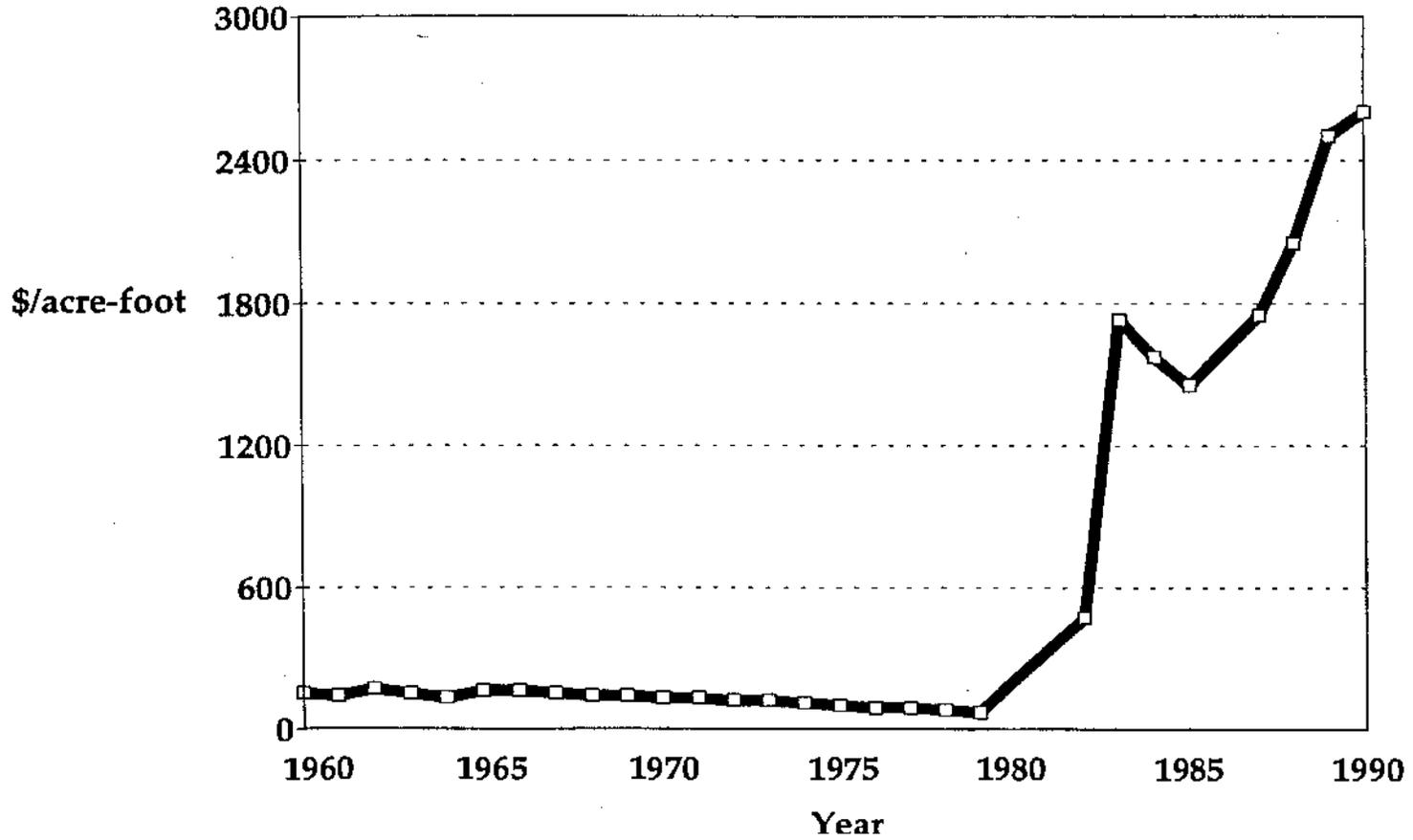


Figure 2-4.—Market Prices for Water Rights Truckee Basin, Nevada.
Source: Saliba and Bush, 1987; Colby unpublished data, 1988-90.

of acquiring additional irrigation water rights from irrigators had been declining and unprecedented rates of urban growth threatened to outpace Sierra Pacific's capacity to serve additional water. In 1978, Sierra Pacific commissioned an independent study of its water resources and projected demands. The report concluded that the current rates of growth in water use in Sierra Pacific's service area would exceed the firm yield of the company's existing water rights inventory and would be insufficient to meet demand within two or three years.⁸⁶

A water crisis hit the Truckee Meadows seemingly overnight. Holders of water rights on the Truckee River recognized that they possessed a scarce and valuable commodity. Landowners, who had until then subdivided their holdings with the water rights appurtenant, began to sever the water rights from the land to sell them separately. Sierra Pacific was reluctant to pay the increased costs for water rights. In 1980, the utility raised its offer price for water right from \$75 to a range of \$95 to \$135 per acre-foot, based on relative water rights priority dates. Later it raised its offer price to \$140 per acre-foot and eventually to \$250. The increase, however, was not enough to attract sufficient numbers of sellers, who found many other buyers willing to pay over \$1,500 per acre-foot. Water rights acquisitions by Sierra Pacific slowed to a trickle as potential sellers held out for higher prices.

Faced with an impending water shortage, Sierra Pacific was forced to slow its provision of new water service. New water users were put on a lengthy waiting list pending the acquisition of sufficient water rights. The creation of the waiting list touched off a political battle between government and industry and between pro-growth and no-growth advocates. In response to this crisis, Sierra Pacific, the Nevada Public Service Commission, and the state, county, and local governments created a new legal and administrative process to provide water for growth. Under a ruling of the Public Service Commission, Sierra Pacific was required to provide water service to approved new developments within 60 days⁸⁷ but this rule became obsolete as the water rights market became better established. Water rights are provided to Sierra Pacific by Washoe County on a 99-year lease⁸⁸ and by Reno and Sparks under a Treatment and Distribution Agreement.

Local governments acquire the water rights they lease to Sierra Pacific from developers who must dedicate sufficient water rights to the local government jurisdiction as a condition for project approval. The developers acquire the rights themselves or from Sierra Pacific.

In accepting water rights in exchange for water service, Sierra Pacific established the following guidelines. The water rights are required to produce a firm yield (initially defined as 58 percent of the long-term average yield, but with implementation of the Preliminary Settlement Agreement, now set at 90 percent) of water sufficient to meet the estimated water demand for the proposed development.

In 1985, Reno, Sparks, Washoe County, and Sierra Pacific agreed to offer landowners \$422 per acre-foot for their water rights under a coordinated local government acquisition program. The price was based on market values for water rights, less the transactions costs of acquiring and transferring the water. When the rights are applied towards a new development, Sierra Pacific passes its costs of acquiring the water right, plus the expenses incurred in doing the title work on the transfer, on to the new water users.⁸⁹

During its first year, this program of acquiring water rights met with only limited success. Sparks had purchased about 50 acre-feet of rights, and Reno about 325 acre-feet. There were two reasons for potential sellers' general lack of response to the program. First, many holders of water rights resisted selling their rights in the belief that prices would soon rise significantly in the future. Second, several private water brokers operating in the Truckee Meadows were outbidding the cities. Typically, the price offered by the brokers to the sellers ranged between \$600 and \$800 per acre-foot, far exceeding the local governments' offer price. Private brokers were able to consolidate small rights into larger packages of water rights which they then sold to developers for \$2,000 per acre-foot.⁹⁰

Since the mid-1980s, Washoe County has been acquiring private water companies providing groundwater in rural areas. The acquisitions began because of concerns regarding the poor condition of many of the companies and potential health problems posed by their deteriorating facilities. As a condition for taking over the companies, the county generally has required the owners sell all assets and rights of way necessary to provide water service to existing customers, including water rights, for an amount not to exceed the cost of the initial investment.⁹¹

Surface water rights in the Truckee Basin are highly valued, although prices vary. Large, consolidated blocks of surface water rights appurtenant to lands outside the existing service area of Sierra Pacific sell for higher prices. Somewhat lower prices are observed for small rights appurtenant to urbanized lands within the Reno-Sparks metropolitan area which are already served water by Sierra Pacific. An independent water rights appraisal

conducted in 1984 listed 52 water rights transactions occurring between 1982 and 1984, with (nominal) prices ranging from \$875 to \$2,016 per acre-foot.⁹² According to comments on the draft report submitted by Sierra Pacific, recent prices for Truckee River water rights located in Truckee Meadows have risen to \$2500 to \$3000 per acre-foot. Larger lots of water rights tend to bring higher unit prices than do smaller lots because of the high transaction costs associated with water rights transfers in the Truckee Meadows. Lengthy and sometimes expensive title searches are often necessary to prove ownership of water rights before they can be transferred. According to Sierra Pacific, the total cost for the title search, the payment of filing fees, and other costs for transferring a water right can be \$1,000 per transaction or more.⁹³

Interior comments note a small market for water rights in the Truckee Division of the Newlands Project. The major direction of transfers is from agriculture to municipal use. The Town of Fernley has already acquired over 3,000 acre-feet of water rights in association with development projects in much the same manner as is done in Reno. It is expected that a substantial portion of the water rights in the Truckee Division will be purchased by Reno, Sparks, Washoe County and Interior (on a willing seller basis) in implementing the Truckee River Water Quality Agreement.

Groundwater rights in northwestern Nevada have sold for substantial sums of money. Prices have risen to unusually high levels in some isolated groundwater basins where development pressures are strong. In the late 1980s, for example, groundwater rights in the Spanish Springs and Lemmon Valley areas outside of Reno and Sparks sold for prices ranging between \$4,000 and \$18,000 per acre-foot.⁹⁴

Sierra Pacific and others have actively explored importing groundwater from other basins, as described above. For such locations as the Honey Lake Basin, the high costs and political controversies associated with inter-basin transfers have made such transfers less promising than local options for improving urban water supplies. To date, no water has become available to augment urban water supplies from the Honey Lake Basin or from other distant groundwater basins that Sierra Pacific was considering for interbasin water transfers.

Present-Day Water Transfers Market

As in many of the arid western states, water policy in the Truckee-Carson Basin now emphasizes transfers of water from one use to another. Initial activity centered on transfers from agriculture to serve growing cities. More recently, transfers have been initiated to enhance fisheries and wildlife and to resolve conflicts over the appropriate allocation of water between environmental, agricultural, and municipal uses. The impetus for a voluntary market approach to resolving conflicts over water allocation was enhanced by the 1990 water settlement, which specifically authorized market acquisitions of water to satisfy environmental needs.

Since the 1990 Settlement Act, several different types of voluntary water transfers have occurred to accommodate urban and environmental needs for water. First, Sierra Pacific continues to acquire water rights to support growth in the Reno-Sparks area. The rights are transferred to developers at a price that covers Sierra Pacific's acquisition and administrative costs, and the developers in turn dedicate the rights to the appropriate local government. This process has resulted in a regular transfer of water for urban growth during the 1990s. Such transfers are likely to accelerate under the 1996 multi-party agreement to acquire water to maintain water quality in Pyramid Lake. Carson City, on a smaller scale, also has acquired water from irrigators. In 1991 and 1992, it completed several transfers of Carson River water rights to serve its growing population and reduce its reliance on local groundwater. Acquisition of water for urban growth appears to be effectively accomplished through voluntary transfers in the Truckee-Carson Basin.

Water transfers out of agriculture to protect the Stillwater National Wildlife Refuge began to occur in the late 1980s primarily through purchases from willing sellers. Through a series of local, state, federal, and actions, significant amounts of water have been transferred to support the refuge. Regional public interest groups, sportsmen's groups, the Nevada Legislature, and Congress have worked cooperatively to provide water rights acquisition funds in order to supplement flows into the refuge:⁹⁵

- ! Congress allocated \$2.7 million to the Fish and Wildlife Service in the late 1980s to acquire parcels of irrigation rights for transfer to wetlands preservation.⁹⁶

- ! The Nevada Legislature made up to \$9 million available in 1989 through separate funds earmarked to settle water rights disputes in the Truckee basin and bond money allocated for parks and natural resource protection.⁹⁷
- ! Another state bill, enacted during the 1989 session, clarified the definition of beneficial use to include “the watering of wildlife and the establishment and maintenance of wetlands, fisheries and other wildlife habitats,” legitimizing water rights acquisitions to protect wetlands areas.⁹⁸
- ! In 1990, through voter ballot, Nevada passed legislation to issue bonds for parks and wildlife habitat, including \$8 million for acquisition of water for the Lahontan Valley Wetlands.⁹⁹
- ! In 1991, new state legislation authorized the Nevada State Engineer to enter into interstate agreements over management of shared groundwater basins.¹⁰⁰
- ! In 1995, Nevada passed Senate Bill 03 which authorizes directors of irrigation districts to allow transfer of storage water to land outside of TCID, if the potential impacts of the transfer on district members’ water costs and district delivery efficiencies are considered, and if the public interest is considered.¹⁰¹

These legislative actions demonstrate commitment by the state to resolve water conflicts in the Truckee-Carson Basin.

Locally, the Nevada Waterfowl Association, the Lahontan Valley Wetlands Coalition, and the Nature Conservancy have spearheaded efforts to raise funds, purchase irrigation rights, and transfer them to wetlands purposes. The 1990 negotiated settlement authorized federal purchase of water rights from willing sellers, including targeted purchases in areas deemed to be most beneficial for wetland restoration. TCID endorsed proposals allowing farmers to transfer voluntarily water rights previously associated with marginal farmland for wetlands protection.¹⁰²

The Pyramid Lake Paiute Tribe typically objected to transfers of Truckee River water that is diverted for use in the Carson basin because they want to protect flows vital to Pyramid Lake. After extensive negotiations among area interests in 1990, the State Engineer allowed water rights to be transferred to the Stillwater National Wildlife Management Area, ensuring that the

transfer did not impair water availability for Pyramid Lake through strictly limiting the quantity transferred to the amount that formerly had been used in farming. TCID withdrew its objections to the transfer after the parties agreed that the federal government (which holds water rights for the federal wildlife area) would pay the operation and maintenance assessments for the water transferred from the district. Resolution of early proposed transfers set an important precedent for future transfers of water from irrigation to fish, wildlife, and recreation.

As described above, the FWS and NDOW developed and implemented an active water rights acquisition program in the early 1990s. The water rights are being used to improve and expand wetlands in the Lahontan Valley. The guiding policy objective for the program is to restore and maintain 25,000 acres of primary wetland habitat. Roughly 122,000 acre-feet of water rights may need to be acquired to accomplish this objective. Water rights are acquired from willing sellers in voluntary transactions, which can include acquisition of land along with water rights. In addition, some water for wetland restoration may be acquired through leases, through acquisition of water rights held by the Fallon Naval Air Station, through exchanges of land and/or water, and by accepting donations of water and money to support wetland restoration.¹⁰³

The acquisition program initiated prior to the 1990 water settlement through various congressional actions is nearly complete, with about 20,000 acre-feet acquired as of mid-1996 by FWS and NDOW. Prices paid per acre-feet of water transferable to the wetlands ranged from \$435–\$812.¹⁰⁴ Water rights acquisitions have been on hold, pending the completion of an EIS on the program. The Final EIS was released in September, 1996 and a Record of Decision supporting the acquisition program was issued on November 4. Churchill County and the City of Fallon have filed litigation regarding their concern with further acquisitions. The District Court ruled in favor of FWS and the case is on appeal. The required 45-day notice for the next phase of acquisitions has been sent and the agencies are preparing for the next phase of acquisitions.¹⁰⁵

In August 1995, Churchill County filed a formal request with Reclamation in Carson City to receive approximately 20,000 acre-feet of Truckee River water for supplemental municipal and industrial use to be delivered through the Truckee Canal and the existing distribution network in Churchill County, Nevada. The water would come from Claim 3 of the Orr Ditch Decree which allows up to 1,500 cfs (nominal capacity of the Truckee Canal is only 900 cfs) of water to be diverted at Derby Dam on the lower Truckee River.¹⁰⁶ Since

Truckee River diversions began at Derby Dam in 1906 for Newlands Project farmlands, this represented the first formal request for an additional interbasin transfer of Truckee River water for a purpose (municipal and industrial) other than agriculture. This has heightened concerns that water rights purchases on lands irrigated by the project could dramatically affect the reliability of future water supplies (CRA:95-96). However, Interior's trust responsibilities to the Pyramid Lake Tribe and under the Endangered Species Act raise a substantial bar against new Truckee River diversions. Churchill County could follow the example of Fernley, Reno, Sparks, Washoe County and others upstream on the Carson, and purchase irrigation water rights for use in a domestic water system, or require developers to purchase such rights and deed them over to serve new developments.

3. History and Implementation of the Settlement Act

At the end of 1990, Congress passed the Truckee-Carson-Pyramid Lake Water Rights Settlement Act (Public Law 101-618). This Act attempted to resolve decades of disputes between the states of California and Nevada over the allocation and use of the Truckee and Carson River basins they share. This Act also settled several conflicts between competing users in the state of Nevada, and put into place a framework for identifying—and resolving—those conflicts that were not settled by the provisions of this Act. During the ensuing six years, efforts have been made to implement the provisions of P.L. 101-618. This Chapter provides an historical background to the negotiations that resulted in P.L. 101-618 and those that followed in the atmosphere created by P.L. 101-618; describe the provisions contained in this law; and document those elements of P.L. 101-618 that have been carried out to date.

3.1 Early Conflicts

The history of conflict over water resources within and between the states of Nevada and California is long and complicated. For over a century, different water interests within each state have tried, unsuccessfully, to reconcile their conflicting water demands. Lake Tahoe lies in the Sierra Nevada, straddling the California-Nevada border; two-thirds of the lake lies in California, while the remainder is located in Nevada. The shared Truckee and Carson river systems are described above (Chapter 1). Given these physical circumstances, it is no surprise that competition emerged between the two states.

The long history of conflict in the Truckee-Carson basins began in the 1860's when Alexis Von Schmidt created the first major controversy over Lake Tahoe when he formed a water company to supply water to San Francisco via an aqueduct. This plan drew heavy opposition from Nevada, which feared loss of Truckee River waters and other water rights entanglements led to the project's abandonment in the early 1900's. The dam constructed by Von Schmidt and surrounding property eventually came into the hands of the Bureau of Reclamation and Truckee River General Electric Company. The ensuing conflict among the power company, federal government, and lakeshore property owners marked the beginning of the modern era of controversy about uses of the Truckee River. The controversy focused on water rights and the special complications that occur on interstate rivers.

The authorization and construction of the Newlands Project in Northern Nevada in 1905 did little to solve the water problems of competing users in the area. Indeed, it exacerbated them by bringing into existence additional

players and competing uses for the area's scarce water supplies.¹⁰⁷ The Newlands Project was the first major reclamation project undertaken by the Reclamation Service (later the Bureau of Reclamation) under the authority of the Reclamation Act of 1902. It was designed to irrigate the lands around Fallon, Nevada. The Newlands Act made reclamation of arid regions through irrigation a national responsibility. It also set the pace and direction of future reclamation activity in the West.¹⁰⁸

Upon completion of the Project, additional controversies surfaced immediately, both among competing users within the state of Nevada, and between Nevada and California. During the early years, the allocation and use of water supplies were dictated primarily by local interests: Tahoe property owners, power company officials, representatives of various irrigation districts, and individual farmers. Steps were eventually undertaken by the two states, however, to more formally conclude the disputes. And as the tendency to use litigation as a means to allocate water rights increased, state and federal courts became involved. As a consequence, a number of agreements, decrees and doctrines resulted, governing allocation and use of the waters of Lake Tahoe and the Truckee and Carson River systems.¹⁰⁹

In 1908, the Truckee River General Electric Company entered into an agreement with the Floriston Pulp and Paper Company (both of whom utilized Truckee River waters in their operations) to establish Floriston Rates on the Truckee River. These rates require that water be released from Lake Tahoe (if possible) when natural flows in the river drop below a certain point. The agreement was made to assure adequate flows for the generation of electricity by the electric company, which then owned the dam at the outlet of Lake Tahoe.

Without clear control of the dam at Lake Tahoe, the reliability of the Bureau's Newlands Project water supply was questionable. The Truckee River General Electric Decree issued in federal court in 1915 partially resolved issues between the agency and the electric company by granting Reclamation an easement to operate the dam and use surrounding lands. When the Reclamation Service obtained possession of Lake Tahoe dam from the electric company in 1915, the revised consent decree required the government to adhere to the Floriston Rates.¹¹⁰

Lakeshore property owners continued in conflict with irrigators over the lake level, especially during the record drought of 1928-1934. Some of the more colorful examples include a threat by Truckee Meadow farmers to dynamite

the rim of the lake after it dropped below its natural rim in 1924, and a steam shovel dispatched by Nevada interests with a Reno police force guard to dig a diversion trench to the rim in 1930. A local sheriff's posse sought to stop the digging and an injunction was ultimately obtained against TCID to halt the digging. Crop damage suits were threatened against lakeshore owners and pumping was sometimes allowed under this coercion.

Negotiations continued intermittently over many years, but were hampered by uncertainties regarding Truckee River water rights, including complications due to the two states' different water doctrines. These negotiations finally issued in the Truckee River Agreement of 1935, which remains the basis for river operation. The Agreement also played an important role in the 1944 Orr Ditch Decree, which adjudicated water rights among the Pyramid Lake Tribe, Sierra Pacific Power Company, TCID, Washoe County Water District, Newlands Project irrigators, and individual water rights holders.

On the Carson River, the first disputes over water arose from milling activities associated with the Comstock mines. The extremely rapid expansion of the mines in the early 1860s led to a correspondingly intense period of mill construction. It was estimated that the area had more than 70 mills by the end of 1861 (CRA:61). Typically each mill would construct a timber diversion dam to direct water to its flume. Some generated electric power as well. Scant summer flows, however, combined with upstream irrigation diversions forced mill to shut down and twenty years of litigation between mill owners and agricultural water users followed. Called the "Union Mill cases," these led to federal court recognition of the priority of riparian rights, while the Nevada State Supreme Court repudiated the doctrine of riparian rights in an 1885 decision, holding that the state's water rights should be based on the doctrine of prior appropriation, because it better suited the region's arid conditions. The mills themselves did not survive the collapse of the Comstock boom and most were gone shortly after the turn of the century.

Later clashes in the Carson watershed involved upper river users and Newlands Project users on the lower river. The Anderson-Bassman Decree, issued in 1905, addressed the West Fork Carson River in both California and Nevada, primarily Diamond Valley and upper watershed valleys in California and Carson Valley in Nevada. The decree did not specify the amounts of water that could be diverted, but established the acreage that could be irrigated pursuant to these rights, established a rotation of the river between California and Nevada users, and made special recognition of riparian rights.

Subsequently, the Price Decree in 1921 adjudicated California water rights in the upper basin.

In 1925, the federal government initiated litigation in the Carson River Basin, complementary to that it had initiated in 1913 on the Truckee River, to establish Newlands Project water rights. This long-running battle did not issue in an adjudication on the Carson River until the 1980 Alpine Decree (defined above and further discussed in the subsequent sections).

3.2 History of Settlement Act of 1990

Water rights disputes over the Truckee River and Lake Tahoe dating to before the turn of the century, led to a 1912 recommendation by the California Conservation Commission that California petition the U.S. Supreme Court for an allocation of the water between the two states (TRA:1). Twenty years later, responding to pressures caused by the severe drought then in progress (1929-35), the governors of California and Nevada established the California-Nevada Interstate Water Conference Committee in 1931, and assigned it the task of reaching an agreement governing the allocation and use of Truckee River waters. The final result of their efforts were incorporated into the Truckee River Agreement, signed in 1935. This agreement, negotiated among the major water rights holders themselves, specified operating criteria for the Truckee River, established maximum storage levels for Lake Tahoe, and laid the groundwork for the construction of Boca Reservoir to create additional storage on the Truckee System. It included the Floriston Rates requirement, which could be met by releases from Lake Tahoe or Boca Reservoir, once the latter was completed.¹¹¹

In 1913, the United States government had initiated a suit to establish firm water rights for both the Newlands Project and for irrigation on the Pyramid Lake Reservation (*United States v. Orr Water Ditch Company*). Although the trial took place between 1919 and 1921, the final decree was not issued until 1944. The Orr Ditch Decree, as it later became known, gave legal sanction to the major elements of the Truckee River Agreement, including the section dealing with Floriston Rates. It also awarded the national government water rights for the irrigation of approximately 5,800 acres on the Pyramid Lake Reservation. These rights were awarded a 1859 priority date (the year in which the reservation was created). The national government made no effort to obtain water rights on behalf of the Pyramid Lake Tribe for purposes *other than irrigation*. Efforts by the Tribe to reopen adjudication and challenge this on the basis of reserved rights were rejected by the courts, a result which has led the irrigation community to hold that subsequent decisions in favor of

tribal trust and endangered species responsibilities are fundamentally in error.

This specific focus and commitment became important during later efforts to negotiate an interstate compact between the States of Nevada and California. For the Newlands Project, the United States received a 1902 priority right to divert Truckee waters at Derby Dam at the rate of 1,500 cubic ft. per second. The water was to be used for the irrigation of 232,800 project acres; for storage at Lahontan Reservoir; and/or for the generation of power and other municipal and domestic purposes.¹¹²

During the 1930s and 1940s, reclamation projects in the West were pursued as part of Roosevelt's public works program to take the United States out of the Great Depression. During the 1950s, reclamation became part of the "pork" of pork-barrel politics.¹¹³ Nevada received her share; consequently, additional storage capacity now serves the system. None of these actions resulted in long-term, comprehensive solutions to broader interstate water problems--which were becoming more numerous and complicated as the years went by.

Competition for East slope waters intensified after World War II. Lake Tahoe grew into a major gaming and recreational area. The Reno-Sparks Metropolitan area evolved into a bustling commercial and recreation center. Competition for water among the ranching and farming interests on both sides of the border continued. All of these changes resulted in increased demands on the system—and contributed to a growing awareness of the need for the two states to reach a comprehensive agreement regarding the allocation of their shared water resources. The political leadership in both states advocated the development of plans to allocate the water in the Walker River, and the preparation of contingencies for drought years. California politicians wanted assurance that some of the flows of all three rivers would be available to support future state growth. Nevada's leaders were fearful that California would one day lay claim to the waters that, although originating in California, flowed naturally into Nevada. Both sides realized that an interstate water compact was the only way to get a comprehensive water agreement through Congress.¹¹⁴

Against this backdrop, the two states decided in 1955 to use the authority of the Commerce Clause of the U.S. Constitution to negotiate an interstate compact, which would allocate once and for all the waters which they held in common. On August 4, 1955, President Dwight D. Eisenhower signed Congressional legislation authorizing representatives of the two states to

begin negotiations. The ensuing process was a lengthy one, requiring the appointment of compact commissions in each state, with a federal representative to safeguard federal interests and to chair a joint commission; ratification by the respective state legislatures in identical form; signatures of the two governors; ratification by the U.S. Congress; and the signature of the President of the United States.¹¹⁵

After 14 intense years of negotiation, an agreement was finally reached: 90% of the disputed waters were allocated to Nevada and supplies reserved for growth in the Lake Tahoe-Truckee area of California. In 1968, the compact was submitted to the respective state legislatures for ratification. Much to the surprise of the participants, it took yet another two years and many concessions to complete the process of state approval.¹¹⁶ California ratified the compact in 1970; Nevada followed in 1971. Approval by the United States Congress, however, was not forthcoming. The states operated voluntarily according to the terms of the compact from that time until the larger Settlement Act supervened. Numerous efforts were made to persuade Congress to give its stamp of approval. Indeed, between 1972 and 1979, Nevada and California Congressional delegations offered six different bills seeking ratification; none even received a hearing. One last major effort to have the compact ratified was made by U.S. Senator Paul Laxalt in 1985; although his proposal did receive a hearing, at least, no other actions were taken.¹¹⁷

The failure of various parties to obtain ratification of the compact for more than 15 years was due, in large part, to the fact that the versions of the compact submitted to Congress emphasized the protection of the water rights of the vested interests involved in negotiating it, to the exclusion of other interests involved, especially those of the Pyramid Lake Tribe. Neither the possible inclusion of water to maintain Pyramid Lake nor the recognition of nonestablished or unclaimed water rights by the Pyramid Lake Paiutes under the Winters Doctrine of 1908 was seriously considered by the compact commission.¹¹⁸ The commission recognized only those waters allocated by the Orr Ditch Decree of 1944, which limited tribal water rights to agricultural use. Under the Winters Doctrine of 1908, however, and subsequent case law, the tribe is entitled to enough water to serve all the purposes for which a reservation of land was made; additionally, those reserved water rights are entitled to the priority date on which the reservation was created (in this case, 1859).

The state's view, as given in comments on the draft report offered by the California Department of Water Resources (DWR), is that the federal

government had been asked to participate in the negotiations, declined to be substantively involved, and then opposed the solution that the states worked out. DWR states that California and Nevada have long enjoyed a cooperative working relationship on Truckee-Carson interstate issues. For example, for years both states voluntarily limited the issuance of new water rights in the Tahoe Basin so that the allocations contained in the proposed interstate compact would not be encroached. Over the many years when the states sought federal ratification of the compact, DWR felt that “it was usually a case of the states agreeing with one another and disagreeing with the federal government. The states were frustrated over the unwillingness of one part of the federal government to formally participate in compact negotiations, while at the same time another part of the federal government was actively involved in building reservoirs in the basin.”

As described above, the various water diversion and storage components of the Newlands Project have been associated with a series of adverse impacts to the resources of Pyramid Lake. Lake levels dropped, exposing sandbars at the mouth of the Truckee; fewer and fewer fish were able to spawn. With its last spawning run in 1938, the original strain of Lahontan cutthroat trout in Pyramid Lake became extinct by 1940. A closely related strain of Lahontan cutthroat trout was subsequently introduced to the lake, and it has been declared "threatened" while the cui-ui, found only in Pyramid Lake, have been listed as "endangered." Both are thus entitled to protection under the provisions of the Endangered Species Act of 1967. Indeed, negative environmental impacts to Pyramid Lake from the Newlands Project has triggered lengthy and intense litigation by both the Pyramid Lake Paiute Tribe and the U.S. government against the Newlands Project's operators, Truckee-Carson Irrigation District (TCID), as well as virtually every other user of Truckee River water in both Nevada and California.¹¹⁹ The Tribe had been winning these cases—and was becoming increasingly successful in its efforts to increase flows into Pyramid Lake.¹²⁰

For example, in the early 1970s, the Secretary of the Interior, responding to the provisions of the Endangered Species Act, decided to use the waters stored in Stampede Reservoir *exclusively* for the benefit of the Pyramid Lake fisheries.¹²¹ That decision was challenged unsuccessfully by the Carson-Truckee Water Conservancy District and Sierra Pacific Power Company. And in 1973, in response to a suit brought by TCID asserting that the amount of water allocated to it was insufficient, the court found instead that Newlands Project water diverted for use by TCID was inefficiently used (approximately 40% of the diversions did not reach the crops they were diverted to irrigate). Subsequently, a federal court-ordered administrative

process, known as "Operating Criteria and Procedures" (OCAP, discussed above), in combination with several court cases, have served to significantly reduce Newlands Project diversions from the Truckee,¹²² in order to provide as much water as possible to Pyramid Lake.

In a second important case,¹²³ the Secretary of the Interior was *required* to deliver all water to Pyramid Lake not otherwise obligated by court decrees or contracts. The court further ordered the Secretary to enforce the original 1973 OCAP, which reduce TCID's combined Carson and Truckee River diversions to a maximum of 288,000 acre/feet annually; if the provisions of the OCAP were violated further, the court asserted, the 1926 Newlands contract with TCID was to be terminated. The Secretary terminated the contract, as directed,¹²⁴ and TCID brought suit. From 1973, the Bureau of Reclamation issued an interim OCAP each year, pending the outcome of the case which concluded in 1985 (the courts upheld the United States). The central issue in the litigation was whether or not the Secretary's compliance with the court order on OCAP was legal. Interior put TCID on notice that any water diverted in excess of the court-ordered OCAP would be recouped. TCID continued to divert, and neither the Bureau of Reclamation nor the federal Water Master prevented TCID from diverting water above the amount to which it was entitled under OCAP. The Bureau then issued the 1988 OCAP, based on projected diversions averaging 320,000 acre-feet. The 1988 OCAP is mandated to remain in place through 1997 under P.L. 101-618, however P.L. 101-618 reserved to the Secretary of Interior the right to modify the 1988 OCAP prior to 1998, if deemed necessary to meet his legal obligations.

A new contract between the Bureau and TCID signed in 1996, covers the appointment and function of a District water conservation coordinator; the implementation of water conservation education projects for Project water users; the water measurement and accounting system to be used by the District and a water measurement component; the Operation and Maintenance charging structures to be used by the District to obtain sufficient Operation and Maintenance revenues from Project users while encouraging water conservation; and a prioritization of activities to be performed under the Plan, an estimate of their costs, and a schedule for implementing each activity. Thus, the new contract will emphasize conservation issues, which Reclamation estimates will increase costs to farmers by 10 to 20 percent over the next five years. TCID has agreed to set aside certain miscellaneous revenues they receive from the U.S., or 10% of their water service payments, whichever is greater, for water conservation measures including improved water measurement.

In 1988, the Bureau proposed an OCAP based on models projecting average annual diversions to TCID from the Carson-Truckee system of 320,000 acre-feet/year. This proposal was challenged on a number of fronts. The Tribe has also been pursuing restitution from TCID and Newlands Project irrigators for past diversions from the Truckee which are claimed to have violated the OCAP. Such disputed diversions may be in excess of one million acre-feet.¹²⁵

Failure to achieve ratification of the interstate compact after the 1970s can be attributed to other factors as well. One of these is the environment. The federal government felt, for example, that the terms of the proposed compact would conflict with their efforts to secure water to repair the environmental damage caused by the Newlands Project, not only within Pyramid Lake but elsewhere in the Carson-Truckee system.¹²⁶ Consequently, under pressure from various environmental groups, one set of environmental problems targeted in the 1990 legislation involved the Lahontan Valley wetlands in general, and the Stillwater area near Fallon in particular (impacts to these systems are described in Chapter 1).

The third set of water problems facing the federal government in Northern Nevada concerned the status of the Fallon Paiute Shoshone Indian Tribe (see discussion in Chapter 1, above). Promised irrigation water in return for surrendering most of its lands when the Newlands Project was formed, the Fallon's saw the on-reservation irrigation works go uncompleted for decades. By the late 1980s, the federal government found itself the target of pressure to make restitution to the Indian tribes involved in these disputes, as well as to the environmental interests that had been harmed by previous policy. It was under these conditions that the final effort to negotiate an interstate compact between the States of Nevada and California occurred.

3.3 The Settlement Act Negotiations

Harry Reid was elected to represent Nevada in the U.S. Senate in 1986, and assumed office in 1987. His predecessor, Senator Laxalt, had failed to obtain ratification in the Senate of his version of an interstate compact during his last year in office, largely due to the fact that it did not adequately address federal obligations resulting from treaties and other agreements. Immediately after assuming office, Reid announced his intention to successfully resolve the myriad issues relating to a long-term solution to

northern Nevada's water problems. He chose to utilize negotiation as the means to this achievement, as promoted by the Reagan administration.

Toward the end of 1987, Senator Reid and his staff began to develop a comprehensive understanding of the various parties and issues involved in Nevada water politics. That process took nearly six months. At that time, Reid brought the major Nevada players together for the first rounds of negotiations: Sierra Pacific Power Company (interested in the capacity to store additional water supplies to provide both drought protection and support future growth); the Pyramid Lake Paiute Tribe (interested in economic development, compensation, and the enhancement and preservation of Pyramid Lake and its fisheries); the state of Nevada (interested in seeing to it that northern Nevada's rights to water were protected from encroachment by California); and the Truckee-Carson Irrigation District (interested in continuing to utilize Newlands Project water supplies for irrigated agriculture).

Although other parties would certainly be affected by the outcome, Reid felt strongly that the scope of the conflict resolution process should not be enlarged until the need arose. The Fallon Paiute Shoshone Tribe's legal position was so strong that, combined with the commitment of the federal government to see to it that their situation was remedied, Reid felt it was not necessary to bring them into early negotiations. The remedy that would be forthcoming had already been agreed upon (a settlement fund of \$43 million)—and is reflected in the 1990 legislation.¹²⁷ The environmental groups advocating protection of the wetlands, most notably the Lahontan Valley Wetlands Coalition, would be brought in later in the process, after some of the more conflictual elements of the agreement were worked out.

According to some observers, TCID took an adamant position at the outset. By June of 1988, it withdrew from the process.¹²⁸ An attorney representing the opposing interests of the Pyramid Lake Paiute Tribe offered the opinion that TCID felt it had little or no incentive to participate; he believed that TCID felt that it would stand a better chance in the courts. Frank Dimick, Western Relations Liaison for the Bureau of Reclamation, mirrored this sentiment: "TCID felt there was nothing to bargain for. There are different perceptions to what happened that day when they walked out. They voluntarily left, but they felt there was nothing to negotiate so they were squeezed out. Why negotiate for less water? No one left them anything to bargain with—no chips on the table."¹²⁹

One observer¹³⁰ noted the difference in atmosphere at these negotiations, compared to previous attempts. In the earlier cases, there seemed to have emerged an "us" against "them" attitude, which pitted the non-Indian interests against Indian claims, and served to push the Indian interests into the background. Such an attitude was not apparent during the 1988 negotiations. In fact, the parties—with the exception of TCID—seemed willing to bargain rather than pursue additional years of court battles.¹³¹ After TCID's departure, the other players remained and managed to reach agreement on the major issues involved, one issue at a time.¹³²

An important building block for the initial negotiations was the Pyramid Lake Tribe and Sierra Pacific Power Company preliminary agreement to seek an adjustment of the Floriston Rates. This "Preliminary Settlement Agreement" (see discussion in Chapter 2) allowed water from Stampede to be released in the springtime during the spawning of the cui-ui fish, while allowing Sierra Pacific Power Company storage in Stampede under certain conditions.¹³³

Reid gradually expanded the negotiations in the summer of 1988 to include the State of California, the Stillwater National Wildlife Refuge, the Fallon Naval Air Station, the Fallon Paiute Shoshone Tribe, the cities of Reno and Sparks, as well as the U.S. Department of Interior bureaus of Reclamation and Indian Affairs. The two Interior bureaus needed to sign onto an agreement before Congressional ratification would be likely. As more and more progress was made, very large sessions, which included all interested parties, were held. Two groups which became involved at this point in the process were the Lahontan Valley Wetlands Coalition and the Coalition for a Negotiated Settlement. These sessions provided participants the opportunity to report what had been accomplished to date and to obtain input.

Throughout this process, the parties came to realize that unless the legal and political problems facing the federal government regarding the Indian tribes and the environment were adequately addressed in the settlement, ratification by Congress would not be forthcoming.¹³⁴ As noted, neglect of these interests was the major impediment to consideration of the 1985 Laxalt proposal.

An agreement was reached in a remarkably short amount of time (less than two years). The Truckee-Carson-Pyramid Lake Agreement was signed and a draft of its component parts was submitted to Congress on August 4, 1989; the Act was signed into law by President Bush on November 16, 1990. Implementation of its provisions is discussed below.

3.4 Washington, D.C.: The Bigger Picture

The negotiated water settlement that was reached in Northern Nevada was hailed as an outstanding feat by many, especially given the number and scope of the conflicts that arose at the state level. The bill had to be ratified by Congress, however, to become law. And Washington politics proved to be an even more complex negotiation process than that which took place in Nevada, with many Congressmen, Senators, committees, agencies and the President needing to sign off on the bill to make it law.

To a distant observer who may have read the Reno papers, the process appeared basic. The water policy bill was introduced by Senator Harry Reid and initially died in a package of other water bills in the Senate Water and Power Subcommittee.¹³⁵ The bill was later revived and attached as a "rider" to S. 3084, the Fallon Paiute Shoshone Tribal Settlement Act. This Act was passed in the Senate during the last days of the 101st Session of Congress. Subsequently, it was passed by the House of Representatives and was signed into law by President Bush.

Prior to that, however, the proposal had a number of other hurdles to jump. A closer look at the process which culminated in Public Law 101-618 demonstrates that several Washington politicians significantly influenced the outcome. These actors, pursuing seemingly unrelated political agendas of their own, had the power to kill the bill outright if those agendas were thwarted.

Several members of Congress wanted to use the legislation to take a broader policy stance in a related issue area. For example, Senator Bill Bradley, as Chair of the Senate Water and Power Subcommittee which exercised jurisdiction over the bill, questioned the rationality of continued support of Western irrigated agricultural projects, especially in the face of increased competition from more "beneficial" uses (environmental, Native American, industrial, municipal).¹³⁶ Several Eastern legislators made known their distaste for Western water practices. They noted that farmers in Maine were going bankrupt without federal water subsidies, while Western farmers, living in the desert, are flourishing because of them.¹³⁷

The message emanating from Bradley and other influential D.C. politicians was straightforward. Irrigated agriculture in the West should no longer be subsidized; rather, western water should be subject to the same market mechanisms as other commodities.¹³⁸ From their point of view, the economics of irrigated agriculture have never been even marginal; the major reason for

developing reclamation projects involved the need to encourage Westward development.

Currently, for example, western farmers in general are getting 80% of the benefits of federally subsidized irrigation projects, while footing only 20% of the bill.¹³⁹ Comments received from Reclamation in response to the draft report, however, assert that Newlands farmers are not heavily subsidized. In an average water year, the Newlands Project consumes more than 4.5 times as much water as Sierra Pacific's entire water service area. Water consumers in the Reno/Sparks area pay roughly 80 times as much for their water as do agricultural consumers in the Newlands Project. (To some observers, these facts might suggest that farmers are benefitting at the expense of others. However, as pointed out in comments received on the draft report, if the Newlands ceased taking any water from the Truckee River, there would not be any more water available for the Reno/Sparks area, nor would there be any decrease in the price they would pay. Nearly half the water rights used by the Newlands Project are held by 3% of the large farmers.) The Newlands Project losses amount to about twice as much water as the Sierra Pacific service area uses. And, finally, 82% of the water is used to support less than 1% of the economy, while 18% of the water use supports 95% of the economy.¹⁴⁰

A typical consumer of water for agriculture in the Newlands Project area pays an average of \$5.86 per acre/foot of water, while the average consumer for municipal/residential purposes in Reno and Sparks pays \$450.00.¹⁴¹ Urbanization and the drought have only intensified the concern and demand for water, not only in Nevada but elsewhere in the West.¹⁴² (Beginning in 1987, Nevada suffered from extreme drought conditions for seven years.)

The concerns expressed by various D.C. politicians regarding the inefficiency of Western water projects were not the only ones to surface as the bill wound its way through the Congressional system. Significant elements of the Washington bureaucracy also became involved, most of them located in the Department of Interior. Indeed, cooperation from the Department of Interior was critical for passage of the bill. Cooperation *within* the Department was difficult to obtain, however.

The Department of Interior has competing (and sometimes conflicting) interests, with the Bureau of Indian Affairs, the Bureau of Reclamation, the Division of Water and Science, the Bureau of Land Management, and the U.S. Fish and Wildlife Service (among others) all under the same roof. When three assistant interior secretaries testified before Bradley's Water and

Power Subcommittee in February of 1990 on this and other pending water settlement legislation, the subcommittee expressed displeasure with the lack of knowledge and unwillingness to cooperate among them.¹⁴³ Interior then proceeded to iron out and evaluate the department's position, resulting in a unified position. Members of this committee helped draft the amendment language that eventually was signed into law—language that moves away from traditional conceptions of reclamation policy in the United States.¹⁴⁴

The Office of Management and Budget (OMB) and the Senate Select Committee on Indian Affairs also tried to influence a major component of the settlement. The amount of money to be allocated to the Pyramid Lake Tribe was the key issue here.¹⁴⁵ Although the OMB insisted that the amount of money targeted for the Tribe (\$65 million) was much too high, the Select Committee thought the offer was fair, and the Tribe itself was in agreement. Senator Reid was worried that Bush would refuse to accept this section of the bill if OMB dug in its heels. Reid decided to go with the Committee's recommendation anyway. President Bush apparently agreed. In the closing hours of the 101st Congress, Reid successfully lobbied committee chairmen in the House to let the bill go to the floor on a voice-vote.

Pivotal to the process was the united front presented by the Nevada delegation. Senators Bryan and Reid and House members Vucanovich and Bilbray all favored the amended legislation.¹⁴⁶

Another crucial aspect of the bill's success was the united front in supporting its passage by the local parties involved in the initial negotiations. Those parties with veto power—the States of Nevada and California, the Federal government, Pyramid Lake Tribe, and Sierra Pacific—supported the measure.¹⁴⁷ TCID, which left the table early on and chose to take its own opposing stance on the measure, did not have the influence to stop the process.

Between the time the bill was submitted and signed into law (nearly a year), several significant amendments had been made to it. The amendments were significant because they were apparently specifically designed to restrict TCID's ability to litigate, and thereby stall implementation of the settlement. The amendments also mandated recoupment of illegally-diverted Project waters, giving the Secretary of the Interior leverage to force TCID to improve its irrigation systems. Both these amendment were added to Reid's original proposal by the Committee on Energy and Water which reviewed it. One D.C. insider¹⁴⁸ suggested that Bush was prepared to veto the bill if these provisions were not included.

In the meantime, various state and local interests, TCID aside, managed to obtain at least part of what it wanted from the terms of the settlement.¹⁴⁹ Sierra Pacific wanted drought protection; it got at least 40 years of it, provided it develops storage capacity to meet future urban demands. California and Nevada wanted assurance that their water supplies would be protected in the future; they both received such assurances *and* ended the 100-year-old water war between the two states. The Pyramid Lake Tribe wanted money and water enough to maintain and enhance Pyramid Lake and its fisheries; it got the promise of some of both, and while those amounts may turn out to be "not enough" in the long run, the agreement continues the pattern of decisions favorable to the Tribe and the Lake. The Fallon Tribe wanted justice. If one defines justice in terms of forthcoming water rights and monetary compensation for past damages, then justice, in this instance, was served. The environment benefitted as well, with provisions built in for wetlands and wildlife.

The federal government was also able to begin to move in a new direction regarding reclamation policy in the United States. Although irrigated agricultural projects in the West probably will never be totally abandoned, it seems that only the most efficient agricultural projects will continue to be partially subsidized, at least if the policy directions reflected in this piece of legislation, continue to be pursued.

3.5 The Settlement Provisions: P.L. 101-618

The Truckee-Carson Pyramid Lake Water Rights Settlement Act (84) contains two titles, which are only very briefly reviewed here. The first settles the 70-year-old dispute between the Fallon Paiute-Shoshone Tribe and the federal government. It creates a settlement fund for the tribe in the amount of \$43 million, to be allocated over a five-year period beginning in 1992. The fund is to be used for tribal economic development. In exchange, the tribe agreed to release all claims that it has had against the federal government resulting from its failure to meet its water obligations to them. The tribe also agreed to accept and abide by the limitations imposed on their water rights served by the Newlands Project. These are not to exceed 10,587.5 acre/feet of water per year for the reservation. They agreed to withdraw their previous objections to the OCAP set by the Bureau of Reclamation for the Newlands Project in 1988. And, finally, they agreed to cooperate in the development and implementation of a plan to improve the

efficiency of irrigation systems on the reservation that will utilize Project water.¹⁵⁰

Title II is much more complicated. The first set of conflicts that it resolves concerns "the equitable apportionment of the waters of the Truckee and Carson Rivers and Lake Tahoe between the states of Nevada and California" [Sec. 204(a)(b)(c)]. Sec. 204(a) deals with the Carson River, in which the provisions of the Alpine Decree (1980) are reaffirmed. In brief, the state of Nevada was allocated approximately 80% of the waters of the Carson River and approximately 90% of the waters of the Truckee River.

Sec. 204(c) deals with the Truckee River. This section grants the state of California the right to "divert or extract, or to utilize any combination thereof, within the Truckee River basin in California the gross amount of 32,000 acre-feet of water per year from all natural sources, including both surface and groundwater, in the Truckee River basin. . ." [Sec. 204(c)(1)]. The state of Nevada is entitled to all of the rest. While this section does explicitly reaffirm the provisions of the Orr Ditch Decree, it does note that ". . . [n]othing in this section shall be construed as modifying or terminating any court decree, or the jurisdiction of any court" [Sec. 204(c)((3)(h))]. Thus, the provisions of the Orr Ditch Decree relating to the allocation of water rights on the Truckee River remain intact.

Sec. 204(b) deals with Lake Tahoe. Essentially, California gets the use of 23,000 acre-feet per year; Nevada gets 11,000 acre-feet per year. Both allocations must be used within Tahoe Basin.

Title II also authorizes the Lahontan valley and Pyramid Lake Fish and Wildlife Fund (Section 206(f)). It is to be used both for wetlands protection in the Lahontan valley and threatened and endangered fish in Pyramid Lake. It authorizes the purchase of water rights from "willing sellers" in the Newlands Project service area. The target goal is to sustain approximately 25,000 acres of primary wetland habitat within the Lahontan Valley Wetlands. The fund is managed by Interior. As discussed above, provisions were also made for the protection and expansion of the Stillwater National Wildlife Refuge.

The Pyramid Lake Tribe, in exchange for dropping the claims it presently has against the federal government, is to receive \$25 million for enhancement of its fisheries, as well as an additional \$40 million for tribal economic development. Aggressive plans for the recovery and enhancement of the fisheries are also specified.

The Act expanded the legal purposes for which Newlands Project water may be used; these purposes now include—in addition to agriculture—fish and wildlife, municipal and industrial water supplies, water quality, recreation, and other purposes recognized as beneficial under state law. The expanded purposes are to be met, moreover, in a manner that will not increase diversions of the Truckee River over those presently allowed.

The Act requires the Secretary of the Interior to “recoup” water diverted by TCID during the 1973-1987 period in excess of the amounts allowed under OCAP, during the period the OCAP was under dispute between TCID and Interior. As noted above, recoupment was inserted as an amendment to the Act and there were apparently strong feelings in the federal government about it. The Department of Interior felt that these diversions were defiant and flagrant, and asserts that TCID was at times simultaneously diverting water from the Truckee River to Lahontan Reservoir and spilling water from the reservoir. Interior states that two major efforts were made to resolve the issue by negotiation prior to the United States filing suit, one during 1992-93 and a second in the facilitated negotiations of 1994-95. The present estimate is that approximately one million acre-feet are owed by TCID.

The Act also specifies that the OCAP presently in effect shall remain in effect until December 31, 1997, unless the Secretary decides, in his sole discretion, that changes are necessary to comply with his obligations, including those under the Endangered Species Act. It further specifies that, prior to December 31, 1997, no court or administrative tribunal shall have the jurisdiction to set aside any such OCAP or to order or direct that they be changed in any way. Indeed, “all actions taken heretofore by the Secretary under any operating criteria and procedures are hereby declared to be valid and shall not be subject to revision in any judicial or administrative proceeding.”¹⁵¹ Under these provisions, the TCID appears to be constrained from litigating the conditions of the settlement.¹⁵²

Section 210(a)(2)(A) of the Act provides that the interstate allocation (Section 204), provisions affected Fallon Naval Air Station water use (Section 206(c)), acquisition of water rights and use of Stampede and Prosser reservoirs (Sections 207 (c) and (d)), disbursement of the Pyramid Lake Paiute Economic Development Fund (Section 208(a)(3)(D)) shall not take effect until the agreements and regulations required under Section 205 (including TROA) have entered into effect and the outstanding claims described elsewhere in Section 210 have been dismissed with prejudice or otherwise resolved.

3.6 Implementation of P.L. 101-618

The Act, in essence, has seven major elements. These include:

- ! Settling issues related to the Fallon Paiute-Shoshone Tribe;
- ! Settling water allocation between the states of Nevada and California;
- ! Encouraging the development of solutions for demands on Truckee River waters;
- ! Improving the management and efficiency of the Newlands Project;
- ! Settling issues related to the Pyramid Lake Paiute Tribe;
- ! Promoting enhancement and recovery of Pyramid Lake's endangered and threatened fish species; and
- ! Protecting Lahontan Valley wetlands from further degradation.¹⁵³

Each of these items is discussed further below.

The Fallon Paiute-Shoshone Tribe

Title I of P.L. 101-618 created a settlement fund for the Tribe in the amount of \$43 million, to be allocated over a five-year period beginning in 1992 and to be used for tribal economic development. The Tribe agreed to release all claims that it has had against the federal government resulting from its failure to meet its water obligations to them. The tribe also agreed to accept and abide by the limitations imposed on their water rights served by the Newlands Project. They agreed to withdraw their previous objections to the OCAP set by the Bureau of Reclamation for the Newlands Project in 1988. And, finally, they agreed to cooperate in the development and implementation of a plan to improve the efficiency of irrigation systems on the reservation that will utilize Project water.¹⁵⁴

The Act also mandated that "the Secretary [of Interior], in consultation with the Tribe and in accordance with applicable law, shall develop and implement a plan for the closure, including if appropriate, modification of components, of

the TJ drain system [see discussion above], including the main TJ drain, the TJ-1 drain and the A drain and its sublaterals, in order to address any significant environmental problems with that system and its closure" [Sec. 106(A)]. Under the settlement, the Tribe agreed to cap their use of water rights at 10,587.5 acre-feet/year.

As of 1996, the final installment on the settlement was appropriated; these funds have been placed into a Treasury account created on behalf of the Tribe and the Tribe is able to access a portion of the interest of these funds at this time. Claims against the federal government resulting from its failure to meet its water obligations to the Tribe have been dropped. Presently, negotiations are ongoing between the federal government and the Tribe regarding the Tribe's ultimate ability to operate their facility independent of TCID, should they so choose. The federal government and the Tribe are in the process of closing TJ drain.

Federal Water Master

Under the provisions of the Orr Ditch Decree (for the Truckee River and Lake Tahoe) and the Alpine Decree (for the Carson River), a federal Water Master has been and is currently responsible for seeing that the water rights decreed by these courts are satisfied in all three basins.

Specifically, the Orr Ditch Decree states:

A Water Master shall be appointed by this Court to carry out and enforce the provisions of this decree and the instructions and orders of the Court, and if any proper orders, rules or directions of such Waster Master. . .are disobeyed or disregarded he is hereby empowered and authorized to cut off the water from the ditch or canal owners or water users so disobeying or disregarding such proper orders, rules or directions. . . The owner or owners of each ditch or canal herein authorized to divert water from the Truckee River or any of its tributaries, or from any ditch or canal or other waterway receiving water therefrom, shall, within sixty (60) days after the entry of this decree. . .install and thereafter at all time properly maintain in such ditch, canal or other waterway, a reliable, sufficient and easily-operated regulating headgate and locking and measuring services. . .whereby the water diverted into such ditch, canal or other waterway at any and all times may be properly regulated and correctly measured. .

*.. The stored water of any reservoir, including Lake Tahoe, may be turned into and carried in the channel of any natural stream and mingled with the waters thereof and diverted therefrom for the proper uses of the persons or parties entitled thereto. The Water Master, upon timely notice, shall so regulate the headgates along the streams and do and direct to be done such other things as may be needful to transport such stored water and deliver the same to the person or persons entitled thereto. All persons are hereby prohibited from in any way interfering with any such stored water while the same is being legally carried to the persons or parties entitled thereto.*¹⁵⁵

The Alpine Decree essentially uses the same language to create and empower a court-appointed Water Master to manage distribution of water from the Carson River system to those entities holding legal rights thereto.¹⁵⁶

Once the various negotiations that are underway (discussed below) are concluded, it is not certain that the current Water Master will assume the additional responsibilities emanating from the negotiated settlement. Indeed, the negotiated settlement specifically states that the new TROA may include provisions for the "administration of the Operating Agreement, including but not limited to establishing or designating an agency or court to oversee operation of the Truckee River and Truckee River Reservoirs" [Sec. 205(a)(3)(a)].

Water Allocation Between Nevada and California

Congress allocated Lake Tahoe primarily for in situ uses and the two rivers for use in Nevada. Both the Truckee and the Carson are interstate rivers shared by Nevada and California, but there was no formal comprehensive allocation between the two states by Supreme Court decree, compacts, or acts of Congress until 1990. As part of the Truckee-Carson water rights settlement, Congress ratified the long history of judicial decrees, federal agreements, and the 45 year history of efforts to negotiate a compact to provide a de facto allocation.

Section 204 of the Settlement Act allocates the water rights of the Carson and Truckee Rivers and Lake Tahoe. As to the Carson River, allocations are administered in accordance with the Alpine decree. However, the Act does not limit assertion of water rights that existed prior to January 1, 1989. Primarily, allocations are not to exceed 1,300 acre-feet per year in California and 2,131 acre-feet per year in Nevada. Nevertheless, California received an additional storage amount in proportion to the reduction of imported effluent

from the Lake Basin into the Carson River watershed when the available water supply in the Truckee River basin is thereby increased. However, these storage rights cannot interfere with mandates of the Alpine decree; adversely affect fish and wildlife; nor exceed 2,000 acre-feet per year, or a proportionate increase in the Truckee River basin, whichever is less. Additionally, these storage rights must be available for irrigation purposes, not to exceed 2,000 acre-feet per year. Further, California and Nevada are permitted to study future beneficial interests, which includes the use of water for wetlands or wildlife. Finally, interbasin transfers must comply with California and Nevada state laws, and must comply with the Alpine decree.

As to the Truckee River, California can divert or extract a gross amount of 32,000 acre-feet of surface or groundwater per year, and California water purveyors may divert up to 10,000 acre-feet of its allocation directly from unregulated surface flow for any beneficial use in the California part of the Truckee River Basin. These diversions are subject to the rights of the Pyramid Lake Tribe and Sierra Pacific Power Company. California cannot use Truckee River basin water for uses outside the Truckee River basin. Any change in timing and return flows made by the Tahoe-Truckee Sanitation Agency, or other similar agency, must be offset against California's gross diversion amount. Moreover, all uses of water for commercial and irrigated agriculture within the California Truckee River basin are subordinate to beneficial interests in Nevada, which includes the maintenance of the Pyramid Lake fishery. Any boundary changes in the Tahoe-Truckee Sanitation Agency are subject to California's rights under the Act. The first 225 acre-feet of water used in California for snow-making purposes is not charged against California's gross diversion rate. Unmetered diversions used for residential purposes in California is presumed to be four-tenths of one acre-foot per residence per year.

As to Lake Tahoe, California was allocated 23,000 acre-feet per year and Nevada 11,000 acre-feet per year. For snow-making purposes, the first 600 acre-feet for California and first 350 acre-feet for Nevada are not charged against either states' gross diversion. Additionally, the Act specifies that any unmetered diversion or extraction of water for residential purposes presumptively equals four-tenths of one acre-foot per residence per year.

Interstate transfers are subject to California and Nevada law. Additionally, these transfers are chargeable against either state's allocation, and may be charged where the water is used. However, each state may deny a transfer

based upon a finding of adverse impacts on the environment or overall economy of the area.

TROA and the PSA

As described above, the Secretary of Interior was ordered to negotiate a new Truckee River Operating agreement with the State of Nevada and the State of California. Details regarding TROA are given in Chapter 2.3 above. The provisions of the Preliminary Settlement Agreement (PSA) signed by Sierra Pacific Power Company and the Pyramid Lake Paiute Tribe (also described above) are acknowledged in the negotiated settlement and will become part of that settlement once agreement has been reached on the TROA. Public Law 101-618, Sec. 205(a)(2)(c) requires that the provisions of the PSA be included in the TROA.

The PSA will not become operative until the following criteria have been met, however:

- ! Federal authorizing legislation is passed;
- ! The United States and Sierra Pacific reach an agreement on storage fees, and develop and sign an operating agreement for carrying out the PSA's water storage provisions;
- ! The PSA has been submitted to and approved by the Orr Ditch and Truckee River General Electric Courts;
- ! Specific outstanding litigation and proceedings must be dismissed with prejudice or otherwise finally resolved;
- ! A water conservation plan is developed for implementation during drought years; and
- ! The state of Nevada passes legislation authorizing water meters, and develops a plan to finance their installation.¹⁵⁷

Regarding the first four points above, the negotiated settlement authorizes and includes the PSA in its provisions. An interim agreement has been reached between the United States and Sierra Pacific regarding storage and water storage provisions.

Section 29(e) of the PSA mandates that a conservation plan for drought conditions be developed by Sierra Pacific. The plan must produce an annual savings of 10% or more during the ensuing year whenever it appears that a drought situation will occur (based on the April 1 seasonal Truckee River runoff forecast). Sierra Pacific, the Pyramid Tribe, Reno, Sparks and Washoe County entered into such an agreement on July 18, 1996. In this agreement, Reno, Sparks and Washoe County agreed to adopt and implement ordinances limiting lawn watering to a staggered system of no more than two days per week during each and every year. Each entity also agreed to adopt and implement ordinances prohibiting lawn watering during the summer season between the hours of 1:00 p.m. and 5:00 p.m.

Sierra Pacific further agreed to distribute free water saving devices, such as toilet-fill-restrictors, toilet-reservoir-water-displacement devices, faucet restrictors, leak detection tablets, low-flow showerheads, or other water-saving devices, provide adequate field personnel during the summer lawn water season in order to encourage conservation and provide support for monitoring implementation of the ordinances that limit lawn watering. Sierra Pacific also agreed to reimburse Reno, Sparks and/or Washoe County for expenses incurred (staff time) in issuing water ordinance citations within Sierra Pacific's service area; and to provide, beginning in 1997, a program to encourage, facilitate or participate in projects to retrofit water efficient landscaping. Sierra Pacific also agreed to provide annual reports on its water conservation efforts (Water Conservation Agreement, July 18, 1996:6-7).

In signing this agreement, all parties acknowledged that the agreement met the conservation plan requirements set forth in Sec. 29(e) of the PSA. Further, the Conservation plan will become null and void if the TROA has not been agreed upon and entered into effect by December 31, 1997.

With regard to water meters, the Nevada legislature passed (and the Governor signed) Water Meter Legislation on June 30, 1989 (CH. 617, 1980 Nev. Stat. 1393). This legislation lifted Sierra Pacific's ban on the use and installation of residential water meters in the Truckee Meadows, provided that: the Truckee River Negotiated Settlement goes into effect; residents do not pay for hookups (they don't and won't); and residents are not forced to be billed on a metered rate until 90 percent of Sierra Pacific's retrofit meter installations are completed. This means that before older residents living in homes built prior to 1988 can be required to pay a metered rate, 90 percent of the retrofits must be completed. New homes are required to be metered. On February 20, 1996, the Public Service Commission approved Sierra Pacific's

Water Meter Financing Plan, which includes provisions for paying for the installation of meters.

Newlands-Related Issues

Operating Criteria and Procedures (OCAP).—The OCAP were originally separate rules and regulations set down by the Secretary of Interior specifically for the Newlands Project, as explained above. In 1990, P.L. 101-618 required that an efficiency study be conducted to investigate the feasibility of increasing Project efficiency to 75% [Sec. 209(c)]. There is no requirement to actually achieve this level of efficiency, although in 1994 hearings before Congress, Reclamation reported that it is “achievable.” Nor is there a requirement that the Newlands Project have efficiency targets; project efficiency targets were first incorporated into OCAP in 1988.

P.L. 101-618 specifies that the OCAP that has been in place since 1988 shall remain in effect—and cannot be set aside—until December 31, 1997, unless the Secretary of Interior decides that changes are necessary in order to meet his obligations, including those set forth in the Endangered Species Act. The Secretary has apparently decided that such changes are necessary and Interior has developed and published a proposed adjusted OCAP.

The long-term issue remains, as noted elsewhere in this report, the question of certainty and whether there will be an ultimate limit to the amount of water to be shifted from the Newlands Project under OCAP.

Recoupment.—P.L. 101-618 gives the Secretary of Interior the authority to cancel all TCID repayment obligations owed to the Bureau of Reclamation, provided: (a) the TCID agrees to collect all such repayment obligations anyway, and to use those funds to develop and implement water conservation measures; and (b) TCID enters into an agreement with the Secretary to repay the more than one million acre-feet of water that it diverted above and beyond that permitted by relevant OCAP.

TCID may have already met its repayment obligations to Reclamation in full, however TCID still owes about \$1 million from federal financing of various supplemental construction activities, with the final payment due in the year 2016. Other inducements offered to settle the recoupment issue under P.L. 101-618 included \$4 million in federal water conservation spending (Section 209(h)(3)) and an equal amount from the State of Nevada (Section 209(h)(2)), the opportunity to have a water bank (Section 209(d))

and the financing of a recreation study (Section 209(e) and an effluent reuse study (Section 209(f)).

However, if TCID and the Newlands irrigators perceive that these inducements are small in relation to what they are being asked to give up (recoupment water) and what they are being asked to pay for (conservation, which they perceive benefits others, not them), then the incentives offered in the Settlement Act may not be sufficient to obtain recoupment and follow-through on the requirement to purchase Bureau of Reclamation repayment obligations and devote funds to improving water use efficiency is highly questionable.

Notwithstanding, the Secretary has the "exclusive authority and responsibility to pursue such recoupment, except that, if an agreement or an order leading to such recoupment is not in effect as of December 31, 1997, any party with standing to pursue such recoupment prior to enactment of (Title II of P.L. 101-618] may pursue such recoupment thereafter" [Sec. 209(j)(3)]. In November 1995, the federal government pushed the issue of recoupment further. In *The United States of America v. Board of Directors, et al.*, the government requested an order requiring TCID and the Newlands Project water users to comply with recoupment plans, when those plans are developed, and to comply with present and future OCAP (CV-N-95-00757-HDM, November 22, 1995). The plan is not complete but will be presented in litigation.

Pyramid Lake Paiute Tribe-Related Issues

Sec. 207(a) requires the Secretary of the Interior to revise, update and implement plans for the conservation and recovery of the cui-ui and Lahontan cutthroat trout. These plans, moreover, "shall include all relevant measures necessary to conserve and recover the species." As discussed above, these plans were released in 1992 and 1995. In addition, the status of Anaho Island, which was a part of the original reservation and later designated as a National Wildlife Refuge, was clarified (it remains a part of the reservation).

Sec. 8 authorized \$25 million to be appropriated for the newly-created Pyramid Lake Paiute Fisheries Fund, to be held in a Treasury Account for the Tribe; interest on these funds are to be used for the maintenance and operation of the fisheries. (Sec. 8 also authorized the appropriation of an additional \$40 million, to be used for tribal economic development.)

The law also authorized the Secretary of Interior to acquire water rights, from willing sellers, to be held and used to benefit the Pyramid Lake fishery. Water rights acquisition under the cui-ui recovery plan has not proceeded because NEPA requirements must first be met.

As noted, the Tribe is still pursuing avenues to obtain the right to all unappropriated Truckee River water as well. Section 210(a)(2)(b) of the Settlement Act provides that the PSA and the new TROA will not become effective until the Tribe's claim to the unappropriated waters of the Truckee River is resolved. On July 13, 1994, the State of Nevada and the Tribe entered into a Memorandum of Understanding that provided, among other things, that: (a) Pyramid Tribe's unappropriated water claim will proceed through the State Engineer according to the two applications the Tribe had filed in 1984; (b) if the Pyramid Lake Tribe is granted a water right to the unappropriated waters of the Truckee River, Nevada and the Tribe will jointly seek confirmation of that right, along with a determination that the waters of the Truckee River are fully appropriated; and © the Tribe's unappropriated right, if granted, will be enforced by the Orr Ditch Water Master.

Stillwater National Wildlife Refuge

Title II, Sec. 206 "authorizes and directs" the Secretary of Interior, in conjunction with the State of Nevada and other parties, "to acquire by purchase or other means water and water rights . . .and to transfer, hold and exercise such water and water rights and related interests to sustain, on long-term average, approximately 25,000 acres of primary wetland habitat within the Lahontan Valley wetlands," provided such "acquisition shall be only from willing sellers. . ."[Sec. 206(a)(1)]. The Act also created the new Stillwater National Wildlife Refuge as described above, to be managed by the U.S. Fish and Wildlife Service for the purpose of maintaining and restoring natural biological diversity within the refuge; providing for the conservation and management of fish and wildlife and their habitats within the refuge; fulfilling international treaty obligations of the United States with respect to fish and wildlife; and providing opportunities for scientific research, environmental education, and fish and wildlife oriented recreation [Sec. 206(b)].

The U.S. Fish and Wildlife Service has assumed management responsibility for the Refuge, as required by the law and has developed a proposal to acquire 75,000 acre-feet of water, over the next several years, to support the 25,000 acres of wetland habitat in Lahontan Valley that it is required to

protect under P.L. 101-618. This amounts to about 40% of the water rights that are currently in private ownership in the Carson Division of the Newlands Project. An EIS has been completed on the impacts that such acquisitions would have in and around the Newlands Project area. The price-tag for these rights is estimated to be as high as \$69.4 million. The long-term impacts are difficult to determine at this point in time because of all the other issues that are as yet unresolved. For example, if the newest OCAP further reduces the amount of water diverted to the Project and/or recoupment becomes a reality, the wetlands will certainly be negatively affected. Either move would reduce the amount of flows to the wetlands, thereby making the U.S. Fish and Wildlife's mandate to protect the wetlands more difficult to achieve. Nonetheless, at least two other impacts cannot be avoided, no matter how these other issues are resolved.

A 1993 FWS report to Congress on the Water Rights Acquisition Program, anticipates that the rural lifestyle, highly valued in Churchill County, will be affected. "The Lahontan Valley wetlands water rights acquisition program may take 53 to 78 percent of the currently irrigated agricultural lands with water rights out of production."¹⁵⁸ Yet "[f]or many members of the community, 'farm preservation values' reflect a prevalent attitude that the farming lifestyle should be protected. As acres of farmland are taken out of production, those members of the community who hold these values would be adversely affected."¹⁵⁹ So prized is the rural lifestyle in Churchill County, of which family farming is an integral part, that the Service may be hard pressed to find willing sellers in the numbers necessary to achieve their goals.

Second, the area around Fallon, Nevada (the Carson Division) derives its drinking water from wells in the shallow aquifer, 10 to 50 feet below the surface, and this aquifer has increased in volume and extent since the inception of the Newlands Project. This is because it has been constantly recharged through seepage of irrigation water from Project delivery canals, and the application of irrigation water to fields. No one seems to be certain what the water-rights acquisition program, if successful, would have on the water table—nor what the long-term consequences might be. For example, while the U.S. Fish and Wildlife report mentioned above suggests that "transferring water rights from agricultural areas to the wetlands is predicted to have. . . minimal adverse impact on aquifer recharge in the Lahontan Valley" (p. 7), the U.S. Geological Survey states that in "areas where irrigation is removed, the amount of decline could be about 10 feet at a distance of one to two miles from lined canals."¹⁶⁰

3.7 Subsequent Negotiations and Agreements

In the course of implementing the various provisions of the Act, including the resolution of these issues, a series of post-settlement negotiations between various parties emerged. The most important of these concerns the Truckee River Operating Agreement, which remains in progress and is nearly ready for signature (see above and Section 4.4). Not all of the objectives have been achieved to date, however, and some of the subsequent negotiations have failed. However, other initiatives to negotiate solutions have flourished in the atmosphere of accommodation and compromise created in the aftermath of the Settlement Agreement.

The “Second Generation” or “Facilitated” Negotiations

The Settlement, while groundbreaking, merely established a framework for addressing issues related to the allocation and use of the Truckee-Carson river waters. The Settlement required, at a minimum, a second generation of negotiations among the parties and interests involved. One key player identified the following important remaining questions in testimony to Congress:¹⁶¹

- ! How much water is irrigated agriculture entitled to from the Newlands Project?
- ! Who is to benefit from any savings in the delivery of water to farms?
- ! What should the final operating criteria and procedures for the Project be?
- ! How much water is needed for the Lahontan Valley wetlands?
- ! How can cui-ui recovery be integrated with the restoration of the Pyramid Lake and Lower Truckee River ecosystems?
- ! Can the water needed for the wetlands, Pyramid Lake and the Truckee Meadows be acquired consistently with the evolving water needs and shifting agricultural base of the Fallon and Fernley communities?

Other issues touched on (as noted by Interior) included Truckee River water quality, possible further settlements with the Fallon Tribes, storage of state

water acquired upstream of Lahontan Reservoir in the Carson River Basin, and other upper Carson issues.

Beginning in late 1993, nine negotiating teams, representing a variety of users and interests affected by the Settlement, began a series of discussions that some hoped would lead to the development of answers to these and other questions regarding implementation of the Settlement. To facilitate the process further, Senator Reid agreed to let a professional mediator from Resolve (Center for Environmental Dispute Resolution) of Washington, D.C., conduct more formal negotiations to mediate and arbitrate outstanding water issues among the parties pertaining to Pyramid Lake and the Truckee and Carson rivers.

Negotiator Gail Bingham from Resolve convened the first meeting of the Truckee-Carson Settlement Negotiations in Reno, Nevada. Participants included:

- ! U.S. Department of the Interior (Office of the Secretary) and members of a federal team that included FWS, Reclamation, BIA, TCCO, the Solicitors Office, EPA and Justice;
- ! State of Nevada (Department of Conservation and Natural Resources), including Wildlife, Parks and State Lands Divisions);
- ! Pyramid Lake Paiute Indian Tribe;
- ! Fallon Paiute-Shoshone Indian Tribe;
- ! Truckee Meadows Regional Planning Governing Board (Washoe County);
- ! Sierra Pacific Power Company (WestPac Utilities);
- ! Carson River Subconservancy District;
- ! Lahontan Valley farmers and TCID (represented through the Lahontan Valley Environmental Alliance or LVEA);
- ! Newlands Water Protective Association;
- ! Local governments (Fernley, Fallon and Churchill County); and

! Conservation Caucus (The Nature Conservancy, Environmental Defense Fund, Lahontan Wetlands Coalition).

Various working groups consisted of the Modeling Working Group, Water Quality, Land Use Planning, Hydro Power, and M&I (municipal and industrial). The initial deadline for the completion of negotiations was established to be January 31, 1995.¹⁶²

Five months later, the Lahontan Valley Environmental Alliance, representing local community and agricultural interests in Churchill County, reportedly withdrew from the process, unable to reach an agreement with the other parties where their interests were concerned. Indeed, one report had it that “about the only thing the farmers, the [Pyramid Lake] tribe and environmentalists got [from each other] out of the talks was a commitment to continue communicating and try to work out differences” in the future.¹⁶³ However, as with the question of Newlands irrigators so-called “walk-out,” other sources again characterize the conclusion of negotiations more neutrally, as a situation in which the LVEA had tried to take a tentative deal back to the community, was unable to sell it, and, the negotiations already having gone beyond their self-imposed deadline, most parties felt that further negotiations would not be fruitful at that time.

These negotiations did provide the framework from which the Water Quality Agreement (below) sprung, however. Also, the State of Nevada and the federal government agreed to keep a minimum pool of 4,000 acre-feet of water in Lahontan Reservoir at all times (for fish preservation), and to allow the state to store water it buys for wetlands restoration there.

Negotiations Sponsored by Nevada Department of Conservation and Natural

Resources

The Director of Nevada Department of Conservation and Natural Resources initiated negotiations between Fallon farmers and the Pyramid Lake Tribe. In July 1996, after twelve negotiation sessions, negotiations were terminated without agreement when both parties failed to agree on which issues could be discussed. Some progress was made with respect to the Fallon farmers being open to the idea of storing some of their Truckee River water in Sierra Nevada Mountain reservoirs and bringing it down to Lahontan Reservoir later in the spring.¹⁶⁴ This would have allowed a more accurate determination of Carson River shortfalls which would then be made up by TCID's Truckee River allocation.

According to one observer¹⁶⁵, the negotiations were constructed to involve representatives who had not already committed to positions but were crippled by their lack of understanding of the issues and the Truckee-Carson system. Tentative agreements were made that were taken back to respective managers and boards and which could not be accepted by these decision-makers. This observer felt that the net effect was to damage the larger process by creating an impression of failure to follow through on agreements, and also a fear that other party would expect these unacceptable agreements to become the opening positions in future discussions.

Water Quality Agreement

The cities of Reno and Sparks, Washoe County, the Department of the Interior, the Department of Justice, the Environmental Protection Agency, the Nevada Division of Environmental Protection, and the Pyramid Lake Paiute Tribe signed the Truckee River Water Quality Settlement Agreement on October 10, 1996. This agreement was negotiated among these parties in order to settle pending litigation brought in December 1988 by the Tribe against Reno, Sparks, EPA and NDEP.

The suit was brought when the Truckee Meadows Water Reclamation Facility increased its treatment and effluent capacity from 30 to 40 million gallons per day. In exchange for the Pyramid Lake Paiute Indian Tribe dropping its lawsuit and allowing the cities of Reno and Sparks to use the full 40 million gallons per day capacity of the Truckee Meadows Water Reclamation Facility, the cities and the U.S. Department of the Interior agreed to spend \$24 million to purchase Truckee River water rights.

These rights will be purchased over the next five years for the purpose of improving water quality in the Truckee River. This will be accomplished by diluting treated wastewater in the Truckee Meadows, thereby improving the quality of water in the Lower Truckee River—which will, in turn, improve the quality of water that makes it into Pyramid Lake.

The water rights acquisition cost will be shared equally between the cities and Interior. The purchased water, estimated to total approximately 24,000 acre-feet, will be stored in upstream reservoirs and released during low-flow periods.¹⁶⁶ This acquisition represented the first such water purchased specifically for the Truckee River itself and will be used to dilute treated effluent discharges from the treatment plant and to provide more water for Pyramid Lake.¹⁶⁷ A computer model predicted that over a 95-year

period, the additional water will allow Pyramid Lake to rise by 11 feet over its level without the acquisition. It will also keep at least 300 cfs in the river at Sparks during July and August 95% of the time (a condition occurring only 15% of the time previously) and will lower river temperatures. These actions are projected to increase the number of days the river meets temperature standard to 262 and the number of days it meets the dissolved oxygen standard to 322.

The cost to local residents of the Truckee Meadows was estimated at \$0.41 per month, and sewer hookup fees were predicted to rise by \$200 per home.¹⁶⁸

The Water Quality Agreement also deals in creative ways with application of treated effluent to supply certain uses that require water even in time of drought (such as parks, golf courses and the University of Nevada experimental farm). Effluent is supplied in return for substituting clean water flows based on less firm water rights.

Suit Seeking Programmatic Environmental Impact Statement

Uncertainty concerning the total environmental impacts that will be caused by implementation of the entire Act (all provisions of P.L. 101-618) prompted local interests (Churchill County and the City of Fallon) to file suit against the Secretary of the Interior. In *Churchill County v. Babbit*, filed November 22, 1995, the county contends that the Act:

. . . seeks to reallocate water resources away from the farms and communities in the Lahontan Valley located 60 miles east of Reno\Sparks, Nevada, for the benefit of federal interests, including an Indian Tribe, wetlands, and two species of fish. . . . Rather than assessing the environmental impacts of this reallocation in a programmatic manner, the United States has chosen to piecemeal the environmental analysis by preparing simultaneously numerous separate environmental documents under the National Environmental Policy Act. . . all of which are related in time, geography and environmental impacts. Plaintiff alleges that this piecemeal approach to environmental analysis violates NEPA and has the potential to cause significant environmental harm to the health, safety and welfare of the people and communities in Churchill County (p. 2).

A similar suit was filed by the City of Fallon shortly thereafter and the two suits were consolidated. The City and County are seeking an injunction

against implementation of the Act until a Programmatic Environmental Impact Statement is completed. A third suit (consolidated with the first two) was filed in relation to an inadequate NEPA compliance for water rights acquisition under Section 206 of P.L. 101-618. In early 1997, the Court found that the plaintiffs lacked standing to bring the action and the case is now on appeal.

4. Critical Issues: Case Study Discussion

During Phase II, the Truckee-Carson River Basin Study team focused on five critical water-related issues in the basins:

- Water transfers
- Surface-Groundwater Relationships
- Newlands Irrigators
- TROA/OCAP
- Watershed Management/Carrying Capacity

Our approach to the Truckee-Carson was as a **case study**, to inform Western water policy. The five issues were investigated in depth not to develop new recommendations or research for the river basins themselves, but to illuminate water policy in terms of lessons learned and transferrable experience.

The focus for this phase of work was **evaluation**: what worked, what did not, and why. Emphasis was placed on **federal** agencies and programs, and their role and actions, but interactions with the local, state, tribal and private levels were considered as well. In evaluating the five selected issues during Phase II the team considered the following:

- What activities and programs most significantly address the problem? Why they have been effective? Which are not working, and why? Which Federal water resource management programs have been generally successful and widely supported?
- Might a basin-wide commission be effective in addressing these problems? What are the pros and cons, including effects on state water management?
- What innovations in governance structures have promoted collaborative efforts across stakeholder groups, jurisdictions or levels of government? What innovative voluntary water marketing, banking, or transfer systems should be noted? What innovative water conservation efforts have helped reduce diversions? What innovative approaches to scientific research or data collection have fostered wide participation and agreement among stakeholders on either matters of fact or management strategies?
- What has been the Federal role in problem-solving? How effective have Federal programs been in facilitating resolution? What changes in Federal programs, authorities, missions, budgets, organization etc. would more effectively address the problems under discussion?

- What mechanisms could integrate local, state and Federal levels for planning, priority-setting, and problem-solving?
- What must be done at the Federal level to address the water problem under discussion over the next 20 years?

4.1 Water Transfers

Description of Emerging Markets

Motivations for Market Activity and Potential Buyers.—The primary motivations for water transactions in the study area include to secure water for threatened and endangered fish of Pyramid lake, support urban growth in Reno and Sparks, acquire water under the multi-party Truckee River Water Quality Agreement and secure water for wetlands restoration in the Lahontan Valley.

Growth rates in the Reno Sparks area were around 32% over the 1980 to 1990 period, with high growth in rural communities as well—Carson City at 26% and Fallon at 51% (see Section 1). Sierra Pacific expects to have adequate firm supplies to serve projected demands through the year 2015 based on its continuing water acquisition and conservation programs and through the agreements it has negotiated to augment supplies through improved reservoir management. Sierra Pacific will continue to focus its water acquisitions in the Truckee Meadows and thus its purchases will not compete directly with acquisitions associated with the water quality agreement described below.

The multi-party Truckee River Water Quality Agreement signed in October, 1996 obligates (among many other provisions) the cities and the U.S. Department of Interior to spend \$24 million to purchase Truckee River and Truckee Division water rights over the next five years to improve the quality of water in the lower Truckee River, diluting wastewater from the treatment plant and improving the quality of inflows into Pyramid Lake. The acquisitions are expected to total about 24,000 acre feet, with costs to be split equally between Interior and the cities—who will cover the costs through small increases in water rates and increases of about \$200 per home in sewer hookup fees (see Section 1 above). Interior and the cities are considering retaining a joint broker to handle their acquisitions and are seeking Newlands Project rights to retire, so that diversions through the Truckee Canal will decrease and the quantity and quality of flows into Pyramid Lake will increase. The water acquired will be released from upstream reservoirs

to improve water quality during the summer months so that the Lower Truckee River is in compliance with Clean Water Act standards.

The 1990 Preliminary Settlement Act requires that an annual average of 25,000 acres of primary wetland habitat be maintained in Lahontan Valley. USFWS has calculated that this requires 125,000 acre feet of water (including return flows, usable spills and acquisitions, see Section 1 above). USFWS and the state already had acquired about 20,000 acre feet as of mid-1996 and are committed to continuing acquisitions until wetland restoration goals are satisfied.

Potential Sellers.—Potential sellers are primarily irrigators because irrigation is still the largest consumptive use of water in the basin. Irrigated acreage is located in the Truckee Meadows, in the lower Carson Basin and in the upper Carson Basin.

In the early 1990s, about 10,000 acres of land were still being irrigated in the Truckee Meadows. No data is available on exactly how much irrigated acreage remains in the Truckee Meadows as of the mid-1990s that is suitable for water transfers to support urban growth. Irrigated acreage in the Truckee Meadows will continue to be acquired and the water transferred to support urban growth, continuing Sierra Pacific's long standing water rights acquisition program.

TCID irrigators comprise the largest group of potential sellers for the water quality and wetlands acquisitions programs, as they control the largest block of water rights in the study area. A recent survey of irrigators in the Newlands Project indicates that sellers are influenced to sell by personal reasons, such as farmers ready to retire with no heirs interested in taking over or needing to sell due to divorce or other changed family circumstances. Moreover, sellers have a higher portion of income from off-farm sources, a higher debt-to-equity ratio, lower quality soils and are less likely to live on the farm property than non-sellers.¹⁶⁹

The Upper Carson Basin is experiencing population growth and former pastures are being converted to subdivisions, concurrent with conversion of some water formerly used in irrigation to urban use. Carson City is gradually acquiring water from irrigators to support urban growth. About 58,000 acres are irrigated above Lahontan Reservoir, with an approximately 140,000 acre foot annual depletion of Carson River flows. While some of this acreage potentially could be fallowed in order to provide water for wetland restoration or other downstream needs, numerous legal and political issues

would need to be resolved in order to transfer Upper Carson water for use in the lower basin.

Markets, Price Determinants and Fair Market Value.—While the Truckee River Basin has been home to one of the most active and longstanding markets for water rights in the western United States for over a decade (see above for detailed history of market), the nature of the water market is becoming more complex as transactions in the region now serve not only urban growth but environmental needs as well. This section examines the factors that characterize water markets and affect water prices and fair market value in the western United States. Specific implications for the Truckee Carson Basin are discussed at the end of the section.

What Is A Water Market?—The term “water markets” refers to transactions which satisfy three conditions:

- Water’s value is recognized as distinct from the value of land and improvements. Water is bought and sold for its own sake, not merely as an incidental part of a land transfer.
- Buyers and sellers agree to reallocation voluntarily.
- Prices are negotiable by the buyer and seller, not constrained to be “not for profit” or “at cost.”

Transfers may include sale or lease of fee titles, water use permits, conservancy district shares and project contract rights; conditional water leases for drought year use; exchanges of water rights with varying priority dates and arrangements to use conserved water. Water resources which have been involved in market transactions in the American West include groundwater, native and imported surface water, artificially recharged and recovered water, effluent and conserved water.

The motivating force behind market transfers is the perception that economic gains may be captured by transferring water to a location or purpose of use in which it generates higher net returns than under existing use patterns. Three conditions must be satisfied for a buyer and seller to consummate a water transfer:

- The seller must receive a price offer that equals or exceeds the economic benefits sacrificed in transferring water. A farmer, for instance, must consider the net returns to water in irrigation, any decreases in the value

of land, improvements and equipment due to reduced water availability and expected appreciation in the value of the water right over time.

- The buyer must expect the economic returns from the water right purchase to exceed the costs associated with the purchase.
- The buyer must view market acquisition of water rights as an economically attractive method of obtaining water, relative to other possibilities—such as litigation to change water allocation, new supply development or contracting with an existing water service organization.¹⁷⁰

What Affects the Prices Farmers Are Willing to Accept?—Irrigated agriculture is still the major consumptive use of water in the study area, and so most acquisitions for urban and environmental needs will involve transfers from irrigation to the new use. The price paid for water will vary from case to case, depending on the nature of the transfer arrangement. The upper bound of what will be paid depends on the budget and willingness to pay of the party acquiring the water. The lower bound on the negotiated price will depend on the opportunity cost to the seller, lessor—that is, the net income from irrigated crop production that they forego. In negotiated transactions, the price will lie somewhere between these bounds, and will depend on the bargaining power and skills of the two parties.

Cost-based pricing is sometimes used to set a price for acquisition of water by public agencies. However, cost based pricing focuses on the opportunity costs to the seller, and does not consider the economic benefits to the buyer. Consequently, cost based pricing does not confer any of the net economic benefits of the transfer on the seller.

How much an irrigator can reasonably accept for water rights depends on several factors:

- **The value of water in irrigation**, which in turn depends on both crop revenues and production costs. Crop revenues are a function of crop prices, and are also heavily influenced by federal commodity programs. Where federal crop price support programs exist, they can make farm revenues much higher than they would be otherwise. These additional receipts make water more valuable to the farmer and thus make it more expensive to bid water out of agriculture. However, alfalfa, the primary crop grown in the Truckee-Carson basin, has never had price supports according to comments submitted by the Natural Resources Conservation Service.

Production costs have many components. Those most relevant for this discussion are the costs of irrigation water and of energy. Increases in the cost of irrigation water from federal projects will increase farmers' production costs and reduce the net value of water in agriculture. The cost of energy is an important component of the costs of irrigating—both for farmers who pump groundwater and farmers who use surface water that must be pumped and conveyed from the river to their fields. Renegotiation of energy contracts and declining groundwater tables are two factors that can significantly affect irrigation costs and thus influence farmers' incentives to sell or lease their water.

- **Returns to farmland and assets without water.** The economic benefits are farmers *really* giving up when they sell water rights are the differences between economic returns with and without water rights. If farmland is not transferred when water is sold, the land may have value for dryland crop production or grazing. Revenues, production costs and risks will each be quite different in these alternative uses, if they are practicable at all, than they were for irrigated crop production.
- **Expectations regarding future water values.** A key question in any irrigator's mind involves the timing of a water transfer. "Should I accept an offer for my water rights this year or hold onto them hoping for higher prices?" The value of water in farming is based on the expected present value of the periodic receipts to which the water right entitles its owner. Because the value of a water right is based on a stream of returns over time, it is sensitive to the time rate of discount and the expected change in relative price of water rights in the future. Because the expectations that affect prices for water rights are uncertain, willingness to sell is also influenced by the risk-aversion of the farmer, and his willingness to hold on to his water, taking the chance that the value of his right may fall rather than rise.
- **Value of rural, agricultural lifestyle.** Sociological and economic studies indicate rural households are not in farming primarily for its income potential. In fact, many farmers are living on less income than they could earn in other jobs requiring comparable skills because they value the independent, rural lifestyle that goes with farming. Where the family has been established in farming for several generations and has close cultural and historic ties to the land, these lifestyle values may be quite important.

All of the factors described play a role in determining the price at which farmers are willing to sell or lease water. Where water rights are obviously quite valuable in non-agricultural uses, farmers may hold out for prices that far exceed the value of water in irrigation. For instance, Gardner and Miller indicate that prices in Colorado's Front Range peaked at values equal to the capitalized marginal demand for water by municipal users in the late 1970s.¹⁷¹ As urban growth accelerated, agricultural right holders believed that they each had a high probability of being able to transfer their water rights to municipal or industrial water users and were no longer willing to sell at prices that reflected only water's value in irrigation. For a brief period of time, the value of the water in urban uses was fully capitalized into market prices.

Factors That Affect Water Right Prices—Examples From Western US Water Markets.—A single unit price is unlikely to dominate in a regional market for water. Price dispersion within a water market persists for two basic reasons. First, as with other commodities characterized by multiple attributes, water users are willing to pay different amounts for water rights based on the specific attributes of the right. Second, characteristics of regional markets contribute to price dispersion. The number and size distribution of potential buyers and sellers, high search and information costs in thin markets, and the heterogeneity of water commodities traded explain the persistence of price dispersion in many water markets.

First, the number and size of potential buyers and sellers affects the degree of price dispersion. Specifically, when there are few potential traders, or traders are highly disparate in size, the linkages and information flows within a market may be inadequately developed and a common unit price will not emerge. This is often the case in regional water markets where there may be only one or two large buyers (a mining corporation, municipality or power plant, for instance) who purchase water from a number of small landowners. Second, the more complex and multidimensional the commodity traded, the higher the costs of search and the larger the dispersion in market prices. Search and information costs, and numbers and sizes of potential traders account for price dispersion not explained by specific water right attributes.

Gila-San Francisco Basin: Water market activity in the Gila-San Francisco Basin began when the basin was closed to additional appropriation in the 1960s. Market transactions in the Gila Subbasin are more numerous than in the less populated San Francisco Subbasin, where right acquisitions did not become common until the 1970s. Until the 1960s, most water rights were

held by farmers and ranchers but mining interests acquired the majority of water rights in the basin in the 1960s and the water market has operated on a continuing basis since these large mining purchases. Water rights buyers include irrigators, individual homeowners, small water service organizations, Silver City, mining corporations, and other commercial enterprises. Many transactions involve small quantities of rights, often less than an acre foot of water.¹⁷²

The area was adjudicated under *Arizona v. California* in the 1960s, when the total amount of water that can be used (both surface water and groundwater) was fixed.¹⁷³ Consequently, the only means for those who need additional supplies to get them is acquisition of existing water rights. The copper industry was volatile during the 1970s and experienced a dramatic downturn in the early 1980s when several mines in the area closed operations. Because this industry was the dominant water buyer, its peaks and slumps are directly reflected in water rights values in this basin. However, there has been a steady increase in the population of Silver City, New Mexico, which acquires groundwater rights in this basin and pipes the water to its service area on the other side of the Continental Divide. Silver City's demand, along with that of second home and retirement developments, keeps water values from being entirely subject to the cycles of copper prices. In the 1990s, prices continue to rise in response to steady municipal and rural development demand and to an increase in mining operations.

Statistical analysis of water rights transactions in this basin indicates that water rights seniority is the single most important factor in predicting the price at which water rights will sell, followed by the location of the water rights, the buyer's intended use for the rights, and the quantity of water sold. Overall, this region experienced a very small (less than 1%) price increase per year over the period 1966 to 1990. Over the shorter period 1966 to 1981, the average annual increase measured 4%.

Statistical analysis is based on data from 95 water market transactions which occurred during the period from 1971 to 1987 in the Gila-San Francisco Basin. Each factor which is statistically related to water price is discussed below, along with evidence from other regional markets.

Priority/Reliability of the Water Right: In the Gila-San Francisco Basin, higher prices are accorded to water rights with older (pre-world War II) priority dates. Buyers pay about \$370/ac-ft more for rights with pre-1940 priority dates. This is consistent with other observations in other regional markets. Ross (1984) notes that prices paid by Colorado municipalities for

senior water rights that can be exercised throughout the summer peak demand period are three times higher than prices paid for junior water rights limited to diverting water during periods of high stream flows.¹⁷⁴ Municipal and industrial water providers pay a premium for senior water rights that may be used throughout the year, and that are less likely to be curtailed during drought. Water users are willing to pay reliability premiums for supplies available during dry years and droughts, as evidenced by the fact that senior water rights sell for more than their junior counterparts. In basins with an active market in water rights with different reliability characteristics, the reliability premium can be inferred by examining market price differentials. The value of more reliable water can also be inferred from investments in storage and other strategies to firm up the reliability of existing supplies. In general, the reliability premium will approach the incremental cost of additional storage. If the premium were less than the costs of storage then water users would acquire more senior rights instead of investing in storage.¹⁷⁵

Flexibility in Purpose and Place of Use: Compared to the San Francisco Subbasin, growth pressures have been stronger in the Gila Subbasin, where Silver City and mining companies have actively acquired water rights. Water rights in the Gila Subbasin sell for about \$1155/ac-ft more than water rights in the San Francisco Subbasin. This illustrates the significant impact that legal restrictions on market transfers can have on water prices. These findings are consistent with evidence from other market areas. In Utah's Lower Sevier River Basin, for example, rights to pump groundwater generally can be transferred out of (but not into) areas that have been designated by the state as "high impact" groundwater zones. This provision is designed to prevent new groundwater pumping in areas where groundwater overdraft is a serious concern. This barrier to transfer creates a differential in water rights values. Groundwater rights located within the high impact zones sell for 50–100% more than comparable groundwater rights located outside and adjacent to the zones.¹⁷⁶

If the point of diversion and place of use for a water right can be changed at a relatively low cost, one would not expect to see large price differentials associated with the original location of a water right. However, many western states regulate proposed transfers of water rights across basin boundaries more fully than they regulate transfers within a basin, due to concerns with impacts on other water users in the basin of origin. Consequently, market prices differ for water rights with similar characteristics that are located in different, though neighboring, basins.

Buyer Characteristics: Growing cities, mining operations, and utility companies have been dominant buyers of irrigation rights in many regional markets. In the Gila-San Francisco Basin, these high-visibility buyers pay about \$1125/ac-ft more than low profile buyers. This price differential suggests that area farmers sell water rights to one another at more favorable prices than those they command in transactions involving high-profile buyers. This may reflect irrigators' willingness to accept a lower price when the water rights will remain in agricultural uses and in local ownership. The price differential also suggests that high-profile buyers may pay a somewhat higher price to mitigate the controversy that often accompanies transfers of water out of agriculture. The price differential is consistent with observations in other market regions in which transactions among farmers and between local water users are characterized by lower unit prices than transactions in which the purchaser is not a farmer, is non-local, or is a high-profile actor in the local economy.

Volume of Water Transferred: In the Gila-San Francisco Basin, larger "packages" of water rights sell for a significantly lower unit prices. In most states, the procedures for obtaining state approval to change the place and purpose of use of a water right do not vary with the quantity of water being transferred, and so the transactions costs per unit are likely to be lower for larger volumes. However, such economies of scale may not extend to very large transactions as these can generate attention and opposition that result in high costs of obtaining state approval for the transfer.

The Sevier Basin Water Market: This market illustrates how hydrological cycles and the entrance of large new buyers can affect market prices. The Sevier River Flows north from the high plateaus of southwestern Utah, terminating in the Sevier Desert one hundred and forty miles southwest of Salt Lake City. Four mutual stock irrigation companies—Delta, Melville, Abraham and Deseret (the DMAD companies), control virtually all surface flow rights on the lower stretch of the river. Until recently, water delivered by DMAD was used exclusively for irrigation. Management of the DMAD companies has been highly integrated since at least the early 1960s. Although the historical average yield per share of stock differs from one company to another, the value of the water rights represented by the stocks (on a per acre-foot basis) are virtually identical. In 1985, the price for water represented by stock in any one of the four companies was approximately \$350 per acre-foot.

Water rights prices between 1974 and 1985 exhibit no trend either up or down except for a brief period between 1979 and 1982, when a large

acquisition by the Intermountain Power Project (IPP) caused a speculative boom in land and water rights. The IPP acquisition is discussed further in a later section of this report with respect to the way the acquisitions were structured to preserve an agricultural base in the area. IPP paid over \$2,400 per acre-foot for one large package of groundwater rights and water company stock. Prices exceeded \$1,000 per acre-foot for other sales of water stock occurring at about the same time. By about 1982, the speculative bubble subsided and water stock prices began to return to their former levels.

The vast majority of water transfers in this basin are seasonal water rights rentals among irrigators. Studies conducted between 1948 and 1964 indicate that there has been no long-term upward or downward trend in the real price of surface water.¹⁷⁷ Short-term price fluctuations, documented since the 1940s, have followed the hydrologic cycle of the river—rental prices are higher in dry years and lower in wet years. Over the last several decades rental prices have varied between seven and seventy-five dollars per acre foot. Prices rose sharply in the period preceding and immediately after IPP's purchases in 1980, but leveled off to between \$300 and \$500 per acre foot in 1985 and 1986.

Colorado Front Range Water Market: Another longstanding active regional water market is located along the Front Range region of the Colorado Rockies. Prices are for shares in the Colorado Big-Thompson Project that provides water to farms, cities, and businesses located north of Denver along the east slope of the Rockies. These water rights provide highly reliable supplies, as they are supported not only by native flows on the east slope but also by substantial pipelines and reservoirs that store and convey water from the rural western side of the Rockies to the rapidly growing east slope. This market illustrates how perceptions of water scarcity may increase water rights prices rapidly even though long-term supplies remain relatively inexpensive and abundant and also illustrates price declines as new supplies become available. A development boom in the mid-1970s drove real prices for water rights to unprecedented levels by the early 1980s. Widespread concern that increasing urban water demand was quickly outstripping supply led to sharp increases in prices. Prices peaked at values equal to the capitalized marginal demand for water by municipal users. As urban growth accelerated, farmers were increasingly able to transfer their water rights to municipal or industrial water users and were no longer willing to sell at prices that reflected only the water's value in irrigation plus a modest profit margin.

Water rights prices in this market fell in the 1980s at least partially in response to the completion of the Windy Gap project (which imported significant new supplies to this area), declining interest rates, and a faltering farm economy that made farmers willing to sell at lower prices than previously. In addition, some observers believe that city officials began to recognize that they had acquired adequate water rights to meet foreseeable needs and that continued acquisition of nearby agricultural water rights might have undesirable effects on the regional economy and on the maintenance of attractive agricultural green belts around urban communities. This market experienced a long-term average annual increase of 18% over the years 1961 to 1980 (the market peak) and a much more modest increase of 8% over the longer 1961 to 1990 period.

The Role of Bargaining Power.—While the price that two parties negotiate for a water transaction will be influenced by many factors, one must not underestimate the importance of bargaining power in influencing price. Threats of litigation cause potential sellers to reevaluate the security and value of their water rights and can alter the price they would be willing to accept. This has not gone unnoticed in the Truckee-Carson Basin where some irrigation interests perceive that the OCAP and water transfer and water rights litigation could be used to micro-manage irrigators and drive them into an untenable financial situation so that they become “willing” sellers.

Nature of the Transfer Agreement.—Several characteristics may vary across water transactions: length of contractual agreement, annual versus contingent transfer of water, reliability of supplies being transferred, penalties and conditions for breaking the agreement, firmness of the arrangement in the face of uncertain legal and hydrologic conditions, credit extended to purchaser/lessee and structure of financial payments. Acquisitions may be structured to occur only under specific conditions, such as a water short year in the basin or to occur every year regardless of water supply conditions. Payments may be structured in several different ways. A one time up front payment can be made to permanently acquire water, or the payment can be spread out over time. For a lease, there can be an up-front payment to initiate the lease, followed by annual lease payments. Dry-year option leases can be structured to provide payment to the lessor every year, or only in years in which the option is exercised, and also may involve an up front payment at the time the option agreement is negotiated. Innovative transfer arrangements and market structures are discussed in detail in a later section of this report.

In principle, water can be made available from agriculture in several ways—fallowing of irrigated land, switching to lower water use crops, deficit irrigation and improved irrigation technology and water management. In the case of water acquisitions based on fallowing land, the minimum price offered to farmers will need to compensate the seller or lessor for foregone net returns in crop production over the period the water is removed from agricultural use. These foregone net returns can be estimated by examining the typical cropping patterns in the area where water is being acquired and calculating the present value of the net returns from those crops over a period of years. Information on typical net returns is available from the Cooperative Extension service at the University of Nevada College of Agriculture. For example, for Churchill County irrigated acreage served by TCID, the Bureau of Reclamation estimated a net farm income of \$106 per acre for a 500 acre field crop farm growing alfalfa, barley and irrigated pasture (selected as representative of farming in the Newlands Project).¹⁷⁸ Net farm income varies widely because soil productivity and crop yields vary considerably within TCID. Net profits for alfalfa production vary from \$19 to \$115 per acre depending on bottom land soil type.¹⁷⁹

For land with a primary potential use as agricultural land, decreases in property value due to permanent removal of water rights already will be reflected in the calculation of foregone net returns in farming. A separate calculation to estimate loss of property value for the purposes of compensating the seller is not necessary and would be duplicative.

For cases in which agricultural water is made available through agricultural conservation practices, the price paid for the water will need to reflect irrigators' costs of implementing conservation practices, including direct costs of equipment usage and labor and compensation for increased management efforts necessary to implement and oversee conservation practices. Some conservation practices save water every year regardless of whether it is a dry year or not. Consequently, even if water is only needed in dry years, farmers will need to be compensated for the annual costs of their conservation projects.

Implications For Truckee-Carson Basin.—The factors that affect water prices elsewhere in the West will also be influential in the Truckee-Carson Basin. Water rights that are more reliable, either due to their priority date or access to storage that increases their firm yield, will sell for more than less reliable rights—especially given concerns in this basin over the impacts of drought on wetlands and on urban supplies. Those rights that can be transferred to wetlands, water quality and urban growth needs with a

minimum of transaction costs and legal proceedings will sell for more than those that pose difficulties in transferring across jurisdictional boundaries. In other basins, high profile, non-agricultural buyers pay higher prices for water than farmers pay when acquiring water from one another. Although likely, it is not possible to predict that this will occur in the Truckee-Carson Basin. Development pressures drive up water prices and the rapid growth in the Reno-Sparks area, combined with new development in the Lower Carson Basin and around Carson City will contribute to increasing prices on this region. Litigation, new OCAP and other factors that affect the bargaining power and legal and economic position of the parties in the Truckee-Carson Basin will affect the prices that are negotiated in market transactions, although the direction and magnitude of price impacts cannot be predicted in advance of the new OCAP being promulgated or of resolution of litigation in process. Changes in federal commodity programs and in market prices for agricultural inputs and for crops occur over time. These affect the net returns to water in irrigation and thus are another factor that will affect the price at which farmers are willing to sell.

Water Markets and the Definition of Fair Market Value.—One definition of fair market value used in the appraisal profession is: “the most probable price, as of a specified date, in cash, or in terms equivalent to cash, or in other precisely revealed terms, for which the specified property rights should sell after reasonable exposure in a competitive market under all conditions requisite to fair sale, with the buyer and seller each acting prudently, knowledgeably, and for self interest, and assuming that neither is under undue duress.”¹⁸⁰ There are several concepts that are included in this definition which require a careful interpretation when applied to water rights, and which must be adapted from their typical application to real estate.

First, in many areas of the West, the time period of “reasonable exposure” for a water right is several years. Potential buyers need time to satisfy themselves as to the legal and hydrologic characteristics of the water right, including: the priority date of the right relative to neighboring water claims, its susceptibility to forfeiture or abandonment findings under state law, ambiguities regarding title, the firm yield of the right during dry years, the typical yield of the right during years of normal streamflow and the probable quantity of water that could be transferred to new locations and uses. These inquiries typically take months and can take years for complex water acquisitions. Moreover, some potential buyers seek state approval for a transfer of the right to the buyers intended place and purpose of use before

closing on the acquisition. The state approval process can take months to years depending on the complexity of the transfer and the degree of controversy it generates.

In addition to the lengthiness of reasonable exposure, water markets often deviate from markets for other real property in their “competitiveness,” and this needs to be taken into account when evaluating fair market value. Water markets are typically “thin,” meaning there are only one or two major water buyers in a region or there may be only a few potential sellers. It is not unusual for a water market to involve the one large city in an area as a buyer and a few farmers or a single irrigation district as potential sellers. In some areas, a water right acquisition may only occur every few years, while in active areas there are several transactions a month.

The “undue duress” clause in the definition of fair market value also needs to be carefully interpreted with regard to water right transactions. Water acquisitions nearly always are motivated by some form of duress. Water utilities seek to acquire rights in order to prevent water shortages within growing service areas, to improve water quality so as to comply with state and federal regulations, or to replace water supplies that were lost or restricted through endangered species or other environmental litigation. Municipal, state, and federal agencies, as well as environmental organizations, acquire water rights to preserve fish and wildlife habitat and wetlands. Drought motivates water users to purchase senior water rights that are less vulnerable to dry year shortages. Water right acquisitions in the West also may be stimulated by litigation over Native American water claims; claims which sometimes are satisfied by federal acquisitions of water rights. In short, water acquisitions are typically linked to some regulatory or judicial requirement and therefore are seldom entirely free of duress.

The self-interest motivation included in the definition of fair market value also requires careful interpretation. Financial profit frequently is not the primary factor motivating a water acquisition. Many buyers are public utilities who do not earn profits, or are environmental groups or government agencies with fish, wildlife, water quality or hydropower responsibilities that must be satisfied. Where water acquisitions are made by businesses for investment purposes, profits tend to be based on a long term return, rather than being realized in one or two years.

Appraising the fair market value of water rights differs in a number of respects from appraisal of other real estate. Water rights have a longer period of “reasonable exposure” on the market than other real estate and

water markets typically are less active and less competitive than land markets. Moreover, transactions seldom are free of duress. Water rights acquisitions are heavily influenced by regulation and litigation and a profit motive may be absent. Public agencies acquiring land and water depend heavily on appraised value to determine the price they are authorized to pay. Consequently, appraisals of water assets need to carefully consider the factors noted above and for large or controversial transactions, several independent appraisals may be useful in establishing fair market value.

In the Truckee-Carson Basin, all of the factors described above as affecting fair market value are active. The market involves relatively few buyers, some irrigators may be selling due to financial duress and public agencies, the primary buyers, are not motivated by a profit motive, but rather by an agency mandate to accomplish wetlands restoration and water quality improvements. The parties will be under varying levels of duress over time to the degree that drought, lawsuits and changing regulations, such as new OCAP, affect their water use.

Long Term Outlook for Water Availability and Price.—Various Truckee-Carson water acquisition programs intend to transfer a large quantity of water used for irrigation to wetlands restoration. Over time, the prices currently being offered for water rights likely will no longer be sufficient to attract sellers because the marginal value of water in a specific use (irrigation, in this case) rises as there is less water available for that use. Consequently, offer prices will need to increase and acquisitions will become more expensive. If acquisitions raise the costs of supplying irrigation water and reduce conveyance efficiencies for remaining farmers, there will be negative impacts on these remaining irrigators that may need to be addressed. For instance, if remaining farmers are scattered widely among various delivery canals, the cost per acre foot of delivering water to scattered lands will be higher than when more farmland was being irrigated. Compensation for these types of costs or to avoid the continuing inefficiencies of serving these outliers, if paid, will further drive up the cost of the acquisition program.

It is not possible to predict long-term trends in water prices in the study area because there are many uncertainties, including litigation and negotiations in process that remain unresolved. In general, experience in other western water markets indicates that water prices rise notably as new buyers enter the market for large amounts of water, as is the case in the study area, with the acquisitions programs for improved Truckee River water quality and for wetlands restoration. It is possible that the cost of bidding water away from

farmers could drop when a critical mass of irrigated land already has been retired and not enough irrigated acreage remains for agricultural services and infrastructure to be viable. In this event, the remaining farmers might sell land and water at lower prices. However, developers will be competing for land in locations attractive for development and so price decrease may not occur, even if commercial agriculture declines precipitously. Certainly there will be pressure to look further afield for water as urban growth continues, possibly to water exchanges and transfers involving the Upper Carson Basin.

Market Evaluation

Cost Effectiveness and Affordability.—The cost effectiveness of market acquisitions must be evaluated in the context of the other alternatives available to provide water for the urban growth, for improved water quality in the Truckee River and for the Lahontan Valley wetlands. Other alternatives include improved involuntary water acquisitions using eminent domain powers, urban conservation, accelerated metering of urban water users, improved agricultural conservation and reduced agricultural consumptive use, further refinements in reservoir coordination in the Truckee and Carson basins, canal lining, growth control and improved effluent reuse.

Data is not available to systematically compare the costs and benefits of all these options, in order them to the voluntary transfer approach. However, a number of indicators suggest that voluntary acquisitions are likely to be more cost effective and affordable than other approaches. Recent studies of acquisitions for Lahontan Valley wetlands restoration indicate that it is the less productive lands that are being fallowed, so the voluntary approach thus far is preserving the most productive and profitable lands in farming.¹⁸¹ In addition, an economic optimization model developed for the USEPA indicates that raising water costs (either directly through increased per unit water charges for agricultural and urban water users or indirectly through allowing market forces to signal the opportunity cost of water) is the most effective way to achieve water quality goals for the Lower Truckee River.¹⁸² The model indicates that over 90% of the water should come from reduced agricultural use and 10% should come from urban conservation. Since directly raising the cost of water to TCID farmers and to large urban water users is likely to be politically unpalatable, allowing an open market to communicate the true value for water is more implementable.

Accelerated implementation of urban water conservation efforts already underway is a part of a cost effective solution. The 1990 Settlement Act

required Sierra Pacific to implement specific conservation measures. With funds collected from developers seeking water service, the utility has begun a meter installation program. The program's goal is installation of 44,000 meters over the next decade. However, only 2,000 meters had been installed by mid-1996. Households must volunteer to switch from a flat water bill of \$43/month for a typical household to metered water rates which may result in lower monthly water bills. The metered water rates are based on a two-tiered increasing block structure, with the lowest price block set at 6,000 gallons per month for a single family residence to accommodate typical indoor residential use. Once 90% of customers that formerly paid flat water rates are metered, then metered water rates become mandatory. In addition to metering, the utility has implemented limits on outdoor watering, leak detection and repair, public education, and other conservation measures.¹⁸³

Effects on Water Delivery Efficiency.—As a significant portion of irrigated land is retired, it may be possible to redesign the Newlands Project to focus on irrigating the most productive soils served by the most efficient canals. Possibly this could be accomplished through a land trust and land exchange. When highly productive lands are acquired for wetlands restoration or other purposes, the land could be banked and later sold to farmers who have sold their less productive land but who wish to continue farming.¹⁸⁴ Through such exchanges, the remaining agricultural land could be concentrated in areas best suited for farming and for maintaining conveyance efficiencies. The FWS has frequently expressed interest in exchanging retired agricultural lands to improve the economic viability and water efficiency of the Newlands Project. Most of the Newlands Project irrigated acreage retired to date for wetlands restoration has been land located on the periphery of the project where poorer soils generally are located. The acquisitions program thus far has not had a notable negative effect on conveyance efficiencies.¹⁸⁵

Third Party Economic Effects.—Third party economic impacts fall into several categories and it is important to keep in mind that water transfers out of agriculture have *both* positive and negative impacts. Negative impacts on TCID and agriculturally-based communities get the most attention, but there are numerous positive third party effects on the local economy as well.

Negative economic impacts from transfers include lost farm profits from reduced farmed acreage. However, this is not a "third party" impact, since the seller must receive enough revenue from a voluntary transaction in order to willingly give up these farm profits. Negative third party economic impacts from reduced farm acreage include:

- Reduced profits for "backward-linked" businesses, those that sell inputs and services to farmers,
- Reduced profits for "forward-linked" businesses, those that purchase crops produced and now must turn to more distant and expensive suppliers for alfalfa, feed grain, etc.,
- Reduced profits for general businesses in the area that sell goods and services to households (assuming that some sellers exit the area reducing the overall number of households located in a community),
- Reduced jobs in all of the types of businesses referred to above,
- Reduced property values associated with lower profits in the types of businesses described above,
- ! Reduced tax revenues collected by state and local governments on business sales and property values for the types of businesses described above.

The negative impacts described above assume that revenues earned from water sales are not reinvested in farm operations in the study region. If farm households which sell water remain in the area and spend most of their revenues from water sales in the area (on farm operations or on other types of purchases), then overall business profits and jobs in the region could increase instead of decreasing.

Acquisitions of irrigated land for wetlands in the Truckee-Carson commenced in 1990 and resulted in a transfer of 2,724 acres out of agriculture from 1990 to 1995. However, wetlands acquisitions accounted for less than half of the total farmland transferred to nonagricultural uses. Development pressures accounted for the majority of acreage leaving agriculture. Further, it is the less productive farmlands that is being abandoned so there is a strong potential to maintain a viable agricultural core in Churchill County.¹⁸⁶

An additional concern stems from the fact that Fallon area rural drinking water supplies depend on groundwater pumping from a shallow aquifer which is recharged by seepage of irrigation water from fields and canals. As irrigation seepage declines due to land fallowing, canal lining or farm conservation, the groundwater supplies for the Fallon area may be adversely affected.

Positive third party impacts from transferring water to wetlands include:

- ! Increased business profits due to increased recreation expenditures in businesses that supply goods and services to hunters, fisherman, bird watchers and other visitors drawn to the area by improved wetlands,
- ! Increased property values associated with increased profitability of recreation-linked businesses,
- ! Increased tax revenues collected by state and local governments on property values and sales associated with recreation-linked businesses,
- ! Increased recreation benefits to local residents associated with improved wetlands,
- ! "non-use" values associated with wetland improvements and associated improvements in bird and wildlife populations.

Non-use values for wetlands have been documented to be in the range of \$175 per household per year, in studies on wetlands in California. Non-use values are likely to be an important third party economic benefit associated with wetland improvement in the Lahontan Valley.

Mechanisms to Mitigate Problems

Market transactions can be structured in a variety of innovative ways that can help to minimize third party effects and maintain agricultural activity in rural areas where water is being transferred out of agriculture. This section discusses different possibilities for structuring water acquisitions. Specific implications for the Truckee-Carson Basin are discussed at the end of the section.

Innovative Market Structures.—Water markets and specific negotiated transactions around the western United States encompass a variety of characteristics in order to meet the needs of particular water users and river basin challenges. This section summarizes examples of innovative market structures that can help address the needs of the Truckee-Carson basin and other basins seeking to resolve conflicts over limited water supplies and multiple and expanding water demands. It is worth noting that, without

TROA and its flexibility for river operations, it would difficult or impossible to implement these kinds of initiatives. The rigid operation regime which has characterized the river would not accommodate the banking, storage, retiming, leasing, exchange and other water management options entailed.

Creating A “Free” Market.—Some observers have suggested that a genuine open market be created. There are a number of positive steps that could be taken to harness market forces to serve the multiple water needs in this region. However, it is important to recognize that nowhere in the American West is there a “free market” for water. Water transfers are highly regulated in order to protect the substantial public interest in water use and water quality.

Creating a more open and competitive market with regular transactions could help to assure farmers selling that they are getting a true market price for their water. However, the number of buyers is relatively limited in this region. The primary buyers in the two basins include Sierra Pacific, the cities of Reno and Sparks, Washoe County, the US Department of Interior and the State of Nevada. Each buyer has their own set of objectives and they coordinate with one another to minimize the cases in which they would be bidding against one another for the same properties. Consequently, development of a highly competitive market is unlikely.

Contingent Transfers For Drought Protection.—Dry year transfer arrangements are more flexible in the Truckee River basin because the biology of the cui-ui does not require them to spawn every year. So, during drought the cities can use the water so long as there is adequate water for fish flows in most years. New storage agreements for the Truckee River recognize this and allow Sierra Pacific to store their base water under the big fish flow volume held in Stampede and to build up a margin of saved water over time. The agreements also allow for exchanges and credits among the various reservoirs so they can be operated as one coordinated system.¹⁸⁷

Dry year options and conditional lease-backs, negotiated in anticipation of drought, are two ways to ensure that water quickly can become flexible when it is needed elsewhere. The difference between these two approaches is the degree of security and long-term control over water provided by each. Under a *dry year option*, ownership of the water right remains with the original water user. The new water user, a municipal water provider or a state agency, enters into an agreement with an irrigator allowing them to use water under specific conditions. For water users who need highly reliable

supplies, this type of arrangement provides a back-up source of water for dry years. In one instance, a central Utah city paid a nearby farmer \$25,000 up front for a 25-year dry year option and agreed to provide, in any year the option was exercised, \$1,000 and 300 tons of hay to maintain the farmer's livestock. The option was exercised three out of the first 25 years the option was in place.¹⁸⁸

Though promising, dry year options can be unattractive to farmers who desire more certainty when planning their farming operations. The following example illustrates this point. In 1987 the Metropolitan Water District (MWD) of Southern California attempted to negotiate a dry year option with the Palo Verde Irrigation District (PVID). Under the proposed arrangement, MWD offered Palo Verde farmers a payment up front at the time they register acreage in the dry year option from irrigation and additional payments during years the option would be exercised. MWD expected to call that acreage into retirement once about every seven years in order to firm up municipal supplies. Farmers rejected the proposal for a number of reasons, including its effect on their ability to make long-range farming plans. Under such arrangements, farmers face substantial uncertainty in planning their crop rotations, their marketing strategies, equipment leases, and purchases of inputs.

An agreement eventually was reached between MWD-Palo Verde to transfer irrigation water to urban use in 1991, after years of complex negotiations. MWD and the irrigation district negotiated a price and this price then served as a standing offer to individual irrigators to induce them to fallow land. Farmers were offered a price of \$135 per acre foot of water made available from land fallowing. As of 1992, 93,000 acre feet had been made available under this arrangement.¹⁸⁹ The agreement involved the acquisition by MWD of an option to use water made available by land fallowing and storage in Lake Mead (where it was subject to evaporative losses and the risk of loss due to a flood year spill of stored water.)¹⁹⁰

A number of other issues need to be addressed when dry-year options are considered. One of these involves defining the conditions under which the option will be exercised. Reservoir and stream flow levels can be specified as a basis for activating the option. Additionally, it is necessary to ensure that farmers be compensated for lost crop revenues when the option is exercised, for disruption of farm planning and land use patterns and for any production and marketing expenses incurred prior to being notified that land would be dried up for that season. The terms and timing for notification are important issues to irrigators.

Under *conditional lease-backs*, land and water are purchased by the entity desiring long-term control of the water, most often a municipality or an industry, and are leased back to the farmer so that farming can continue except when the water is needed to replace drought short falls. The new water right holder could be a state agency, and the lease-back conditioned on the need for water to support instream flows for recreation, fish and wildlife during dry seasons and years. Conditional lease-backs are attractive to growing cities because they assure a supply of water that can be reserved either during droughts or for water demand generated by new growth.

There have been several lease-back arrangements implemented in Arizona. In 1985, the city of Mesa purchased 11,606 acres of farmland in Pinal County, planning eventually to use the water in the city's expanding service area. Meanwhile the city is leasing the land back to farmers and the land continues to be irrigated. The city of Phoenix purchased 14,000 acres of farmland in western Arizona's McMullen Valley in 1986. The city plans to retire the land and transfer the associated groundwater to urban uses. Phoenix is keeping the farmland in production, employing local farmers and postponing some of the economic impacts of the eventual retirement of that acreage.

Exchanges among water sources are one way to promote water use flexibility and to encourage use of surface water in years it is available, conserving groundwater supplies for times when streamflow is low.

In 1989, Metropolitan Water District and Arvin Edison Water Storage District, an agricultural water provider in the southern San Joaquin Valley, agreed on an innovative water exchange to firm up MWD's dry year supplies. In wet years MWD will store unneeded State Water Project entitlements in the aquifer underlying Arvin-Edison. In dry years, the irrigators will pump the stored water to irrigate crops and allow MWD the use of about 100,000 acre-feet of federal project water that would have otherwise been used for irrigation. The farmers benefit because the stored water raises the groundwater level and reduces their pumping costs. MWD receives reliable supplies that cushion it against drought. Before being implemented, the exchange must be approved by the California Department of Water Resources and the Bureau of Reclamation.

Such exchanges can involve lower quality water supplies, such as treated wastewater. In a number of areas, policy makers are encouraging farmers to use treated effluent to irrigate so that higher quality water supplies normally used for irrigation can be available for uses requiring higher quality water.

For instance, farmers in the Tucson area receive treated effluent from municipal treatment plants and this enables them to cut back on groundwater pumping.¹⁹¹

Exchanging priority can help certain water users, especially cities and industries, to secure highly reliable supplies in drought years. Such exchanges of priority have substantial potential with Indian reserved rights, since the priority date of most tribal rights goes back to the date the reservation was established. There have been some agreements to defer tribal seniority in drought years so that junior right holders have more reliable water supplies. One arrangement involves the Navajo Nation, which has a senior claim on the San Juan River. In exchange for congressional approval of the Navajo Indian Irrigation Project, the Nation agreed to defer its seniority during dry years and to share water shortages proportionately with non-Indians. This gives downstream users in the Rio Grande Basin, including the City of Albuquerque, more reliable supplies during drought.¹⁹²

Transfer Arrangements to Maintain Rural Economy.—Making transfers contingent on drought conditions is one approach to preserving an agricultural base, as farming will occur as usual in normal years and farmers can be adequately compensated in dry years to allow them to remain in farming. Other approaches include setting a target amount of water to be made available for non-agricultural purposes and rotating acreage fallowed within those limits to maintain baseline agricultural economy. Another approach involves partial buyouts of the water that is appurtenant to land, leaving adequate water rights with the land to support gardens, horse pasture and a rural lifestyle. It has been suggested that TCID farmers be assigned a fixed amount of water and be allowed to benefit from any savings from that pool of water. Rights of first refusal on saved water could be granted to local agriculture and other local water uses before water is transferred for uses outside the locale where it has been used in irrigation.

Innovative transfer arrangements promote efficient and flexible water use, as do traditional purchases, but often have a less severe impact on rural communities and riparian environments. Consequently, they may incite fewer objections and be more easily negotiated. The following paragraphs describe a number of different types of voluntary transfers which can move water to new uses and provide drought supplies for urban and environmental needs.

Innovative Transfer In Utah's Lower Sevier Basin: This transfer provides one example of how a very large purchase of water for non-agricultural purposes was accomplished in a basin where water has been devoted

primarily to agriculture. In 1980, the Intermountain Power Project (IPP) bought twenty percent of DMAD company stocks, thousands of acre feet of privately held groundwater rights, and eighty percent of the water stock in another ditch company upstream of DMAD. The total package of water rights, with a yield of 45,000 acre feet per year, cost approximately \$2,400 per acre foot. The water was acquired for cooling a new coal-fired power plant. The projected size of the power plant operation was reduced after IPP had already purchased the water rights. Consequently, about half the water rights are not needed for power plant operations and IPP rents unused water to irrigators¹⁹³

Many different sellers were involved in the transfer, and most of the water rights were sold in relatively small lots. There were 565 individual contracts signed to purchase water company stock, averaging about 60 acre-feet per contract. Another 31 contracts were signed for the sale of groundwater rights with an average of 174 acre-feet per contract.

Water rights were transferred to IPP via a seller's collective called the Joint Venture. The Joint Venture was formed after a core group of organizers announced IPP's interest in purchasing water rights and advertised for a collective bargaining coalition in the local newspapers in 1978. Anyone owning stock in the DMAD or central Utah companies or groundwater rights in the Delta or Lynndyl areas was invited to participate in the sale to IPP. Participants were allowed to offer prorated quantities of water rights for sale, established as fixed proportions (20%) of the water rights owned by each prospective seller. Individuals were free to offer more than their assigned quantity of water rights for sale, but they had to find other participants who were willing to reduce their allotment by a compensating amount. This led to the development of an active market in sales options. Option prices for the sale of water rights to IPP through the Joint Venture are reported to have sold for as much as \$650 per acre-foot.¹⁹⁴ If a particular farmer didn't want to sell any water, but another farmer wanted to sell more than 20%, the two farmers could strike a deal. The one wanting to sell more than 20% purchased the other's "option" to sell 20%. In other words, all farmers got something of value—either they actually sold water, or they sold no water but were able to sell their "option to sell" to another farmer. No one was left out of the potential proceeds from the transaction, as all irrigators had an equal opportunity to sell water, thus avoiding the divisiveness that has emerged between sellers and non-sellers in many areas.

Transfers of Conserved Water.—Another policy approach that could allow irrigation water to move to new uses while minimizing impacts on the

area of origin, involves *incentives for water conservation, salvage and reduced consumptive use*. Most western states historically have taken a hard line against new uses and transfer of conserved water, arguing that the portions of a water right “salvaged” through conservation measures become available to new or junior appropriators, rather than to those taking the conserving action. In effect, the Interior position on OCAP is an instance of this “hard line approach.” California and Oregon are exceptions, having passed statutes encouraging transfer of conserved water. The Natural Resources Conservation Service responded to the draft report by noting that “Nevada law does not allow transfers of a portion of a water right (e.g., one acre-foot of a 3.5 acre-foot right). On-farm irrigation water management is based on consumptive use (which cannot be changed), and efficient application of the water. Improvements in on-farm delivery do not conserve water, but rather increase the likelihood that it may be utilized by the crop, thus increasing production.”

There are a number of steps a state can take to facilitate the transfer of conserved water. A first step is to provide the statutory incentive and water authority by explicitly allowing transfer of conserved water and by protecting rights not being exercised due to conservation from loss through forfeiture and abandonment proceedings.

Even after enabling statutes are in place, a number of difficult technical and hydrologic issues remain in determining the quantity of salvaged water that actually can be transferred. In 1987, Oregon passed legislation stating that the only salvaged water that may be transferred is that which in the absence of the conservation measure otherwise would have been irretrievably lost to the system and thus unavailable to other water users.¹⁹⁵ Capture of substantial irretrievable losses probably will not come from improvements in irrigation efficiency, however, since most salvaged water previously re-entered the system as return flows. Transferable water could potentially come from switching from a higher to a lower consumptive use crop. Other measures which decrease the amount of water irretrievably lost through evaporation and deep percolation include lining earthen canals, better field drainage, and improved on-field water management. In contrast to the OCAP approach used in the Truckee-Carson basin, allowing farmers who reduce consumptive use, perhaps through new crop rotations, to use the additional water on other land, or to sell or lease the water can provide strong conservation incentives. Laws in the western states on use and transfer of salvaged or conserved water vary considerably, with protection of other right holders being the primary constraint on new uses and transfers.

There are few examples to date of successful transfers of conserved irrigation water. The city of Casper, Wyoming is paying for canal lining on over 200 miles of the nearby Casper-Alcova Irrigation District's conveyance system. This arrangement is expected to provide the city with about 7,000 acre-feet of water per year. In California, MWD and Imperial Irrigation District have reached a preliminary agreement after years of negotiation. MWD will pay for conservation measures within the district that are intended to salvage about 100,000 acre-feet per year, that can then be transferred to MWD's service area. Interestingly, both examples involve water provided under Bureau of Reclamation projects rather than water rights held under state law by individual appropriators.¹⁹⁶

The San Diego County Water Authority and Imperial Irrigation District have, after years of discussions, negotiated draft terms for a transfer of conserved water that addresses the needs of the two parties. The agreement covers issues of changing water values and pricing over time, drought year arrangements and security in the ownership of water rights. IID required that ownership of the water rights remain with IID, that pricing be based on fair market value and the transferrable water be made available through voluntary water conservation by irrigators. While the exact amount of water made available depends on landowner participation, 250,000 to 500,000 acre feet per year is likely to become available for urban use at prices that escalate gradually to account for inflation and changes in regional water values (as evidenced by market-based transactions), with a cap of 25% on price increases over any ten year period. This pricing arrangement allows the seller to capture some of the gains from increased water values of the period of the agreement, while still giving the buyer assurance against sudden and unpredictable increases in their costs. During drought year shortages on the Colorado River system that force cutbacks in deliveries of IID, the authority and the District will share the same percentage reduction in water availability. The agreement extends 75 years from the year of first deliveries to the Authority (anticipated in 1999) and is renewable.¹⁹⁷

Water Banks.—Water Banks have been proposed for the Truckee Carson Basin in order to simplify the process of acquiring water for wetlands, water quality improvements and urban growth. For example, Yargas proposed that water be banked by TCID irrigators in Lahontan Reservoir to be used for any legitimate project purpose, including wetland restoration and maintaining a buffer of supplies stored for dry years.¹⁹⁸

Water banks can serve many important water management and allocation objectives. A water bank is an institutional arrangement for storing water to

be used at future periods in time and to facilitate trade and negotiations among those contributing water to the bank and those seeking to use banked water. When water banks can standardize the units of water to be traded and the trading procedures, they reduce transactions costs because all the multiple participants do not need to independently locate trading partners and develop contracts, pricing and other terms of trade.

The opportunity to trade arises when some right holders have very reliable senior rights and other water users seek more reliability for their own water supplies. Some parties may wish to make a one-time transaction to sell water, others a long- or short-term lease and still others a dry-year contingency arrangement, and similarly for buyers/lessees. A water bank can help match buyers and sellers based on their preferences. The bank's supply of water is an aggregation of the various types of water made available by sellers/lessors. This water is then packaged in ways that meet the timing and reliability objectives of buyers.

Water banks can involve storage in aquifers or in reservoirs. For instance, MWD has negotiated underground water banking arrangements with agricultural districts in which some of MWD's surface water supplies are delivered to and used by agricultural areas during years of plentiful supply. The groundwater not pumped by the irrigators during those years is then considered MWD's stored water, available to them during years of low surface water supply. One such agreement with Semitropic Water Storage District will allow MWD to store about 350,000 acre feet and to withdraw 170,000 acre per year. MWD pays \$90/acre-foot to the District to store the water and \$40/acre-foot plus energy costs to withdraw the water. MWD also will pay \$1.35 million up front for the district to construct facilities for storage and withdrawal of MWD's water.¹⁹⁹

Mechanisms for Establishing Price and Negotiating Transfers.—

Auctions.—Auctions are used in many settings to bring buyers and sellers together and to establish a price for assets to be exchanged. Auctions have been used to allocate water supplies among potential buyers, with recent examples in Victoria, Australia and in Texas.²⁰⁰ Auctions have a number of advantages. They are public and transparent, mitigating the appearance of favoritism or secret negotiations. They rely on the forces of supply and demand and prices emerging at auctions will reflect current market conditions and can respond to changing conditions. Auctions do not require an administrator to set a price for water as the price emerges in the auction process and reflects the participants knowledge of the basin and of

the value they and others place on water in alternative uses. Variations in water right attributes, such as seniority and location, are considered by bidders in the auction setting and are reflected in price. Disadvantages of auctions can include lack of familiarity with auctions by potential water buyers and sellers and the need to carefully design and describe the auction process so the rules and procedures are clear and so that collusion among participants to influence prices is thwarted. Features which need to be specified in designing an auction process include the minimum and maximum amounts of water that can be offered for exchange, minimum and maximum acceptable prices per unit of water, the notification process used to alert interested parties of upcoming auctions, bidding procedures, necessary documentation to be provided by sellers on the rights offered, qualifications of bidders such as financial ability and location of intended water uses and procedures for determining the winning bid and resolving disputes arising in the auction process. There are many types of auction mechanisms that can be used to solicit offers to sell and to buy water. Two of the most basic are the English auction (the most familiar type) in which verbal bids are solicited from an assembled group of potential buyers, and the sealed bid auction in which written bids are submitted and then reviewed and the award made to the highest bidder.²⁰¹

An auction approach is being used in Texas to acquire water for environmental needs from irrigators. The Edwards Aquifer Authority (EAA), created by the state legislature in 1993 in response to years of litigation and controversy in the San Antonio area, is charged with addressing the rapid growth in groundwater use that imperils endangered species that depend on springs fed by groundwater and the regional economy based on irrigation and urban growth. EAA is using a bidding approach to solicit irrigators to agree to reduce their groundwater withdrawals during dry periods when the water is needed to sustain spring flows for endangered species. In late 1996, the EAA solicited offers to suspend irrigation from owners of irrigated acreage within the Authority's boundaries. The irrigators submitted a bid for the price per acre they require to suspend irrigation on their farm unit, along with descriptive information on the wells at which pumping would be reduced, on their irrigation systems and the type of crops that would be cut back. EAA evaluated the offers based on several criteria: proximity to the springs at which groundwater levels must be maintained, types of crops to be cut back (preference to water intensive crops), types of irrigation systems used (preference to less efficient systems), commitment to dry land farming (preferred over complete fallowing) and the offer price per acre. EAA will accept offers adequate to obtain 20,000 acre feet of reduced groundwater use. Half of that water will remain unused in support of endangered species needs

and the other half will be auctioned off to municipal users who are experiencing supply constraints in order to raise revenue to fund the acquisitions.²⁰²

An auction process used in Victoria, Australia to allocate new water supplies illustrates some of the factors to be considered in designing and implementing an auction. In the late 1980s, about 38,750 acre-feet of water became available through completion of a dam constructed at government expense. Government studies recommended that new supplies be allocated so as to maximize the economic return to the state and recover an appropriate level of capital costs, in contrast to the customary practice of providing water at low cost to encourage settlement and agricultural development. Initially the government decided on a sealed bid process to solicit bids for the fifteen year diversion licenses (the customary arrangement for rights to public project water in this area). However, farmers resisted the notion of any process that would cause them to pay more for water than they were accustomed to and favored an open auction process, if there had to be a competitive process at all. Participants were limited to those who already had legal access to water in the river basin and to landowners and lessees located in the basin, with urban areas and irrigators located within irrigation districts specifically excluded. Bidders had to pre-register and indicate the maximum quantity they wished to acquire and their intended uses. Local farmers were concerned that large corporate farms would dominate the auctions and so maximum volumes to be purchased by a single bidder in a given auction were set at 625 acre-feet and no one land holding could purchase more than ten percent of the total volume being offered. However, landowners with multiple holdings could and did purchase more than ten percent. The regional water commission approved a reserve price which remained undisclosed, set at roughly the marginal value of water in the lowest value crops grown in the region. Since the auctioneer did not accept bids below this reserve price, this price became widely known after the first few auctions. In the first two of six regional auctions, the median price bid was well above the reserve price and there was substantial variation in the prices paid. In later auctions, median bids approached and then equaled the reserve price. Most of those acquiring water were existing irrigators, though one fourth of the buyers were new irrigators. At the end of the auction process, about 10,000 acre-feet remained unsold—likely because competition from urban areas and irrigation districts was disallowed in order to make the auctions politically acceptable to local farmers. Public knowledge of the reserve price in later auctions, combined with weak demand, resulted in the reserve price eventually functioning as a posted price, with bidders being able to acquire the water they wanted at this price.²⁰³

Standing Offers.—Standing offers are a widely used mechanism for soliciting water supplies by public entities. For example, the City of Albuquerque maintained a standing offer of about \$1,000 per acre foot for senior irrigation rights and gradually acquired supplies for urban growth in this manner over much of the 1980s. A standing offer involves publicizing a fixed offer price for water rights with specific characteristics that meet the buyers needs. Standing offers have the advantage of simplicity and minimum transaction costs as there is no negotiating over price and potential sellers merely need to decide whether the posted price is adequate to induce them to sell. The key disadvantage of standing offers lies in correctly setting the offer price and specifying which types of water rights will be accepted for acquisition. If the offer price is set too low, this will become apparent as few takers will arise and then the price will need to be adjusted upward and readvertised. If the price is set too high, more offers to sell will be received than are needed and the purchaser will have to determine which water rights to acquire and which to reject and will be paying more than was necessary to acquire the quantity they needed. Moreover, water rights can vary widely in their seniority, convenience of location and firm yield. Consequently, a purchaser may prefer to vary the price paid based on the specific characteristics of the right acquired, rather than to only acquire specific types of rights at fixed prices. The fixed price will only approach the true economic value of water in a region through a trial and error process of adjusting the price, or through setting the price based on information on the economic value of water provided by an active water market. However, in regions where there already is an established market for water, there is little reason for a purchaser to use a standing offer approach as they can simply participate in the market through the usual channels.

The complexities of a standing offer approach are illustrated by the California Drought Emergency Water Bank in 1991-92. In 1991, the Bank offered \$125 per acre foot to willing agricultural lessors and quickly acquired 820,000 acre feet. However, end users only wanted 655,00 acre feet at the price they had to pay and so the bank and its buyer of last resort (the State Water Project) was left with a substantial amount of unwanted and relatively expensive water. On the positive side, the bank rapidly acquired water for drought needs from a pool of previously unidentified sellers and coordinated delivery of water to end users, though it did not accomplish this at least cost due to the high price offered. The following year the bank offered farmers just \$50 per acre foot and acquired 154,000 acre feet, all of which was passed on to end users. A standing offer approach is inflexible over the short run if hydrologic conditions change and less or more water is needed than was anticipated, as it is not practical to vary the offer price

frequently. However, the price can be varied from year to year, reflecting new knowledge of water supply and demand.²⁰⁴

Case By Case Negotiations.—Transactions negotiated on a case-by case basis are the typical way in which prices are established and water transfers arranged in a market setting. The prices emerging from bargaining between potential buyers/lessors and sellers/lessees will better reflect the value of water to the parties involved and the overall demand and supply conditions in the basin than prices set administratively, as with standing offers. When multiple transactions involving similar types of water rights occur, a going price for water is established and this signals the value of water to water users, encouraging economically rational decisions regarding water conservation and transferring water to higher valued uses. With case-by-case negotiations, the parties can tailor the transfer to meet their specific needs as to timing of payments, schedule for new water uses to phase in, and so on. Some potential disadvantages of negotiated transactions include the power of big players to strike better deals for themselves than smaller players, the transactions costs incurred in negotiating the terms of exchanges and the tendency for negotiated prices to cluster around a norm established in past transactions, even when water values have changed.²⁰⁵

Implications For Truckee-Carson Basin.—All of the market structures discussed have potential applicability in the Truckee-Carson Basin. Dry-year options may be preferable to conditional lease-backs as the ownership of the water does not shift out of agriculture and this may suit the politics of the basin better. Water source exchanges and water banking have excellent potential for balancing water demands and supplies for alternatives needs between the Truckee and the Carson Basins in dry years.²⁰⁶ Transfers of conserved water would require careful attention to hydrological connections between surface flows, groundwater and flows into wetlands but are another possibility for the study region. Auctions could be a useful mechanism for acquisition programs that seek to acquire a large amount of water within a specific period of time, such as the wetlands and water quality acquisition programs. This would be a change from past practices of acquiring water for wetlands only from sellers who already had put water (and land) up for sale, as auctions actively solicit participants. The standing offer approach could facilitate an orderly movement of water out of agriculture but if the offer price is not carefully selected, the problems described earlier will be encountered. Case-by-case negotiations have been the norm in this basin and have worked well in the past when water for urban growth was the main motivation for acquisitions. Now that water quality and wetlands also drive

acquisitions, it may be time to try new market structures such as water banks and auctions to facilitate transfers.

Targeted Acquisitions and Incentive Buyouts.—The U.S. Fish and Wildlife Service (FWS) is authorized to pay fair market value for land and water, as determined by an appraisal, and approaches only property owners who have put their land up for sale. Although Section 207(c)(2)(B) of the Settlement Act states that “the Secretary may target purchases in areas deemed by the Secretary to be most beneficial to such a purchase program,” the FWS does not target specific locations and solicit owners in those locations to sell land and water. There are special agency provisions and procedures that can be used to obtain authorization to pay 5% more than the appraised value. FWS has not yet found it necessary to exceed appraised value in the acquisitions program for the Lahontan Valley wetlands. Another avenue for obtaining authorization to pay more than appraised value is to obtain such authority from the relevant congressional subcommittees in both houses of Congress. Special congressional authorization has been obtained for FWS acquisitions elsewhere, in cases involving unique properties that contain habitat essential to a species in imminent danger of extinction.

For its Lahontan Valley wetlands acquisitions program, FWS uses its own local staff appraisers, solicits reviews by agency appraisers at the regional level, retains outside appraisers and also considers appraisals conducted for the property owner. Once the appraisals are completed, negotiations focus on whether the appraisal are accurate and correctly reflect the property being considered, rather than being negotiations involving price per se. The State of Nevada conducts its acquisitions in a parallel manner, coordinated by the State Lands Department. The State and FWS informally divide up irrigated areas between them so they are not competing for the same properties.²⁰⁷

In order to choose which properties to acquire given limited budgets for acquiring land and water, the FWS and the State of Nevada could solicit bids to fallow land from irrigators and rate them on a modified SCS Land Evaluation and Siting Assessment (LESA), including measures of land productivity, project efficiency, local planning objectives and suitability for the acquisition program.²⁰⁸

Mitigation of Third Party Impacts.—Some of the most important opportunities to mitigate impacts of water transfers are the creation of innovative market structures and transfer mechanisms and have already been discussed. This section discusses need for mitigation and possible

approaches to mitigating effects of transfers on rural economies. First, it is important to understand the relative importance of agriculturally-linked economic activity in the region.

The Truckee Carson River Basin encompasses a diversified regional economy ranging from highly developed urban areas, to sparsely populated ranch lands and irrigated farms, to remote, unpopulated wetlands and wildlife habitat. The urban areas are characterized by high population growth, resulting in pressures to acquire more water for urban uses. Outside of the Reno-Sparks urban area, the primary sources of employment are the services sector (which includes gaming and tourism), government, manufacturing, and retail trade. Agriculture (including farming and agricultural service businesses) accounts for a small portion of overall jobs and earnings in the basin (less than four percent), but is important to some communities. In Churchill County, farming and agricultural services account for 10–12 percent of jobs and personal income, with agriculture ranking below services, mining, government, and wholesale and retail trade as a component of the county's economies.²⁰⁹ Churchill County has been the focus of concerns over economic effects of water acquisition programs and is the geographic scope for the recently completed FWS Final EIS for such acquisitions. The Fallon Naval Air Station (which accounts for 27 percent of jobs in Churchill County), nature-based recreation and farming have been the traditional mainstays of the Churchill County economy. Given the rapid growth in the Reno-Sparks corridor, much of the conversion of agricultural land to non-agricultural uses has been driven by the fact that Churchill County serves as a bedroom area for commuters into the cities.²¹⁰

Outdoor recreation associated with wetlands such as hunting, fishing, hiking, and bird watching) also is an important component of the economy of some communities in the basin and will become more significant as wetland acreage improves in quality and size.²¹¹ In good water years, the SWMA supports hundreds of thousands of birds including ducks, geese, whistling swans, egrets, and herons. In addition to its natural diversity, the area provides high quality fishing and hunting opportunities. A recent study indicates that 20% of economic activity in the rural area in which SWMA is located is linked to tourism and recreation dependent upon water and wildlife resources.²¹² However, less than a third of the original wetland areas at the end of the Carson River remain, creating overcrowding and increased competition for food which have adversely affected waterfowl populations and recreation opportunities.

Most farms in TCID are small, with about half (on average) of household income coming from non-farm sources.²¹³ These households are irrigating land as a part of their rural lifestyle, not for economic returns from crops produced (comments received from the Natural Resource Conservation Service disagree with this assertion). They may be more disinclined to sell water than commercial farmers, yet they own a notable portion of the water rights in the areas targeted for acquisition. The conventional market-based approach would be to raise the offer price until the required amount of water is obtained. With the small "lifestyle" farms, this strategy may not succeed, unless there is some incentive that related to protecting or enhancing the quality of life in the area. It is worth exploring whether there is some other amenity or concession that could be offered—such as special hunting or recreation access to restored wetlands, for local water sellers only. An area of wetlands could be set aside for the sole use of local residents, or specific hours or days of the week could be reserved for local use only. This area could be managed by a local unit of government, such as Churchill County, in order to assure responsiveness to local preferences.

Most farm households in the area rely heavily on non-farm income and so the economic stimulus of improved wetland quality will benefit these households, even as local economic activity associated with irrigated acreage declines. An agricultural land trust could be created to preserve a permanent core of irrigated lands, of a size sufficient to sustain a viable agricultural sector in the local economy. Further, if fallowing of irrigated acreage is spread between the Lahontan Valley and the Upper Carson Basin, then the economic effects of reduced irrigated acreage will be less concentrated around the community of Fallon. In addition, a small portion of the price paid for water rights could be dedicated to local governments for economic development assistance in the areas where large numbers of irrigated acreage are fallowed.

To summarize, agriculturally-linked activities are only a small portion of the overall economy of the region and many farm households already rely on non-farm income for a significant portion of total household income. Lost economic vitality in agriculture can be mitigated by some off the market structures described earlier that minimize the amount and frequency of irrigated land being fallowed. The Lower Carson Basin already is in an economic transition in which farming is giving way to residential and commercial development. Reduced economic activity in agriculture will be balanced by increased economic vitality due to improved wetlands and recreation opportunities and to the general trend of development in the area. Consequently, mitigation of third party impacts from agricultural land

following is not as urgent as it would be in an area with a primary economic dependence on agriculture.

Evaluation of Other Issues

- ! **Federal activities and programs:** Micro management of water management, as some observers characterize the OCAP, is not the most effective way to encourage water use efficiency. Rather, as noted below, the real value of water needs to be communicated through an active market or through increased water prices. (See Section 4.3 for further discussion.)
- **Basin wide commission:** The Truckee-Carson basins already have a negotiating forum, so an official basin wide commission is probably not needed and would only provoke disputes over representation and other confusion.
- ! **Innovative governance structures for the Carson Basin:** Improvements in Truckee River operations over the past few year have been accomplished through multi-party negotiations, but nothing similar has occurred to examine the fragmented manner in which the Carson Basin is operated. Through the Alpine Decree, the river is fragmented into multiple segments, without a unified means to examine the basin as a whole.
- ! **Federal role in problem solving:** In other regions, such as California's Central Valley, the federal government can exercise its control over federal water so as to ensure that the real value of water is signaled to project water users. However in the case of the Newlands Project, the federal government does not supply water by contract, so the government does not have that option. The irrigators have water rights and pay the irrigation district (TCID, as Reclamation's agent), to operate and maintain the water distribution system.

Encouraging development of a water market in the region may be an effective means to communicate the scarcity value of water. In order for the market to perform this function effectively, project water must be transferrable for multiple purposes within and outside of project service area boundaries. However, one commentator to the draft report noted that discussions of the free-market concept with wetlands interests received adamant opposition owing to concern that wetlands could not compete for

water effectively in an open market. Signaling the scarcity value of water will also provide incentives for water conservation, without the need to prescribe exactly what conservation measure water users should implement. As water becomes recognized as costly and valuable, water users will have reason to investigate and implement the most economically rational water conservation strategies.

Federal agencies could take the lead in establishing a dispute resolutions process, a forum where problems and concerns regarding water acquisitions could be discussed and resolved. Federal agencies could take a lead in reinvestigating multi-party bargaining.

4.2 Surface-Groundwater Relationships

The relationships of surface and groundwater in the Truckee-Carson River basins are functions of natural conditions and the alterations imposed by development of agriculture and urbanization. In many circumstances the natural trends are exacerbated or enhanced by the impacts of agriculture and urbanization. This thesis is consistent between water quality and water quantity considerations.

In general the quality of surface water and its ionic signature deteriorates and changes respectively down valley. As represented by Total Dissolved Solids (TDS), the headwaters of the Truckee-Carson Rivers exhibit dissolved solids of 50 mg/l. The terminal discharge points exceed 10,000 mg/l at Carson Sink (Carson Basin) and greater than 5,000 mg/l at Pyramid Lake (Truckee Basin). The ionic character of the head waters is predominately calcium bicarbonate. As the waters drain down valley they become sodium chloride type with increasing amounts of sulfates.²¹⁴

As described elsewhere herein, the basin water budgets that maintained the elevation of the terminus lake water levels and the size of the wetlands has been significantly impacted in this century. The natural change from water source to sink in the water budget which occurs down basin from the wet mountains to the arid desert has been skewed by water resources development. The specifics of these trends along the drainage and the degree to which the trends are exacerbated or enhanced are complex, including the retention and spreading of waters from the rivers, changes in surface-groundwater interactions and the changes in groundwater recharge and discharge. For example groundwater conditions are significantly impacted by the transport and spreading of irrigation systems in the basins. Downward percolation of diverted surface waters in unlined canals and fields have

raised the shallow water tables over large areas. The Carson River naturally creates a groundwater recharge mound in the valley, the spreading of the irrigation systems has expanded this mound. The Truckee Canal provides enhanced recharge to the aquifer from which the Fernley public supply well draw.

Water Use

The primary diversion of waters in the basins is for irrigation and agriculture (83%) with public supply using 14%. The remaining users are commercial and domestic, industry and mining and power generation.²¹⁵ Trends reported in current water use are increasing domestic and municipal water well installations and pumping, less irrigation well pumping associated with the conversion of agricultural lands to residential use or the sale of their water rights for environmental and municipal purposes, and efficiency conversions on irrigation systems. The consequences of water use in the basin are expected—as water is consumed in part or totally by municipal and domestic uses or spread for irrigation the water resource available to the terminus is reduced. Water quality is also impacted; loading of both the surface and groundwater by waste streams affects the quality of the return waters to the streams and the termini with both chemicals and concentrated native minerals. The concentration of minerals is a natural process in the down valley transport of waters but is enhanced through the land application of waters. These induced changes in the interactions between surface and groundwater affect both aquatic organisms and potentially the terrestrial consumers. Diversion and withdrawals of the water from groundwater can induce changes in the recharge and discharge of aquifers, affecting the availability of moisture to native plants, agricultural crops and the depths of water supply wells.

Interactions of Basin Waters

The interconnection between surface-groundwater in the Truckee-Carson Basins is conceptualized in various Interior reports and investigations depicting the interactions of the various aquifers as well as the surface-groundwater through conceptual models.²¹⁶ Important limitations to the conceptual models include a lack of sufficient measurement and accuracy to predict the long-term and localized consequences of changes in water uses. The Natural Resource Conservation Service notes that PL 101-618 mandates studies, but did not fund them or indicate how, when, where, and who would complete them. This would appear to be an issue to which the Commission should give serious attention, insofar as a settlement may give the

appearance of completion, when the research work needed to provide its underpinnings may not have been funded and completed. The USGS also comments that a major void exists in modeling the interaction of groundwater and surface water on a compatible time step. The need (driven by contested water rights) is most acute at low river flows. This is where surface water model errors become significant, because of unquantified surface and subsurface irrigation returns and near-channel irrigation pumpage. Since surface water model time scales are shorter than groundwater models, some way is needed to simulate interactions on streamflow over relatively short time scales.

Changes in the Truckee-Carson basins' largest water use, diversions and applications of water by irrigation, are likely to impact the basins.²¹⁷ Possible changes in response to programs initiated under Public Law 101-618, particularly the water rights acquisition program, could include: reduction of flow to the Carson Desert wetlands, reduction in recharge to the shallow aquifers, and consequent loss of some recharge to the intermediate and deep aquifers below. Beneath some of the irrigated lands, reductions in sulfates, chlorides and dissolved solids in the groundwater have been attributed to the diluting effects of surface waters imported from the rivers. These waters are generally lower in TDS. The counter effect of causing the dissolution of minerals as infiltrating waters leach native salts and metals is also theorized.

The impact of the reduction in the application of irrigation waters is probably complex and further measurement is needed. In fact, substantial additional study is suggested by the United States Geologic Survey (USGS), including further physical characterization of the aquifers, measurements for the more accurate estimates of the components of the water budgets for the basin, water quality studies, tritium and other stable isotope studies to evaluate preferential movement of groundwater and the interactions of the aquifers.

An investigation conducted under the USGS National Water-Quality Assessment Program summarizes the natural and land use impacts on water quantity and quality.²¹⁸ The flow in the Truckee River is influenced by the regulation of reservoirs in the headwaters, and irrigation diversions, return flows and wastewater effluent in the lower reaches. The Carson River flows are influenced by runoff from snowmelt in the headwaters and base flows associated with imported irrigation waters in the lower reaches.

Loading of nitrogen and phosphorus in the Carson River Basin was found to increase below agricultural activities where both are added as fertilizers.²¹⁹ Historical silver and gold mining activities are known to have contributed mercury to the waters and alluvial sediments of the Carson River drainage. Since the mining predates the twentieth century surface water diversions, sediments containing mercury have been deposited beyond the Lahontan reservoir and have reached the Carson Sink. This mercury occurrence is currently being investigated by the U.S. Environmental Protection Agency. The primary water quality impacts to the Truckee River are considered to be the municipal wastewater effluent and the agricultural land return flows through drains.

Groundwater quality, like the surface water quality, degrades down valley. A noted example is that the TDS in the headwaters aquifers is 200 mg/l or less and increases to over 10,000 mg/l at the Carson Sink, paralleling surface water loads. The aquifer waters naturally increase in certain constituents as the water drain down valley, as there is contribution from the geothermal waters. Calcium sulfate and sodium sulfate probably associated with gypsum and anhydrite deposits are some of the specific constituents that increase. Chlorides from sources that may include basalt aquifers are suggested by the USGS. In the basins the leakage of underground petroleum fuel storage tanks, municipal landfill leachate, industrial spills, acid mine drainage, applications of fertilizers, herbicides, pesticides and the spreading of treated municipal wastewater effluent are all potential contributors to the degradation of groundwater from land use changes (notwithstanding regulations prohibiting these effects).

Water quality changes that include toxic chemicals and metals impact aquatic organisms which can not digest these non-nutrients in the Stillwater Wildlife Management Area.²²⁰ Water quality changes which add nutrients are not considered as significant.

FWS indicates the optimum change with most immediate impact would be the importation of high quality surface waters directly to the Stillwater Wildlife Management Area. Examples of the risks of the current water quality problems in the Carson valley are the mercury which persists and passes upward in the food chain, and the acutely toxic waters laden with native metals such as arsenic in the TJ and Hunter Drains. In the Truckee Basin the nutrient loading of the wastewater effluents and loss of dissolved oxygen threaten the Lahontan cutthroat trout and the endangered cui-ui sucker in Pyramid Lake.²²¹ (However, comments received to the draft report dispute this, stating that “although such discharges may cause a problem on

the Truckee River itself by stimulating algae growth and thus depleting oxygen, it does not negatively impact Pyramid Lake itself, and may benefit it by providing needed nutrients.”)

Municipal and domestic wells in the influence zone of the irrigation canal and distribution systems benefit from these projects. The water levels in the shallow aquifers are artificially raised, which helps offset the pumping costs. The “freshening” effect of the relatively low TDS water that infiltrates can in some circumstances offset the less fresh native groundwater which experiences loading of natural salts and metal concentrated by evaporation. Communities such as Fernley and much of the wells in the Carson and Lahontan valleys are benefactors of these conditions.

Effects of Land Use Changes, Particularly Changes in Irrigation

During the past 150 years land use changes have impacted the water balance in the Truckee-Carson Basins, increasing the loading of both nutrients and toxins to the surface and groundwater and impacting the quality of the waters at the terminus of both basins. In some cases transport from mining delivered metal to the wetlands. In others, the increased recharge of the shallow water table by irrigation may actually have changed the size and the areas of discharge in the sinks. This may also have changed the concentration zones of salts from evaporation. At least in some areas, it has concentrated the mobile metals in the drains, resulting in acute conditions of toxicity as discussed above.

Can the responses to a public law now change the conditions in the basins again? Certainly, the balance can change again with each shift, however the uncertainties are still large regarding the extent of potential impacts to the basin resources and environment. The interactions of the ground and surface water will play an important part in the changes, as much of the water use (irrigation) in the basins has interacted with the shallow groundwater.²²²

Changes in the efficiency of the irrigation water application will reduce infiltration and consequently reduce recharge to the shallow groundwater. Since the shallow groundwater is also the first groundwater to receive infiltrating waste waters, landfill leachate, septic tank wastewater, fuel and industrial spills it is also most at risk. Moreover, since the shallow groundwater also contributes to the wetlands lakes and sinks, changes in groundwater quality potentially impact these water bodies and their ecosystems. Potential changes in groundwater levels associated with the Settlement Agreement can have some impact on the following issues:

- ! The preferential movement of contaminants such as immiscible petroleum fuels and dissolved toxins,
- ! The lift of water wells screened in the shallow water occurrence,
- ! The quality of water at drains,
- ! The basin water budgets, and
- ! The availability to crops and native plants.

It has been theorized that improvements in irrigation efficiency may improve water quality at the terminus, such as the wetlands, if it reduces the contribution of the drains. Alternatively, the zone of evaporative discharge of the groundwater at the sinks and wetlands will retreat from the current artificially extended location due to irrigation recharge of the shallow aquifer and possibly expand the salt accumulation zone back up valley. Thus, a mix of countervailing water quality and quantity-related impacts may occur.

Communities like Fernley may experience both declining water levels and water quality if the Truckee Canal is lined.

Impacts from Non-Irrigation Land Uses

The shallow aquifers of the Basins are the most vulnerable to degradation due to the relatively high permeability of the shallow soils and the permeable channels in the shallow subsurface that connect the deeper water occurrences. Land use changes that have nothing to do with the irrigation efficiencies are now spreading outward from the municipal centers. Septic drainage, commercial/industrial activities and the urbanization of the valleys bring loading of nutrients, metals, organic chemicals, and toxins that are both point and non-point sources of contamination. The development of Best Management Practices for the businesses and residents can aid in reducing the impacts of these new sources of risk.

Rural and urban wastewater treatment systems are an important control on such nutrient and toxin loading, however where the effluent loads the rivers it is also suitable to consider reducing or eliminating the discharge. The recently concluded Water Quality Agreement accomplishes this objective while maintaining flow levels through a water rights purchase program that will substitute effluent discharges with high quality waters in the Truckee river. Conjunctive uses of treated effluent may have measurable benefits

and reduce or eliminate the costs associated with degradation of the water resource where new water is limited. Gray waters consumed for cooling or recycled may reduce contaminant loading of the water resources.

It should be noted that the movement of the groundwater is relatively slow compared to the surface waters and that in the natural down-basin transport, control of the groundwater quality has long-term risks and benefits. The groundwater can be slowly degraded but will also take a long time to remedy. Spills and loading in the surface waters are realized to be at risk much faster and generally corrected faster. Nitrate loading of groundwater is a common long term impact that poses a health risk for those drinking the well water and contributes to the degradation of the surface waters that receive contaminated base flow as well.

Many of the USGS suggestions for additional study can aid in the appreciation of the shallow groundwater risk. The benefit of extending the investigations deeper into the basin aquifers lies in the understanding of the development potential and risks of water supply for sustaining municipal growth. These studies could also improve understanding of the movement of groundwater and the possible impacts of existing and potential future spills to the deeper aquifers. The costs and duration of such studies are dear and long, respectively.

Typically, Federal studies of this nature are county or basin-wide and not accurate to individual parcels of land and their related waters. The complexity of local groundwater flow in the Lahontan Valley is such that reversals in direction from regional flow are possible, as well as water quality changes over short distances. As a remedy to this the USGS has suggested increasing water level measurements in the Lahontan Valley to improve prediction of groundwater flow, especially in areas of the buried Carson River channels. Also in areas of water rights sales where irrigation is going to be halted, the collection of groundwater samples could be used to determine the actual changes in groundwater quality as a new equilibrium is established. The single most important study one USGS researcher recommended was the relationship of the basalt aquifer contacts to the alluvial aquifer in the Lahontan valley. Chlorides are showing statistically significant increases with no apparent changes in the land use practices in some water wells. If this is a result of up-coning of poorer quality groundwater from the basalt aquifer it may have long-term impacts to public water supplies and management of the water resource.

The federal studies to date have provided good conceptual models for appreciation of the interactions between surface and groundwater. The impacts to the municipal and domestic water wells may best be evaluated as wellhead studies, both to learn more about the future impacts of changes in water usage to the aquifers as well as to determine the risks of other land use changes to the water quality. Wellhead protection studies are localized and will add important new data to the existing studies. These wellhead studies should cover both water quality and quantity. With few exceptions the proliferation of water wells with urban advance into the valleys comes with risks both to the control of the water resource as well as the generation of septic wastes that result from water use. Where groundwater is shallow and the septic systems are less efficient the risk of contamination is greater. Establishment of resources districts, rural water systems and best management practices are candidate corrective measures.

Consolidation of water users from multiple to single systems allows better metering and control. Many of the chemicals that load aquifers in urban land use are toxic and persistent, including detergents, petroleum, pesticides, herbicides and solvents. Moreover, they are less regulated due to the small quantities and the absence of education and regulation of non-commercial chemicals.

Mitigation to New Equilibria in the Ground/Surface Water Interactions

Some mitigative measures are visible, however since the conditions of the interactions of water resources are not well defined at the local levels many are not. Importation of waters to the wetlands is the preferred action under the Settlement Act to mitigate loss of acreage. This action is desired because the new waters are likely of better quality than drain waters received currently from irrigation. Since the regional data suggests that the shallow aquifer recharges the deeper aquifers and that down valley toward the wetlands the leakage is upward²²³ there may be an incremental loss of down valley contribution to the wetlands as Project efficiencies improve. This would occur as a new equilibrium is established, although insufficient data exists to accurately predict where to expect such occurrences.

A loss in head of 4 to 17 feet is reported as possible by the USGS in the shallow aquifer due to Project efficiency improvements. Although troublesome to shallow well owners who would be required to deepen some wells or experience reduced yield, this is a one-time capital expenditure. As in many arid basins the aggradization of rural water wells to a rural water system with a single well or well field allows management of production,

consumptive use, monitoring of quality and aids in sustaining development. Rural water systems can be locally financed. This is already being considered in Washoe County by the County, Tribe and Sierra Pacific Power Company. The consequences of Project efficiencies to a public supply well such as at Fernley may be much greater than to individual water supply wells, since the Truckee Canal is the primary recharge source for the aquifer from which they pump their water.

The USGS indicated that in such cases the induction of river losses could occur as the wells cone of depression expands to that source of recharge. The consequence of changing the Project system efficiency to water quality in the middle aquifer is not known. The local drillers in the Lahontan valley report good quantities and quality of water in the middle aquifer unit. The USGS reports downward flow in the west part of the valley from the shallow aquifer into the middle aquifer and upward flow from the middle aquifer into the shallow aquifer and the wetlands in the east. Changes to the recharge of the shallow aquifer from Project efficiency enhancement may result in less available water to both recharge and freshen the middle aquifer water resource. Given the chloride changes mentioned above, the loss in recharge may potentially impact the future public supply value of the middle aquifer. If the unit were developed and the wells over-pumped it might result in the up-coning of these lesser quality waters.

The USGS and the EPA have performed some additional as yet unpublished work in the Lahontan Valley. The work consists of probing and hydraulic testing to determine the locations of some of the buried Carson River channels. This level of investigation is site specific and can aid in understanding the localized impacts of water use changes. It is also expensive. Probably the most cost effective data collection at this point is water level measurements through time. Such measurements coupled with collection and analysis of groundwater samples will aid in refining the theories concerning the changes in groundwater quality. The Truckee and Carson basins have been equilibrating to human-induced changes in water use and the current trends and potential changes are likely to result in new equilibration. Given the highly interactive nature of the ground and surface water such measurements will be important in the understanding of past and future water resources conditions. The increase in studies by the EPA and local agencies related to point source of pollution will also extend the data base applicable to understanding the interactions of water resources.

Key Lessons Learned

- ! Surface and groundwater conditions have equilibrated to changes brought about by human use and changes in that use drives a reequilibration.
- ! There is no way to measure the original conditions and the effects of the original changes. Therefore, the uncertainty involved in those events may be larger than the changes that have occurred since. The effects to wetlands and other water-related phenomena in the basins due to the changes such as irrigation cannot be differentiated from the potential effects due to climatic change in this century.
- ! Project efficiency improvements and changes in irrigation patterns (e.g., due to water rights acquisition), may or may not have detrimental effects. This is clear neither with regard to water quality or quantity. Contemporary urbanization effects may have greater effects on the shallow water aquifer than the effects of irrigation over the past century. The Truckee-Carson basins are exceptionally sensitive to change.
- ! Land use changes are more significant in terms of water quality in basins where surface-groundwater continuity is strong than in western basins where groundwater is confined and hydrologic conductivity is low.
- ! Water quality may be more limiting and may have more significant long-term impacts on the ability of the water resource to sustain use in these situations than water quantity, although the latter has received far more attention in the Truckee-Carson basins.

4.3 Newlands Irrigators

Throughout the west, water reallocation is replacing the development of new supply as the primary source to satisfy demands. The end of the era of relatively easily developable new supplies of water corresponds with a time in which instream values and tribal trust requirements are receiving increased attention, and municipal supplies face the twin stresses of growth and drought. Irrigated agriculture, using a relatively large supply of water at a relatively low price is the natural and first alternative to which many of these water-needy interests turn, seeking to reallocate supply through economic, legal and regulatory processes. The conjunction of these shifts in the conditions and characteristics of supply and demand are not mere coincidence, and the stresses they engender are evident to varying degrees in

most western river basins. The Truckee-Carson provides a particularly apt example of these dynamics at work.

In choosing to focus on issues associated with Newlands irrigators as one of the critical unresolved water-related problems in the Truckee-Carson Basins, the purpose is to provide the Western Water Policy Review and Advisory Commission an in-depth look at this dynamic in terms of the community which is being asked to sell or conserve the water that will allow these other users to meet their needs. The Truckee-Carson may be a somewhat extreme example in the conflicts that have arisen in terms of the contrast between the degree of consensus reached by non-agricultural parties in the basins on the one hand and the degree of alienation from that consensus felt by the agricultural community on the other, but it is not particularly atypical in terms of the power newly exercised on behalf of instream (or, in this case, in-lake and in-wetland) values and tribal trust, and the resentment of that power experienced by the agricultural community. In this respect, an attempt to understand the experience of the agricultural community may be revealing and may clarify how and why such issues reach impasse. The hope is that this investigation can assist water policy-makers to avoid similar degrees of impasse elsewhere in the west.

Notwithstanding the many comments received on the draft report, to conduct such an investigation is not to advocate on behalf of the Newlands irrigators, but it is to listen carefully to their views and experience and to attempt to relate them as precisely and sensitively as possible. Therefore, the following is written with the express intent of stating as accurately as possible the irrigators' point of view and positions, as they experience it and as they see it. Without such an understanding, policy-making must choose between blame or ignorance, neither of which is a satisfactory basis for dealing with people and resources as vast and valuable as those that comprise western agriculture and western water.

In the interests of balance, we also quote at length from the comments received with respect to many of the specific issues raised below (in italics), so that the reader will also have access to the views of the other parties involved in the settlement negotiations. It is important to realize in doing so, however, that it is not the purpose of this document to adjudicate among parties, sort out disputes, propose basin-specific solutions, or decide who is right and who is wrong. The purpose of exploring this particular issue remains to encourage and inform western water policy in reaching resolution by understanding the experience of the irrigated agriculture community as it confronts the changing west.

Effects of Fundamental Change in Federal Goals on Irrigators and Rural Communities

The Truckee-Carson Irrigation District exemplifies a rural western community in transition, which is trying to define itself in the emerging post-reclamation era West. TCID faces pressures typical of many such western communities, but also some atypical ones. The District presents a typical example of the economic pressures confronted by irrigated areas that rely primarily on low-value crops. External market pressures create incentives to leave land fallow or to sell the land and appurtenant water rights. However, few areas are faced with such an unfortunate location as the irrigators of the Newlands Project under post-Settlement conditions. The irrigators are squeezed by two water claims that have been able to mount strong legal and political claims. To the northwest, the Pyramid Lake Paiute Tribe's long-term goal is to eliminate all transbasin diversions from the Truckee to the Carson. The Stillwater National Wildlife Refuge to the east seeks increased high quality flows to support the refuge.

The irrigators share a long, proud history of settling one of the last areas of the inner-mountain West to be irrigated. Farmers settled the Fallon area in the latter part of the nineteenth century as a result of efforts by the state's politicians to find an engine of economic growth to supplement mining and timbering, and arrest Nevada's population decline. The area was not a prime candidate for irrigation. But with the Reclamation Act of 1902, incentives for irrigation succeeded where prior efforts undertaken to develop a private irrigation economy had failed.

The federal government's long support for the Newlands irrigators has created expectations of continued support. Assured delivery of water to meet water rights of Newlands irrigators remains a contractual commitment of the federal government and a requirement of P.L. 101-618 and the courts. However, as new resource conditions and values have emerged in the past two or three decades and as American cultural values have shifted to increasingly respect and incorporate those values, the federal government has, over a period of two or three decades, given increasing priority to the satisfaction of tribal and environmental claims in the basin. These, together with the pursuit of OCAP have challenged the Newlands irrigators to recognize that water conservation and the efficient operation of projects to allow an expanded range of purposes to be served by the available water now form baseline expectations for their industry.

The irrigators have followed two strategies to protect their economy and way of life from federal and tribal efforts to reallocate water to tribal and environmental purposes. They have asserted their prior water rights as a barrier per se to reallocation, and they have at various times proposed to substitute a physical solution for strict reliance on entitlements. However, the efforts of the irrigators to participate in a more general settlement of Truckee River entitlements has been hampered for several reasons. One is conceptual: the federal government, Tribe and Sierra Pacific Power Company are moving toward a more risk-based management scheme. These parties are trading firm rights for a physical solution that provides an adequate margin of safety in water-short years. This concept clashes with the belief by the irrigators that they should be entitled to enjoy their water rights without risk. Indeed, tribal comments to this section of the draft report note “. . .*the most basic problem seems to be that the irrigators believe that they are entitled to divert all the Truckee River water it takes to fill Lahontan Reservoir each year, no matter how much of that supplemental water is beneficially used or how much is wasted due to conveyance losses, evaporation or spills.*”

Another reason is political: the power shift away from the irrigators and towards the tribe, environment, and upstream users has eroded the irrigators bargaining power. There is less incentive for the federal government to bargain, as opposed to subjecting the irrigators to strict interpretations of OCAP, the Endangered Species Act, and Nevada water law. Finally, the irrigators and their communities appear to be still defining a vision for themselves in the new post-reclamation era. The status quo may no longer afford a sustainable vision, as water transfers and other forces work to decrease the irrigated acreage in the Newlands Project.

Alienation of the Irrigators

In some ways, the Truckee-Carson negotiations provide a case study in alienation. We consider the issue of alienation at some length because we believe it presents an instructive object lesson to western water policy and decision-making. It comes as no surprise that the party alienated would be the one whose water was targeted to meet the needs of other participants. Indeed, where else was water to be obtained in the quantities needed to meet the large agenda of restoring Pyramid Lake, recovering the cui-ui, preserving the Lahontan Valley wetlands and improving water quality if not from agriculture? It should have been expected that the Newlands irrigators would perceive themselves as “losers” to the extent that the overall process succeeded in its objectives.

It is strongly recommended that western water policy confront this reality in river basins throughout the western states and begin to explore innovative, proactive solutions that can both serve new needs and that are workable for irrigators. The OCAP provide a classic case in point. It is not the OCAP goal to conserve water and eliminate waste that is at issue (and hence great detail on the achievements in that regard are beside the point), but rather the intrusive form and adversarial manner in which OCAP have been imposed that have made this innovative solution unworkable from the point of view of fostering a final resolution in the basin.

In the Truckee-Carson, many comments in response to the draft report note that negotiations were lengthy, numerous and sincere, and that every effort was made, from the point of view of the non-agricultural parties involved, to meet the demands of irrigated agriculture in ways that would still allow other objectives to move forward. The purpose of the following discussion is not to question the sincerity and effort of those involved, but to illustrate how the irrigators felt alienated, as an object lesson that may be useful elsewhere in western water policy.

We take note as well that, at least in the opinion of the following commentators to the draft report, insofar as the Truckee-Carson itself goes, the situation may be improving: *From an Interior viewpoint, recent years have seen a marked improvement in people working together to solve mutual problems and take cognizance of both mutual and divergent interests in the Truckee-Carson basins. This has led increasingly to approaches based on agreements. The recent successes with the new O&M contract with TCID and the Truckee River Water Quality Settlement are examples; substantial headway is being made with regard to TROA and a second set of negotiations with the Fallon Tribes. There are numerous instances of individual parties and groups going out of their way to draw TCID into negotiations, keep them at the table, provide technical assistance, hold special sessions to address their issues, and provide opportunities for meaningful input from TCID and the irrigators.*

The “Walk-Out” and Scapegoating.—Some accounts of the history of events in the Truckee-Carson negotiations state that the irrigators withdrew from negotiations and “left the table.” However, in personal interviews a number of participants in the process, including both state and federal officials as well as irrigators, offered a more neutral characterization of events. By this view, an impasse had been reached at a particular juncture of the negotiations sponsored by Senator Harry Reid, and a mutual decision was made that it was not productive to go forward. The irrigators refusal to agree

to demands placed upon them at that point was then characterized in some quarters as a “walk-out.” It appears more accurate to say that, both in the Reid negotiations and in the subsequent “facilitated negotiations,” the parties at the table were unable to agree, but the irrigators did not express an unwillingness to continue negotiating.

At a minimum, it must be recognized that such claims and counterclaims are based in perception and that success in a negotiation process (and successful facilitation in particular) is defined by the ability to bring the parties involved to rise above such perceived barriers. The Truckee-Carson settlement has not succeeded in that respect insofar as the involvement of the irrigators is concerned. To date the process has been unable to produce a proactive agreement that includes the irrigators. From their perspective, they have been excluded from genuine influence on the outcomes of the settlement process; at the same time, they experience a great deal of blame directed at them. The consultants preparing this report heard blaming statements frequently in investigating the issues associated with irrigators. Such an outcome represents a fundamental failure to reach closure in negotiation, and falls short of the kind of inclusive achievement that western water problem-solving requires.

Exclusion and blame suggest a situation in which scapegoating may have been perpetuated. Scapegoating as a social process occurs when consensus is achieved by identifying an individual or group with a problem experienced by the community to the extent that the two become nearly indistinguishable. Under such circumstances, a sort of transfer of condemnation occurs, from the problem to the individual or group, who become so associated with the problem that they receive the blame for it. The group finds the necessary cohesion to overcome its internal differences and tensions in the solidarity felt with respect to the rejection and/or expulsion of the scapegoat.

This theory does not perfectly fit the Truckee-Carson situation; certainly the irrigators have varying relationships with other parties, ranging from adversarial to sympathetic. However, as we have pointed out elsewhere, a shift in social priorities and cultural values has occurred in the West, away from “settling the frontier” and toward protecting and restoring the environment and meeting long-neglected commitments to Native American tribes. With this “paradigmatic shift,” irrigators feel that, although they are carrying out a social mission that had enjoyed cultural consensus in times past, they and their work has come to be associated with the creation of these environmental problems and accumulated failures of national policy with respect to Native Americans to the extent that they feel blamed for

these ills. They feel unfairly made the scapegoat for these problems when they are only doing what, in effect, society asked them to do and praised them for doing in earlier times.

This process is described in social anthropology; as with many sociocultural processes, it need be neither conscious nor deliberate (in the sense of conscious intention) in its operation. Many comments to the draft report state that the commentator has neither participated in nor observed an attitude toward the irrigators that would be appropriately characterized as scapegoating. Therefore we have sought to clarify both the use of this term and its intent. It is in no way intended to perpetuate a cycle of blame and condemnation, nor to suggest that the other parties in the Truckee-Carson settlement have deliberately pursued sinister policies. Nevertheless, scapegoating as a social process is unhealthy and, where overall workable solutions are desired, is bound to interfere with the larger objective. The controversial nature of water resource management in the west is bound to raise such temptations; these should be vigorously resisted.

At times, actions were taken that seemed designed more to hit out at the irrigators and cause them harm than to advance toward a larger solution. Enough such instances occurred to raise in the minds of several of those interviewed (not only irrigators) some question as to the agendas of other parties. This is an area where the federal government can and should work to maintain balance, particularly where native peoples are involved and the federal government itself shares some of the blame for a history of old wounds or broken promises that may be festering among them.

In comments to the draft report, the Tribe submitted the following view on the history of events in the 1990 Settlement Act vis-a-vis the irrigators:

After the PSA was signed in the spring of 1989, the major parties involved in the settlement negotiations, guided by Nevada Senator Harry Reid, focused intensively on trying to resolve the issues between the Tribe and TCID. Despite good faith efforts by all parties, no agreement was reached. The issue which led to the impasse was the amount of Truckee River water TCID would be allowed to divert and store in Lahontan Reservoir. The previous year the Interior Department had issued the 1988 OCAP which established a Lahontan Reservoir target storage level of 215,000 acre feet at the end of the spring runoff period in June. That meant that Truckee River water could be diverted to Lahontan Reservoir only to the extent necessary to reach that level. TCID insisted that the end-of-June target storage

level be increased to a full reservoir, 295,000 acre feet. The Tribe and the federal government were equally insistent on at least maintaining the end-of-June target contained in the 1988 OCAP. Indeed, the Tribe had challenged the 215,000 acre foot target storage level as too high.

[At a] meeting in the summer of 1989 at Sierra's office in Reno. . . TCID's representatives informed the other parties and Senator Reid's representative that TCID could not accept anything less than the full reservoir target. They clearly stated that that issue would have to be resolved through litigation unless the Tribe and the federal government were willing to accept the 295,000 acre foot target. The Tribe and the federal government stated that they felt just as strongly as TCID on this issue. Both sides understood and respected the other's position.

TCID's representatives also stated that they did not want Senator Reid's settlement effort to stop because of this fundamental disagreement on the issues involving the Newlands Project. They said that there were other important issues we should try to resolve, including the interstate allocation with California and Nevada. Senator Reid and the other parties said that they appreciated TCID's position that the negotiations on the other issues should continue.

Shortly thereafter agreement was reached on the interstate issues as well as other matters including a water rights acquisition program for the Lahontan Valley wetlands. Senator Reid introduced a bill incorporating these agreements as well as the PSA in the fall of 1989. Senator Reid's bill was silent on the Newlands Project issues because no agreement had been reached.

A hearing was held before the Senate Subcommittee on Water and Power in February 1990. Notwithstanding its previous position, TCID opposed enactment of the settlement legislation because it did not address the Newlands Project issues of concern to TCID. The federal government joined with TCID in opposing Senator Reid's bill for the same reason, among others.

Senator Bradley, the subcommittee chairman, stated at the close of the hearing that the subcommittee would not take any action on Senator Reid's bill for a period of 90 days. He asked the parties to try again to resolve the Newlands Project issues during that period. He also stated that while the subcommittee preferred that the affected parties reach an

agreement, the subcommittee would proceed with Senator Reid's bill if there was no agreement within that 90 day period. The Tribe, TCID and the federal government met again pursuant to Senator Bradley's suggestion but to no avail.

TCID then launched an organized campaign, including public demonstrations, against Senator Reid's bill. The subcommittee proceeded to mark-up and to consider amendments to Senator Reid's bill based on the testimony presented at the hearing as well as new positions advanced by the Interior Department. It was at that time, after TCID had urged the parties to continue to negotiate notwithstanding the impasse reached on the Newlands Project issues, after TCID had opposed Senator Reid's bill that was silent and neutral as to Newlands Project issues, after the Senate subcommittee had provided another 90 days to find a mutually acceptable solution to the Newlands Project issues and after TCID had launched a public campaign against the proposed settlement, that the provisions included in section 209 of the Settlement Act made their first appearance. Those are the provisions of the Settlement Act to which TCID most strongly objects.²²⁴

It is clear from this history that TCID was provided ample opportunity to participate in the settlement and was not left out of the process or made a scapegoat by the other parties.²²⁵ Rather, TCID made a deliberate decision to oppose enactment of the settlement legislation even before the settlement bill included the Newlands Project provisions. The Tribe would have preferred for the Newlands Project issues to have been resolved as part of the Settlement Act or, failing that, for TCID to have adhered to its original position and supported enactment of a settlement bill that was neutral as to the Newlands Project issues.

In short, TCID made a decision and it backfired. As the [report] correctly states. . . TCID is now attempting to defend a water budget it had previously rejected as insufficient. It has no one to blame for the outcome but itself. The. . . attempt to shift responsibility to the federal government (and inferentially the Tribe) for TCID's own deliberate choices. . . [is] unwarranted. [Note: for criticism of the irrigators' strategy, see below.]

Notwithstanding TCID's attempt to derail the settlement, the Settlement Act includes significant safeguards for the Newlands

Project irrigators as well as other water right owners. Section 205(a)(2)(B) states that the Operating Agreement that carries out the PSA must:

[E]nsure that water is stored in and released from Truckee River reservoirs to satisfy the exercise of water rights in conformance with the Orr Ditch decree and Truckee River General Electric decree, except for those rights that are voluntarily relinquished by the parties to the Preliminary Settlement Agreement as modified by the Ratification Agreement, or by any other persons or entities, or which are transferred pursuant to State law.

Similarly, section 210(b)(13) states:

Nothing in this title is intended to affect the power of the Orr Ditch court or the Alpine court to ensure that the owners of vested and perfected Truckee River water rights receive the amount of water to which they are entitled under the Orr Ditch decree or the Alpine decree. Nothing in this title is intended to alter or conflict with any vested and perfected right of any person or entity to use the water of the Truckee River or its tributaries, including, but not limited to, the rights of landowners within the Newlands Project for delivery of the water of the Truckee River to Derby Dam and for the diversion of such waters at Derby Dam pursuant to the Orr Ditch decree or any applicable law.

These provisions of the Settlement Act, which carry out and expand upon the protection provided in section 28 of the PSA, belie any suggestion that Senator Reid, the Congress, the Interior Department, the Justice Department, the Tribe or any other party, either singly or in combination, targeted, went after or sought to diminish the water rights of Newlands Project irrigators or any other water right owners. [Note: for discussion of the irrigators' views on "takings," particularly with regard to OCAP, see below.] To the contrary, the Settlement Act expressly guarantees that the modified and improved operation of Truckee River reservoirs pursuant to the PSA and the Settlement Act will not interfere with the established water rights of any person or entity. The same or similar safeguards will be included in TROA.

Further comments submitted to the draft report by the Tribe go on to the background and history of the TROA and the "facilitated negotiations" with respect to their attempts to involve irrigators:

The TROA negotiating parties have continued to include TCID in their discussions and to try to make peace with TCID in the years following enactment of the Settlement Act in 1990. TCID representatives have participated actively in TROA subgroups, the drafting committee, negotiating sessions and plenary sessions. At one time a special TROA subgroup was created to negotiate TROA issues with TCID. The subgroup was selected with a view toward avoiding antagonism and confrontation and promoting constructive dialogue. The TROA issues also were encompassed in the intense settlement negotiations held in 1994-95 (known as the second generation or facilitated negotiations) under the sponsorship of Senators Reid and Bradley. These negotiations were conducted by a professional and respected mediator approved by representatives of the Lahontan Valley, the Tribe and the other participating parties. The federal negotiating team was led by Assistant Secretary Betsy Rieke. . . . The Lahontan Valley interests rejected a proposal accepted by all of the other parties which was supported by their friends and allies including Nevada Director of Conservation and Natural Resources Mr. Pete Morros, and Nevada Congresswoman Ms. Barbara Vucanovich. Most recently, in the summer of 1996, face-to-face negotiations between representatives of the Tribe and the Lahontan Valley were held without the participation of attorneys, experts or federal officials under the auspices of Mr. Morros. One major goal of the Morros negotiations was to try to find acceptable terms and conditions for TCID and other Lahontan Valley entities to become signatories to TROA.

None of these efforts succeeded, but that was not due to lack of effort. No stone has been left unturned in seeking solutions. Every conceivable mechanism has been tried including the consultant's proposal for direct meetings between tribal and Newlands representatives without federal participation; to the best of [the Tribe's] knowledge, no suggested procedures have been rejected.

Clear Bounds on Water Requirements of Federal Responsibilities.—The process followed in determining the amount of water required from agriculture in order to meet federal trust responsibilities was never bounded in such a way to make clear to the irrigators that some limit existed as to the amount of water sought. They felt exposed to an open-ended process in which one of the principal messages they felt they heard questioned their fundamental right to water, thus keeping before them the specter that they might ultimately wind up losing all their Truckee Division water. Such a

situation continues in the stated objective of the Pyramid Lake Paiute Tribe to eliminate the Derby Dam diversion.

Interior comments: It is true that representatives of the Pyramid Lake Tribe have from time to time stated a goal of eliminating the Truckee Division and of eliminating diversions from the Truckee River. Federal representatives repeatedly and publically have stated that this is not a federal goal and that protecting irrigators' rights is a federal goal. Proposals in negotiating sessions, including proposals supported by the Tribe and the environmental community, have been made to the irrigators that fall short of that goal.

Perceived Process Objectivity.—The irrigators felt that the objectivity of the process was not protected. For example, they felt offended by a statement made by a facilitator during the second round of negotiations, to the effect that perhaps it would not be possible for the Newlands irrigators water rights to be permanent. If such a comment were made, it would be a notable departure from facilitation practice in that it would suggest a negative opinion on a fundamental issue that is perhaps the central concern of the irrigators. Whether or not the facilitator made the comment in precisely those terms or was or was not is in fact objective, was not determined. The significant point is that facilitator's objectivity fell into question on the part of a key participant, and where this happens, facilitated negotiation is very likely to fail.

Process objectivity was also brought into question, in the minds of the Newlands irrigators, by the appearance of conflicts of interest on the part of other parties, particularly with regard to a contract held by an environmental organization with federal agencies for real estate purchases at a time when irrigators were working with that environmental group in the belief that they were an independent agent seeking to form local partnerships. It is beside the point whether or not real conflicts existed or that many parties to the process held federal contracts. The significant issue remains that, in this situation, the irrigators worked directly with this environmental group in the belief that they were a genuine third party, and were disturbed to find that this same group had a contractual relationship with the federal government that, in the irrigators minds, raised a question of potential conflict in terms of the role and information with which the irrigators had entrusted them.

Water Transfer and Water Right Validity Protests.—The Pyramid Lake Paiute Tribe moved to invalidate a series of proposed water transfers among Newlands irrigators and water-righted lands, which both the irrigators and the State of Nevada felt satisfied the requirements of state law. This action

turned on the question of whether the transfers needed to be examined on a parcel-by-parcel basis or a Project-wide basis. Nevada officials felt that a parcel-by-parcel requirement violated both state law and federal decree, however the Tribe successfully argued that the federal contracts authorized water use on specific areas, so that a parcel-by-parcel examination would be required to transfer water. This was upheld twice on appeal to the Ninth Circuit Court of Appeals.

This departure from common practice among irrigation districts throughout the west, where transfers are often allowed among individual Project participants and even between irrigation districts without further review upon the concurrence of their boards, appears to be based on the language of the conveyance contracts, which are specific to particular areas of land to be irrigated, and also on the relatively unique situation with regard to water rights ownership in the Newlands Project (again, under the Alpine Decree, water rights on the Newlands Project are associated with specific parcels of land). These conditions have been used to greatly complicate the irrigators abilities to apply water to water-righted land as best meets the needs of their industry.

The challenge was motivated by the Tribe's belief that the irrigators attempts to transfer old and unused water rights that may have become subject to forfeiture. The Tribe, in comments on the draft report, state that *“(i) literally hundreds of transfer applications involving 20,000 to 30,000 acre feet of water were filed by Newlands Project irrigators and almost all of those applications systematically seek to transfer water rights which had not been exercised for long periods of time; (ii) in many instances, the land to which those rights are appurtenant has been used for long periods of time for purposes inconsistent with irrigated agriculture; (iii) if granted, the transfer applications would result in 20,000 to 30,000 acre feet of increased annual Truckee River diversions to the Newlands Project and away from Pyramid Lake; . . . and (vi) the Tribe has not objected to . . . wetland transfers or to other transfers of Newlands Project water rights which do not seek to revive long dormant and unexercised rights.*

However, according to the State Engineer and recent court decisions, long dormant and unexercised water rights may not be necessarily lost under Nevada water law. In Nevada as in other western states, state water law guarantees that water rights holders who make full beneficial use of their water rights may go on using that water in perpetuity. It provides that “the right to divert ceases when necessity for use does not exist” and also that water rights holders who fail to use all or part of their water right for a

period of five years forfeit the right in whole or in part, accordingly. However, according to the State Engineer, in Nevada non-use is not absolutely determinative of forfeiture, but is only “one element” to be used in deciding whether a water right has been forfeited. Also, pre-statutory water rights (which the Nevada Supreme Court ruled are pre-1913 rights), may be lost only by abandonment, which requires a showing of the intent to abandon. Recent case law (1989 *Eureka* Decision) establishes that forfeiture may be cured by “substantial reuse” of the water and that “clear and convincing” evidence of non-use is required to determine forfeiture.

In the case of the Newlands Project, although the original Project water right is pre-statutory (1902) and water is not distributed among irrigators on a water rights priority basis, the courts have ruled that forfeiture may apply based on the date of contractual conveyance of water to individual land owners (recall that, under the Alpine Decree, water rights are vested in the individual property owners of the Newlands Project and appurtenant to specific parcels of land). These contracts occurred at various times, making some Newlands water rights more vulnerable to forfeiture than others. The Tribe’s attorney states that the transfer application often consisted of a mix of pre- and post-1913 rights, but had to be challenged as a whole.

Invalidation of their proposed transfers is particularly difficult for irrigators to accept in light of the fact that both the wetlands acquisition program and the water quality agreement depend upon large scale water transfers from agriculture. To the irrigators, this raises a question of fairness. The irrigators felt that transfers involving water of similarly questionable status were approved for other parties, giving them the feeling that the authorities were willing to wink at such issues when the parties involved were not Newlands irrigators, but applied the rule strictly when they were. For example, the irrigators note that Sierra Pacific has purchased lands in the area with appurtenant water rights, and has been allowed to store these water rights in Stampede with the anticipation of using them as needed in the future. (Sierra’s attorney notes that more latitude is granted municipal purveyors under Nevada water law than other water rights holders. Also, Sierra purchased perfected, pre-statutory Nevada water rights, which, as noted, may not be lost due to non-use but only by abandonment.

Other commentators to the draft report also contend that there are significant differences as to the history of the establishment and use of water rights at issue, as well as to their environmental impacts. The FWS responds that “Sierra Pacific has not been allowed to store newly purchased water in Stampede Reservoir. [Under] the Interim Storage Agreement for Stampede

and Boca Reservoir (i.e., Contract for the Storage of Non-Project Water Among Sierra Pacific, Washoe County Water Conservation District, Pyramid Lake Paiute Tribe and the United States). . . Sierra Pacific is allowed to store up to 14,000 acre-feet of privately owned water in the excess storage capacity of the reservoirs for 25 years. Sierra Pacific, through exchange procedures, may store its water from Donner and Independence Lakes in these reservoirs when it does not interfere with project functions of the reservoirs. [Note: Sierra Pacific did not make this point in its very detailed comments.]

The Tribe states, in their comments to the draft report, that “*Section 206(a)(1)(B) of the Settlement Act imposes an important constraint on the transfer of water rights acquired for the Lahontan Valley wetlands; the transfers of water rights to the wetlands have been limited to water rights which were recently exercised at the places of use to which they were appurtenant.*” However, as noted above, state water law does not necessarily require forfeiture of unexercised surface water rights; also, the owner may cure forfeiture by “substantial reuse.”

The “fairness” perception is exacerbated by some of the further ramifications of this dispute. State of Nevada officials note that the effect of the invalidation has been to take land out of production for a number of years. As the federal government has moved to adjust OCAP, reducing water allocations to the Newlands Project based on land in irrigation, no account has been taken of the fact that some land was idled because it was tied up in disputed water transfers. The result has been to reduce the water-righted acreage counted under the proposed Adjusted OCAP. One Reclamation official, although affirming no intent to use the invalidation as a means to in effect take water from the irrigators, acknowledged that “perhaps a windfall was taken advantage of.”

The Newlands irrigators also felt that the water right validity challenge was brought in such a way as to increase animosity and make it more difficult for the opposing sides to establish a working relationship. According to the irrigators, 2,200 notices for forfeiture and abandonment were sent out with threats of additional fees and charges if those in receipt did not sign off on the notices, when they believed the proper legal steps (service and filing) had not been taken. The irrigators experienced this as a gambit to see if they could be browbeaten into abandoning their rights without due process.

Further Tribe comments: No entity or group with Truckee River water rights other than the Newlands irrigators has attempted to revive long dormant water rights in a systematic way that is so adverse to the Tribe’s interests.

There are significant and material differences between the water rights of Newlands Project irrigators and the rights of other users of Truckee River water which make the Newlands' rights much more vulnerable to a successful challenge based on the peculiarities of Nevada law.

The notices of the Tribe's claims of forfeiture and abandonment. . . were mailed in accordance with a court order. Prior to the issuance of that order, notice and an opportunity to be heard were provided to numerous attorneys representing TCID as well as individual irrigators. The order signed by the judge was developed in consultation with those attorneys and in accordance with the Federal Rules of Civil Procedures.

The issue of the vulnerability of Newlands irrigators' water rights mentioned by the Tribe has to do with the circumstances explained above. Some were conveyed in contract from the United States to the land owners after 1913 and therefore are subject to challenge for forfeiture (whereas most other Truckee River water rights are pre-statutory rights and can only be lost by abandonment). The Tribe's commentary goes on to ask why wouldn't the Tribe seek to challenge the exercise of rights that would take water from the Truckee and which are vulnerable. Certainly, such a position is understandable on the part of this party, given its position and interests. However, this report focuses on the federal role and opportunities, and the lessons that should be learned for western water policy, not the strategy and tactics best suited to advance tribal interests.

In that light, the combined protests of water transfers and water rights validity at the same time that OCAP were being imposed and tightened and a settlement was underway which the irrigators clearly did not feel they could accept could only make them feel under siege. It is not the kind of timing or combination of actions that suggests a desire to reach a proactive accommodation, but rather the sort that fairly advertises a full scale attack. Attempts to deny this only stretch credibility by denying the obvious and the engagement in such denial (as is evidenced in some comments received on the draft report) only serve to illustrate to the Commission the kind of dynamic which has been set in motion in the Truckee-Carson and which should be avoided on other river basins. We suggest that the federal government is uniquely positioned to "raise the siege mentality" by playing a more balancing role in such situations (see below).

Transfer of Donner Lake Water.—The Warren Act is a law which requires a contract to use federal reclamation facilities to store or convey non-project water. Warren Act contract requirements were used to deny irrigators the

use of federal facilities for transfer of Donner Lake water for other than strictly Project purposes at a time when flexibility was being emphasized in empowering and encouraging the Tribe and Sierra Pacific to develop solutions involving the creative use of Truckee River facilities, including federal facilities, to store and exchange water. The basis for denial was the interpretation that Donner water, while not strictly Project water, should be subject to Project restrictions on Truckee River diversions (OCAP), and that allowing transfer of Donner water would exceed OCAP.

Again, issues of fairness and equity surface. This constraint was felt to be discriminatory by the irrigators, and by other parties as well. Several Nevada officials, for example, characterized the situation as “patently unfair” and “a clear discrimination in the federal treatment of TCID as opposed to Sierra Pacific or the Tribe.”

Both Interior and the Tribe commented similarly; the following is the Tribe’s response: Section 209(b) of the Settlement Act prohibits the Secretary from allowing diversions of Truckee River water to the Newlands Project over those allowed under OCAP. This law must be followed. Allowing Donner Lake water to be diverted through federal facilities also would violate the Secretary’s trust responsibility to the Tribe as construed and applied in the decision in Pyramid Lake Paiute Tribe v. Morton. . .the agreements between the Tribe and Sierra include significant benefits to the Pyramid Lake fishery. The proposals to divert Donner Lake water through federal facilities for non-project purposes (including diversions to the Fernley Wildlife Management Area) only involved detriments to the Pyramid Lake fishery. There were no benefits. . .there are a number of legal issues involving TCID’s share of Donner Lake water which further complicate proposals to divert and utilize that water. Those issues include the question of whether those Donner Lake rights are appurtenant to the water right (sic) lands within the Truckee Division of the Newlands Project and, if so, whether they can be used elsewhere without the consent of those water right owners.

These comments adopt an inflexible legal position where the latitude for greater flexibility in interpreting requirements appears to exist. For example, one federal official interviewed suggested that an interpretation that OCAP applies only to Project water, and that private water could be handled differently. It is also worth noting that TROA itself gives cities flexibility to store water, a situation that would potentially increase Truckee River diversions, yet this effect is stated as the basis of denial for the irrigators proposals.

The comments are disturbing in that they also appear to make benefits to Pyramid Lake the *sine qua non* for all actions taken in the Truckee River Basin. The commentators do not cite significant impacts to Pyramid Lake, but only lack of benefits (perhaps because the amount of Donner water is relatively small). If benefits are to be the *sine qua non*, proposals which have other benefits, but no significant impacts to Pyramid Lake, would be nonetheless ruled out. Where such informal criteria may exist in western water management—and this report does not conclude that they do in fact exist on the Truckee Carson, but uses this case study to illustrate the point—the federal government has an opportunity to exercise the balancing role we recommend elsewhere in this study, to restore flexibility to all parties while protecting its trust responsibilities.

Irrigators Attempts to Participate in Basin Water Management.—The irrigators state that they made a number of proposals to use water in ways that they felt would ultimately benefit fish in Pyramid Lake and wildlife in the Truckee River Basin. They felt that these were ignored or rejected, but they could find little objective rationale for the acceptance of other parties' creative proposals while their own were rejected. Here, as elsewhere, we cannot judge whether the irrigators proposals were in fact better or worse than those made by others. This party to the negotiations continues to feel strongly that the process has been conducted in such a way that their attempts to participate and to exert an equitable influence over basin management have not been met with the kind of open mind accorded other players.

! One area of conflict concerns the use of Donner Lake water, described above. The irrigators claim that Donner water is not subject to OCAP, but can be sold to municipal purveyors, used to serve environmental values, or used for recharge, subject to Nevada state law. Federal agencies take the view that the water is subject to OCAP as well, inasmuch as the Orr Ditch Decree allows water to be used only to the extent needed to satisfy beneficial use, which the federal government argues is bounded by OCAP. Thus, Donner Lake water could be used to serve other uses in the Truckee Basin, but not diverted to serve such uses out of the basin. (Interior comments note that TCID sold some Donner water to a Reno-area golf course during the 1994 drought.)The OCAP and Donner Lake transfer issues are addressed elsewhere; here, we raise the issue to illustrate one of the situations in which the irrigators feel that, in a settlement process that has been characterized by creativity in

revisiting traditional water management practices, they have not been accorded a similar degree of flexibility.

Self-contradictory comments received from Interior on this point assert (1) that Donner Lake water could not be brought over in excess of amounts allowed under OCAP and (2) that “the question has never been whether Donner water is subject to OCAP.” The point remains that the importation of Donner Lake water were subordinated to OCAP and it is precisely this decision which the irrigators do question. Clearly, the commentator does not realize it, but these assertions could both be made at once only if the irrigators’ positions were so minimized as to dismiss the legitimacy of the questions they raise—a symptom of the finding of “exclusion” made in this study.

- ! An example of the kind of proposal made to use Donner water concerns the Fernley wildlife management area (FWMA). The FWMA was created by Newlands irrigators from a combination of surface flow and irrigation drain water. Loss of irrigation in the Truckee Division threatens this resource. The irrigators offered a proposal to help maintain this resource using Donner Lake water (see above), but were rejected. The reason given was that it would create an out-of-basin diversion over the OCAP limit, in violation of P.L. 101-618. Others saw this as a good faith gesture to offer water to environmental values by the irrigators, who had little else to gain from it. A State of Nevada participant observed “it was almost as if they did not want to let TCID do good things.”

Fish & Wildlife Service Response: the Service has been constant in its position that allowing diversions from the Truckee River in excess of that allowed under OCAP would be adverse to threatened and endangered species of Pyramid Lake, and to the riparian corridor of the lower Truckee River and its associated wildlife. The Service’s position is not new, but has been discussed on innumerable occasions and during meetings where debate and understanding has been encouraged. The loss of wetlands is being addressed through the Service’s water acquisition program to protect and maintain at least 25,000 acres of wetlands in Lahontan Valley. [Note: the Lahontan Valley wetlands water acquisition program does not address the Fernley Wildlife Management Area; it is not clear that FWS comment in that regard is meaningful.]

- ! In order to reduce the probability of spilling water at Lahontan Reservoir and to increase flows to Pyramid Lake, Reclamation proposed and TCID agreed to defer taking water TCID was allowed to take under OCAP in

November and December 1995, and allow it to flow to Pyramid Lake. In exchange an equal amount of credit water would be stored in Stampede Reservoir. If Lahontan Reservoir spilled, the credit water would be forfeited; if Lahontan did not spill, the credit water would be diverted to Lahontan later in the year. The proposal entailed a tradeoff of what appeared to be reasonable risks considering the relatively high probability of spilling at Lahontan. A small risk of having to use some water dedicated for cui-ui would be exchanged for an increased flow to Pyramid Lake. The federal (FWS) decision to disallow such a proposal is hard to reconcile, in that it would have benefitted the Tribe and Pyramid Lake levels, and would have kept more water in the Truckee River. TCID was willing to forgo water it would have been legally entitled to under OCAP. The irony is that, as pointed out above, the settlement is based on mutual risk-sharing, but in this case risk-sharing was refused the irrigators. The FWS response (summarized below) does not indicate that a decision to accept zero risk to cui-ui was based on comparative model runs or technical analysis on the impact such a decision would have on the survival of cui-ui. It does not candidly acknowledge that FWS does accept risk to cui-ui when using water stored in Stampede Reservoir for cottonwood regeneration in the Lower Truckee River and in the agreement allowing Sierra Pacific credit storage. Both are based on accepting essentially the same risk tradeoff that the FWS found unacceptable with respect to the Reclamation/TCID proposal. Again, it appears that the irrigators' attempt to participate in a solution that would better manage the Truckee River was met with inflexible policy (zero risk to cui-ui) rather than a risk-based decision clearly grounded in solid technical analysis. It appears that the federal government is more concerned with assuring that OCAP targets are not exceeded than it is with possible overdiversions from the Truckee River, which seems to be putting the cart before the horse. (The situation may be tested again, as the proposed Adjusted OCAP does provide for credit storage, but FWS policy remains a hurdle to exercising this provision.)

*Interior/Fish & Wildlife Service Response:*²²⁶ *The decision by Fish & Wildlife Service not to accept the exchange proposal was explained during a meeting in the Federal Water Master's office with TCID, Reclamation, Sierra Pacific and the Tribe, and in a letter to the editor of the Lahontan Valley News in reply to allegations raised in the column "Waterline."*

In November 1995, the Bureau of Reclamation proposed that December diversions to Lahontan Reservoir from the Truckee River as allowed under OCAP be foregone in exchange for an equal amount of water in Stampede

Reservoir (water reserved by court order for the conservation of threatened and endangered fishes of Pyramid Lake) to be reserved as “project credit water.” The purpose of the proposal was to reduce the chance that Lahontan Reservoir would spill during the following spring. If Lahontan Reservoir did not spill before the end of the next June, project credit water in Stampede would be released to Lahontan Reservoir, possibly in excess of the Lahontan storage limit prescribed by OCAP.

After carefully evaluating the proposal, the Service concluded that implementation of the proposal would not be in the best interest of the endangered cui-ui of Pyramid Lake. Although the proposal had the potential to reduce spills from Lahontan at no risk to the Project, it also could potentially cause less water to be available in the spring to supplement cui-ui spawning flows—the most critical time for the survival of ui-ui. Since Stampede storage is the only assured water supply for cui-ui, the Service must use it conservatively. Such an exchange would not have been in the best interest of cui-ui because it would have been trading spawning flows for lake elevation maintenance. The Service could not accept the risk the proposal imposed on water decreed by the courts for the survival of cui-ui.

- ! Similarly, the irrigators state that they made a proposal with respect to the Water Quality Agreement, suggesting conjunctive use of the irrigators water to serve both water quality and irrigation needs and avoiding a \$24 million expenditure otherwise required to purchase water rights. The proposed management scheme combined upstream storage with the ability to bring water through to the irrigators at critical times, subject to a 48-hour call. Again, this was rejected and it is not the purpose of this report to second-guess such decisions. The following comments explain the view of Interior and the Tribe as to why the irrigators’ proposal was less preferable than the settlement that was achieved:

Interior comments: While Interior had a significant interest in improving water quality through the Water Quality Settlement, its greatest interest was in increasing the quantity of water flowing into Pyramid Lake to help recover and protect the cui-ui. The metro area governments’ greatest interest was in water quality so as to avoid expensive modifications to their waste treatment plant. The settlement involved conjunctively using the water being purchased to accomplish both goals. Without the gain in water to Pyramid Lake, Interior would not have been willing to fund its part of the settlement.

TCID's conjunctive use proposal, in contrast, did nothing to increase flows to Pyramid Lake and would not have resolved the water quality problem in the Truckee River below Derby Dam. All of the additional water being held back in Truckee River reservoirs until the summer low-flow period under TCID's proposal would have been diverted at Derby Dam and would have left the lower Truckee River largely dewatered during the summer as it often is today. Because of this, it would not have solved the Pyramid Lake Tribe's water quality concern and the Tribe would not have been willing to qualify their authority to set water quality standards on the lower Truckee River to assure that the settlement agreement benefits to the metro area were not compromised. It also would not have solved the metro area problem except in the river stretch from Reno to Derby Dam. . . . On the other hand, the TCID proposal could improve water quality and instream flows in the river segment from Reno to Derby Dam and have a residual improvement effect on water quality on the remaining depleted river below Derby Dam. Coupled with the Settlement, it provides a useful gain beyond the great instream flow and water quality gains in the settlement. For that reason, Interior continues to be interested in pursuing such an arrangement in addition to the settlement. [Other commentators to the draft report also state that the irrigators' proposal does not provide the water quality flows needed below Derby Dam, but, as a supplemental to the Agreement, the proposal is beneficial and has been well received.]

It is not the purpose of the Truckee-Carson River Basin Study to go into a detailed comparative analysis of the benefits of the two competing proposals, but assuming the accuracy of the Interior comments (which are echoed by other commentators, such as the Tribe and Sierra Pacific), why has this remained an issue that "sticks in the irrigators' craw?" Various accounts of the steps taken to reach the Water Quality Agreement given by different parties, provide a possibly illuminating explanation:

Interior comments: The principles of the water quality settlement were worked out and discussed during the facilitated negotiations in 1994-95. A one-page presentation of those principles was provided to all parties to those negotiations (including TCID) in the last session in early March 1995. The final substantive negotiation for the settlement took place about a year later. A day or two later (and a year after having the set of principles in hand), a TCID representative at a TROA meeting suggested substituting their conjunctive use proposal for the settlement. It was indicated that Interior would not abrogate the agreement on the basis that agreement had just been reached, subject to clearance by principal. . . . Subsequently, a few minor wording changes were made and the settlement

was signed. . .the reason why the settlement approach was better than TCID's proposal was explained to the TCID representative by several participants at the table in the TROA session.

Fish & Wildlife Service: the Service did not support TCID's proposal to use Newlands Project water in place of the Water Quality Agreement because it would not benefit listed fishes of Pyramid Lake and would not improve riparian and water quality conditions in the lower Truckee River, as would the Water Quality Agreement. The Service, however, is supportive of TCID's proposal as a compliment to the Water Quality Agreement because it would improve instream flow, aquatic habitat, and water quality throughout much of the Truckee River upstream of Derby Dam. It would also increase recreational opportunities in upstream reservoirs and in the river. The Service's positions have been clearly explained in detail to TCID and others on numerous occasions.

Sierra Pacific comments also state that the original concept for the water quality settlement was developed during the second generation facilitated negotiations, which included the irrigators and that it did not deviate significantly from that concept in its final form. It is asserted that the detailed negotiations were in settlement of litigation, "which is customarily a private matter among litigants."

By contrast, the irrigators view is that the water quality settlement was worked out behind closed doors, in a meeting to which they were not invited. They protested in writing, and offered their own proposal. At that point Interior officials are quoted to have said that Interior would not abrogate the Water Quality Agreement; and this moment was understood by the irrigators to be then some months before the completion of the agreement, let alone signing.

It does not matter which account of events is "right;" indeed it is easy to see how all of them could be substantially "right" at once. The Interior commentary outlines a logical sequence of events, but clearly handles the irrigators not as a party who needed to be consulted, but as one who needed an explanation after a fundamental agreement had been reached. It may be quite correct as a matter of protocol to have excluded the irrigators from a litigation settlement negotiation to which they were not party. However, this sequence of events illustrates another instance in which the irrigators felt excluded from the give-and-take of the process. Feeling consistently rejected in their attempts to contribute positively to those solutions, it becomes difficult to maintain a "solutions orientation." Positions harden and litigation may be viewed as the only recourse. The

lesson to western water policy is once again to promote an inclusive approach, even if it means breaking minor precedent by bringing in a party with known interest but without formal standing in a final settlement of a litigated matter such as this.

- ! The irrigators also made proposals for facility improvements that they felt would save water, and again were frustrated in having them rejected. Their frustration was particularly acute in that, having paid off the cost of the Project and unable to qualify to have the federal government turn the Project over to them, they found the government unwilling to make improvements that were felt would save water to the general advantage. For example, the irrigators proposed to line the V-Line, saving water and using the investment value of that water to pay for the cost of conserving it. Interior and Tribe comments assert that the irrigators proposals were not economically practical. The responses do not provide sufficient detail to evaluate the comparative economics (although we note that the Interior response confuses the value of water with the value of water rights), nor was such detail sought from the irrigators. Again, the issue lies not in the details of the cost-benefit analysis, but in the handling of the proposal. Interior comments tie the willingness to appropriate funds to the irrigators' willingness to accept recoupment, a well-known non-starter, thus in effect scotching the discussion by linking it to terms that the proposing party must be expected to reject. The Tribe's response offers a variety of "complexities" which *precluded serious consideration of the proposal [such as] the problem of determining how much of any saved water from the Carson Division of the Project would accrue to the Truckee River and how much would accrue to the Carson River. Further clouding the picture was that these amounts could and probably would vary significantly from year to year.* However, these "problems" all arise with OCAP and have been disposed of in that regulation's implementation. To propose the same problems as barriers in this regard is merely to signal an unwillingness to negotiate. Here again the underlying dynamic is illustrated, providing an object lesson to western water policy.

Recoupment.—Recoupment of water diverted by TCID in violation of OCAP is sought in the amount of approximately one million acre-feet. In a situation where, if efficiency targets and water duties are both met, there is no surplus water with which to "pay off" recoupment requirements, it is difficult to see how the continued pursuit of recoupment pursuit serves the long-term interest of a larger solution. If this contradiction is acknowledged, then the recoupment action seems more punishing than problem-solving. In some respects, as discussed further below, despite its service of the laudable

goal of conservation, the continued pursuit of the “forced march to efficiency” represented by OCAP may have been one of the most negative tactics in which the federal government has engaged. The lesson of OCAP and recoupment appears to be that processes so “heavy on the stick and light on the carrot” are likely only to increase levels of conflict and exacerbate the difficulty of reaching overall acceptable solutions in western water policy.

Summary.—Thus, notwithstanding the “cooperation and consensus” trend that is said to have characterized the settlement negotiations, it appears that the negotiated settlement has included a subtext of sustained attack on the Newlands irrigators which may have undermined what otherwise might have been possible agreements that could have included them. The irrigators themselves felt that they were close to achieving agreement in the so-called facilitated negotiations, but ultimately did not feel enough security to conclude the agreement. What made them feel that they could not agree may have been rhetoric as much as substance. There is something of Israel and Palestine in this; the lack of security felt by irrigators in their property rights under a negotiated settlement stemmed from very pointed rhetoric which implied (or sometimes stated in so many words) that they had no right to exist at all. Such characterizations were made as that they were “stealing water.” They felt blamed for all of the environmental ills in the basins and the failures of the federal government to make good on promises to the tribes over a century or more, but did not see enough evidence that federal agencies or the tribes themselves were taking responsibility for their share in creating the problems at hand.

One might say that this interest group should have been able to rise above such rhetoric, but the point is that they did not, it was very apparent that they would not, and yet words were chosen that could not but be expected to drive them further away from agreement rather than bring them into the circle of consensus. On the one hand, such word choice may reflect only the heat of battle. On the other, it has served to raise questions in the minds of the irrigators as to the sincerity of negotiations. From their point of view, they were forced from the game and then accused of refusing to play. Certainly, they perceived a lack of sincere intent to negotiate with them on the part of the other parties in the process, they did observe that they had a genuine influence on its outcomes, and they doubted that there was a genuine commitment to conclude an agreement with them.

Whether or not the irrigators’ positions were the right ones or their proposals were reasonable, the point is that the structure and conduct of the negotiations did not serve to include them and bring them to workable

solutions with the other parties. It is too easy to simply blame the excluded party for this; a more balanced assessment suggests that other parties to the negotiated settlement and the federal government in particular from time to time lost sight of larger objectives and gave in to the temptation of reaching partial solutions through excluding and scapegoating a key player.

The irrigators have become the one significant exception to the “cooperate and negotiate trend” that led to settlement in the Truckee-Carson basins, and provide an example of what can happen to an important stakeholder when other parties cooperate and negotiate a solution in which they are not willing participants. Notwithstanding, irrigated agriculture remains the player at the table with the most (water) to contribute. Whether they voluntarily left or were forced from the Settlement Act negotiations, irrigated agriculture has been effectively by-passed in terms of influence and control. The irrigators’ position is now fraught with irony—they find themselves rejected today in their attempt to defend a water budget which they themselves had rejected as insufficient in earlier negotiations.

Rural Communities.—As an addendum to this section, it is important not to oversimplify in characterizing the situation as irrigation interests versus tribes, environment and municipal use. In fact, in addition to the irrigators, rural communities and others in the area are affected by the changes contained in the Settlement Agreement. The Lahontan Valley Environmental Alliance tried unsuccessfully to bring them to speak with one voice, but the diversity may have been too great. It is worth noting that, while farmers may ultimately decide to sell and leave, the existing rural communities have no such option.

Indeed, the City of Fallon wrote in response to the draft report, that in their view, “the Act [P.L. 101-618], as it is being implemented, destabilizes the communities on the Carson River side, not only those in the Newlands Project but the entire watershed to its headwaters. . . destabilization and further litigation will likely result.” The Fallon letter shares many of the concerns expressed by Newlands irrigators with regard to effects of settlement implementation on existing water rights and subsequent consequences to affected rural communities. In addition to central concerns regarding the potential effects of the settlement implementation on the City’s drinking water supply, the City indicates that the implementation of P.L. 101-618 goes beyond the understanding that they, at least, had at the time of agreement both in terms of the scope of actions being undertaken under its name and in terms of its effects on water rights and water use. They also hold that minimally required consultation with local interests was not carried out,

particularly with regard to NEPA requirements (see discussion of the lawsuit seeking a Programmatic EIS above).

The City of Fallon's comment letter noted the frustration experienced over a decade in trying to educate the federal government and the general public as to the differences in the duties and activities of the City versus TCID. They state that "casting TCID in [the] capacity [of representing the community] has worked extremely well for the interests. . .who would like to take water from the residents and citizens of the counties of Churchill and Lyon, the City of Fallon and the Town of Fernley, and redistribute it upstream for growth and mitigation for that growth."

Newlands Spokesperson

Newlands water rights are owned by 4,000 individual farmers. Getting agreement from so large a group has proved elusive. According to others involved in the process, parties negotiating on the irrigators' behalf have more than once been unable to deliver when it appeared that an agreement was within reach. Other parties involved have expressed frustration with this and note that, until one party is given legitimate authority to negotiate for this group, it may not be possible to bring them into a final settlement. One commentator to the draft report suggested that some parties hold the view that TCID used their grassroots process as a stalling technique.

Historical context helps clarify the situation. Up until the mid-1980s, TCID largely handled matters on behalf of the irrigators. At about that time, more individual irrigators began to involve themselves in the water controversies and settlement issues, and matters proceeded toward a potential lawsuit between the individual irrigators and the District over the protection of property rights. This led to the creation of the Newlands Water Protective Association.

The decision-making process employed by TCID and the Newlands irrigators has been to hold a referendum vote among Newlands water rights holders when an agreement has needed to be concluded or a position defined. This procedure was used in accepting the original Truckee River Agreement, and the irrigators feel it must be respected in making future decisions affecting river operations and water rights.

This has been a time-consuming and uncertain procedure which some have felt has not worked well within a pressured, deadline-driven negotiating process. As the larger process unfolded, it was felt that there was not enough

time allowed for the irrigators to work through the kind of grassroots process that they needed to achieve consensus regarding the issues on the table. Given that the settlement process has, to date, taken roughly a century to unfold, it seems that allowance could be made to accommodate this need by an important party to the process. One commentator (City of Fallon) on the draft report states “even if the TCID could represent the owners of water rights, it would have no authority to bargain, negotiate or barter those individuals’ water rights without the consent of every holder of such rights. This is simply a legal prerequisite to dealing with individuals ownership of real property.”

The Pyramid Lake Paiute Tribe, another key player in the negotiations, also requires a referendum vote of tribal members to affirm its decisions. A key difference between the course taken by the tribe and that of the irrigators may be that in the tribe’s case, a Tribal Referendum was taken early on (1992) in the negotiated settlement process that, together with Tribal Council approval, established a negotiating position and empowered spokesperson(s) for the tribe, so that each element of the negotiating process did not have to be returned to the full vote of the tribe. Such a strategy might ultimately better serve the irrigators as well.

Negotiating Strategy

Part of the problem in reaching a positive accord may have been that the irrigators have not had a workable negotiating strategy. As was noted in the Phase I report, this was a criticism levied by some other participants in the process. However, upon further investigation it was determined that the irrigators were advised by a very knowledgeable senior water consultant whose reputation and track record make it unlikely that there was a lack of good advice on negotiating tactics and strategic planning. Nevertheless, no matter the quality of the advice the irrigators may have been getting, still more participants interviewed during the second phase of work echoed the view that there appeared to be some difficulty in grasping the complexity of the Truckee-Carson system and in accepting the need for developing a compromise position.

Again, the success of the Pyramid Lake Paiute Tribe in navigating the settlement process provides instructive counterpoint. According to a presentation by Joe Ely, past tribal chairman, the Tribe suffered from a public perception of being unstable and indecisive. Two key steps were taken to overcome this problem and other obstacles, that opened the way toward the realignment in the balance of power regarding water allocations

described earlier in this report. First, as noted above, the Tribe established a negotiating position and convinced other parties and the public of its willingness to settle water issues by negotiating at any time with anyone. Second, the Tribe took a decisive step by negotiating directly and independently with Sierra Pacific, leading to the breakthrough Preliminary Settlement Agreement.²²⁷ In both convincing other parties of its willingness to settle water issues and in negotiating directly with major contenders in the Truckee-Carson basins, the irrigators strategy has lagged behind the Tribe's. Both remain significant challenges not yet surmounted by the irrigators.

There is also the question of the degree to which the irrigators have been painted as unsophisticated to serve the ends of those who would benefit by simply dismissing them and their ideas out of hand. It was often commented, however, that an increased sophistication and awareness on the part of the irrigators has been noted over the years. Comments received from the irrigation community in response to the draft report state "We do understand the environmental, tribal and municipal issues but we do not feel that it serves justice to force one small community to pay for all of these perceived social injustices. . ."

The irrigators' basic negotiating objective as articulated by TCID was to keep their water rights whole. To their opposition, "good negotiating" consisted of their agreeing to give up water. The strategy faced by the irrigators was, in their view, twofold: (1) opposition to any solution in which farmers retained control of water rights, and (2) an attempt to put all water under OCAP, with an absolute upper limit on use. This insight into their opposition's strategy does not suggest a lack of sophistication.

On the other hand, the irrigators perception that the strategy of their opponents was to attack from many sides at once may be more a reflection of how a multi-dimensional resource conflict would appear to the party whose water is at stake when the others seem to have banded together in favor of a solution to which they cannot agree.

An important lesson here is that although a lack of success in negotiating effectively on the part of any key player (such as the irrigators) may afford rich opportunities for other players to take advantage, it cannot be in the overall best interests of a solution. Again, the federal government may be uniquely positioned to provide balance.

The "Takings" Issue

A part of the debate centers on the larger issue of federal “taking” of individual property rights, an issue which is being debated throughout the West today in many places and with respect to many different kinds of resources. The Newlands irrigators feel that the taking of property rights is as central an issue as endangered fish or tribal trust responsibilities, and that federal actions undertaken to meet the latter responsibilities have amounted to a taking of private property without due compensation.

To deal with this issue in depth is beyond the Truckee-Carson River Basin case study, but suffice it to say that a range of sophistication may have been displayed both among individuals and over time. It appears that today, most irrigators understand that ownership right is defined by water demonstrably put to beneficial use and not the face value of paper rights, although in the past there may have been confusion by some members of the irrigator community on this point.

The issue has a long history, as is the case with most Truckee-Carson water problems. For some time, the federal government took the position that water rights belonged to the federal government, while property owners held that water rights were appurtenant to the land and, as such, constituted private property. This was pursued to the United States Supreme Court in 1983, when that court upheld, in *Nevada versus the United States*, that the beneficial interest in these water rights belong to the individual property owner: “the beneficial interest in the rights confirmed to the Government resided in the owners of the land within the Project to which these water rights became appurtenant upon the application of Project water to the land.” In this context, irrigators believe that the pursuit of OCAP, recoupment, and other actions which result in reducing diversions at Derby Dam constitute a taking of decreed water that the Supreme Court has ruled belongs to the Project’s private property owners.

Failure to achieve OCAP standards results in penalties which the irrigators view as forced decreased diversions that constitute “takings.” In another example, the negotiation between the Tribe and Sierra Pacific which reduced Floriston Rates is considered to have overlooked the irrigators significant and valuable interests in maintaining those releases to meet agricultural needs. The irrigators have argued that lowering the Floriston Rates will result in reduction of the amount of divertable water at Derby Dam, a reduction in carryover storage in Lahontan Reservoir, and the promotion of drought conditions. A federal duty to have protected those rights is cited, and negotiations for “remanagement” of water or storage without their involvement is considered inappropriate.

However, commentators to the draft report point out that Floriston Rates can only be reduced under the PSA, Settlement Act, or TROA when other water rights are not being called upon, which they hold provides a built-in protection for TCID. This is reinforced by Section 28 of the PSA, which provides mitigation if there should be inadvertent impairment of another party's water rights. Other commentators argue that reduced Floriston Rates would not reduce the amount of water available at Derby Dam for diversion through the Truckee Canal under OCAP at all. They state that Floriston Rates would only be reduced by the amount of water that would have flowed past Derby Dam into Pyramid Lake, and by the consumptive use portion of water rights (served by Floriston Rates) acquired by Sierra Pacific. Thus, among the non-irrigation parties there is some difference of understanding on this point.

Among the federal actions most prominently considered by the irrigators to have been used in “takings” are the Endangered Species Act and OCAP. In addition, irrigators felt that threats were used in attempts to force their relinquishment of rights. For example, they felt that they were asked to hand over their rights to Donner Lake water under threat of litigation and recoupment.

The irrigators say that they asked Reclamation why they did not just condemn the project, and were given to understand that the federal government could afford neither the price nor the publicity. Thus, the perception has grown that the federal government is killing off the project slowly through the use of tribal and environmental laws. Claims on behalf of these public resource values are seen as, in essence, a cover for condemnation.

Interestingly, an interview with the Tribe's attorney raised the issue of condemnation as a potentially “hard choice” which the federal government may have to confront in such situation. An example was given of the “Thirty-One Corporation” property, served by the Newlands Project, which is said to have 200 acre-foot water right but which is said to require the release of 5,800 acre-feet of water to deliver the water right (due to conveyance losses, etc.). The point made by the Tribe's attorney is that, although this is a valid water right, if the irrigators gave in on such egregious examples of water waste, a more positive negotiation atmosphere would be created. Other irrigators and the TCID would probably respond that they have no right to bargain away the Thirty-One Corporation's water right (or anyone else's), unless that party agreed to terms to retire it. Claiming to have identified some 85,000 acre-feet of water believed to be capable of being saved by retiring about 9,500 acre-feet of rights (these numbers could not be independently verified), the Tribe's attorney suggested that the hard choice

that must be faced is to consider the exercise of condemnation in such situations, given that years of negotiation have not produced a solution and assuming that a reasonable buyout is offered and refused.

From another perspective, the irrigators have already successfully protected their decreed rights against a readjudication, but the “use it or lose it” philosophy of western water law and the legal and financial incentives provided by the federal government makes the property rights strategy difficult to use. A water right depends on the constant application of water to a beneficial use, and thus the precise extent of many individual water rights is unknown (and may be less than claimed or perceived to be). This issue is not unique to the Truckee-Carson, but is true throughout the west.

Not only do appropriative water rights not always correspond to the users’ expectations based on irrigation practices or paper entitlements, but appropriative rights are not conducive to the maintenance of a community of users when external economic pressures create counter incentives. The property rights strategy assumes that all water rights holders have common and unchanging objectives. However, the economic and social incentives for continued farming in the area vary among the water users, and users may be expected to take increasing advantage of opportunities to participate in the new water transfer markets.

It also should be noted that agriculture has done comparatively well in the Truckee-Carson basins as compared to other areas where water was involuntarily surrendered to satisfy environmental restoration priorities (e.g., in Mono Lake, the California Central Valley Project, or the Kesterson remediation). Further, it should be kept in mind that while TCID’s position (and that of farmers who wish to continue to farm) may be relatively weak, those individual farmers who sell water or water rights may come out quite well. In fact, it has been argued that the best approach for TCID would be to stop fighting water purchases. In this, they sometimes oppose their own members. From this perspective, it may be better for the District to work toward creating a genuine open water market, where that the selling price is the “fair market value.”

Perhaps the most telling comment with respect to the takings issue is the observation that negotiations need to focus on interests, rather than rights. So long as parties remain narrowly focused on rights, little movement is possible. When they see how their *interests* may be served by compromise, then solutions can be achieved. This perspective needs to be broadened in one

respect, however. Until a party's legitimate rights are acknowledged, it is rare that they will be able to move forward to consider their wider interests.

Facilitating a Positive, Proactive Role

Level Playing Field.—One of the most widely expressed opinions we heard was that the single most important step that could be made to rein-volve the irrigators in a positive, proactive way would be to simply level the playing field. The federal government has enormous resources and, particularly where legal disputes are carried on over long periods at great expense, federal involvement on one side of an issue or another can skew the balance. Here is a sampling of the various ways in which this view was phrased:

- ! “Simply by taking one side or another, federal involvement may actually make it less likely that the best settlement will be achieved.”
- ! “Where the weight of the federal government swings, there the winner sits.”
- ! “Commitment of such vast resources to the fray means that it will not be a fair fight.”

Without a doubt, for decades, the weight of the government has heavily favored Reclamation and irrigators. Recently, it has swung to favor the side of the tribes and the environment. More than one federal official (and many others) noted both positions are equally wrong.

Many federal officials who work or have worked in the Truckee-Carson River Basins are acutely aware of this effect. One stated “the federal government is coming down on one side, but the role of the federal government should be to *equalize*.” As noted above, State of Nevada officials also feel that the federal government is maintaining a playing field that leans toward the Tribes and environment, and against the irrigators. On the other hand, when the Tribe's attorney was asked whether it was appropriate for the federal government to set a price in the form of benefits to Pyramid Lake on the irrigators' opportunity to participate in TROA upstream storage, he replied, “yes, because federal policy for so long favored and subsidized reclamation interests for so long.”

The Effect of the Bureau of Reclamation's New Mission.—This imbalance is due in part to the changing mission of the Bureau of Reclamation, which has compelled employees of that agency to achieve an appreciation of the balance of interests at work in the larger picture of the Truckee-Carson River Basins. Federal leadership should be applauded for the shift it has effected toward recognizing and protecting neglected environmental values and tribal interests. But, because Reclamation has come further in balancing priorities to a degree that does not always characterize the actions of other key agencies—who vigorously pursue their interests more narrowly—the net effect is to dilute federal vigor in representing one side of the picture (reclamation) while leaving it undiluted and puissant for others (tribes, environment). The achievement in restoring federal support for tribes and environment does not excuse a slip in looking after equally legitimate reclamation responsibilities.

One person with whom we spoke felt that “Reclamation has been put under somebody’s thumb and silenced. It is now politically incorrect for Reclamation to represent the irrigators—indeed, it has been made clear that Reclamation *will not* represent their former constituency.”

The irrigators certainly perceive these dynamics at work. They feel that Interior has shifted from promoting reclamation goals and the success of the Newlands project, to advocacy of tribal trust and environmental values. The consistency with which the tribal position is favored by the federal government suggests, in the eyes of both state and local government as well as the irrigators, a bias. (It is important to note that in identifying that the pendulum may have swung too far, we are not arguing against the shift in social values characteristic of the west today, nor the shift in the federal role to accommodate this change, nor are we implying that a return to previous imbalance in favor of reclamation should be effected.)

As the new Reclamation mission has been implemented, irrigators have felt abandoned by their traditional ally and mentor, and have felt that they have become second-class citizens among water users. Reclamation in turn has found itself in an awkward position, with the mandate that it undergo a “sea change” in attitude and take on a new mission. Reclamation officials interviewed sympathized with the irrigators and felt a sense of responsibility for the Newlands Project, coupled with a recognition of constraints on their ability to support the Project in ways that were previously routine.

Reclamation managers interviewed clearly understand the mandate that Interior speak with one voice (discussed further below). As one put it, “there

is an agenda and that agenda is to favor the tribes.” In such circumstances, it is not possible for Reclamation to act unilaterally to level the playing field. Rather Reclamation of necessity has become the agent required to carry out many of the measures decided by Interior and Justice to reallocate water from reclamation purposes to the now-favored tribal trust and environmental goals. Some of these actions have been experienced as punitive by the irrigators and, coming from an old ally, the wedge of alienation was perhaps driven deeper than it might have been had the initiatives been spearheaded by another entity who shared less common history with the irrigators.

In some instances, in reference to the various proposals which the irrigators have put forth themselves as discussed above, Reclamation appears to have been prevented from responding more positively to the irrigators’ initiatives. One senior Reclamation official stated that the agency could have, for example, provided the resources for efficiency improvements, but was directed not to because “that would perpetuate the Project.” This would suggest that, notwithstanding the stated goal of maintaining a viable agricultural community, other agendas may be operating which have not been made explicit outside federal circles.

It should be noted, however, that a number of key issues such as OCAP, which date to 1973, and the fight over water transfer invalidation, which has been dragging on for 13 years, precede the “new Bureau of Reclamation” by many years, suggesting instead a scenario more along the lines of a frustrated and angry parent taking ever more forceful action to try to force a recalcitrant child to toe the line. Thus for example, senior Interior negotiators express the frustration that Interior has had an extremely difficult time over the entire period of dealing with the irrigators on Newlands water conservation (OCAP) issues.

This analogy may be apt in that, just as a frustrated parent may sometimes strike out, so frustration here seems to have spilled over at times into actions designed more to punish than to solve problems. One water engineer (neither a federal employee nor involved on the side of one of the major contenders) characterized the situation as one in which “Interior regards TCID with disdain because of their view that the irrigators overdiverted and applied water to non-righted land.” Where events have gone that far, the advantage of the years of experience which senior federal negotiators and agency officials may bring to the table may be less important than the need for a fresh perspective, untainted by the frustrations of years past. One senior federal official who has moved on in his career from the Truckee-Carson, looking back, felt that some people have been involved too long and

have set opinions and attitudes. Not surprisingly, those senior officials with the longest involvement feel the opposite.

The Decision to Speak with “One Voice”.—The history of the Truckee-Carson settlement helps make clear how events have proceeded to create such perceptions on the part of some senior, local federal officials in the Truckee-Carson River Basins. As related by senior Interior officials who have long been involved in the settlement, throughout the 1980s Interior had trouble coming to grips with Truckee-Carson issues, including the conflict between tribes, irrigators, and the environment. In February 1990, Senator Bradley held a hearing on proposed settlement legislation at which three Interior Assistant Secretaries (covering tribes, reclamation and fish and wildlife) were not coordinated, expressed differences of opinion, and sought to go in different directions. (It is worth noting that sources who were involved in the Truckee-Carson debate at the time note that these differences involved opposition to settlement based on the feeling that Newlands’ interests were not being adequately protected—just as Washington had opposed the California-Nevada interstate compact because it did not protect tribal interests.) The political fallout was reported to be intense and immediate. One highly-placed Washington source termed the hearing a “first-order disaster” in having given the appearance of a failure of the Assistant Secretaries to work as a team. Marching orders were issued that, henceforth, Interior would speak with one voice in the Truckee-Carson River Basins.

Senior Interior personnel assigned to the matter felt that the main problem was in clarifying goals. The twin pillars for resolution were to be (1) the Preliminary Settlement Agreement (PSA, see discussion in Chapter 2) worked out between Sierra Pacific and the Tribe, and (2) the California-Nevada interstate compact. A third major goal was to tie in environmental interests through Section 206 of the Settlement Act, to restore Lahontan Valley wetlands (this, and not Pyramid Lake, which the Tribe was looking after, was felt to be the primary concern of the environmental community). Along the way, a federal strategy was laid out to make some money on Stampede Reservoir by charging to store water for drought protection (under the then existing PSA). Notably, nowhere in these primary objectives does representation of the interests of the Newlands Project irrigators appear. Even more fundamentally, nowhere in the stated purposes of P.L. 101-618 are the interests of the irrigation communities elevated to be coequal with the other major interests in the basins, which are given notice there (other than passing reference among the list of purposes for operation of federal reclamation facilities in the basin).

Interior responds: it should be pointed out that the Newlands Irrigation Project already had its authorizing legislation in place and didn't need further legislation. it should also be pointed out that Sections 205(a)(2)(D), 209(b)(2), and 210(b)(13) are in the legislation specifically to protect Newlands Project irrigators and other water rights holders on the two river systems, and Sections 206(a)(2)(A), 206(a)(3)(B) and (C), and 207(c)(2) and (4) are specifically in the act to protect irrigation interests with regard to the authorized water right acquisition programs.

It must be appreciated that the numerous federal voices speaking prior to this direction were a source of frustration to the local community and that the “one-voice” achievement (including the Truckee-Carson Coordination Office) has been largely praised and welcomed. However, some of the federal officials interviewed see the direction to speak with one voice as having gone *too far*. These individuals argue instead that there has not been enough opportunity for the various agencies to vigorously articulate the interests they represent before the ultimate decision-makers, who would then perform the balancing function from the vantage of being fully and effectively informed. Such a solution to the conflicts which are inherent in western water management may be more appropriate than a mandate to speak with one voice. It may be too easy for such a mandate to become, in effect, a muzzle on one side of the issue, leading to a playing field seriously out of level.

One official stationed in the Truckee-Carson River basins gave an example (from another river basin) in which a veteran public relations consultant counseled after a rocky hearing that the various federal agencies involved were trying to be *too* uniform. Under such circumstances, their constituencies no longer believed them and, more important, no longer believed that their own voices were being heard or their interests represented. Thus, they believed that their only choice was litigation. Similarly, the irrigators feel that their fallback position is to litigate (or, ultimately, to sell).

In fairness, it must be noted that the federal government is in something of a double-bind here, on the one hand being chastised for expressing the internal contradictions inherent to the situation and on the other for forcing a reconciliation of them. However, the “one-voice” solution did not remove politics from the decision-making, but left some parties feeling that the federal position had become too politicized to make negotiation meaningful. It is telling that the attorney for one party (not one of the major contenders) is quoted to the effect that the only opportunity for a fair, unbiased, apolitical

hearing may be in the courts. Where such feelings become widely held, western river basins can look forward to becoming tied up in decades of litigation.

Upstream Storage.—One area in which the playing field may be out of level is in respect to the right to participate in upstream storage and exchange agreements on the Truckee River. Senior officials with both Reclamation and the State of Nevada question the value (as well as the validity) of denying the irrigators' request for use of Donner water in this respect. They felt that the amount of water involved does not justify "drawing a line in the sand." More fundamentally, they believe that upstream storage for irrigators would significantly advance a solution. They see the intransigence of other parties on this issue as particularly ironic, because such an arrangement could actually benefit both the Reno/Sparks area and Pyramid Lake.

For example, water sent to Lahontan Reservoir (as required) was spilled in the January 1997 flood. Allowing TCID to hold water upstream on the Truckee side to the last possible moment while waiting to see how the water year develops is a win-win opportunity, because it would allow any water that would have been spilled at Lahontan to go to Pyramid Lake. This opportunity is actually taken advantage of under the proposed Adjusted OCAP, but without any consideration given to the irrigators for the benefit it provides. Such tradeoffs as allowing the irrigators to use the proposed credit storage to offset deficits incurred through Project operations less efficient than targeted would seem to be more in line with the win-win flexibility afforded other system users under the TROA to bargain their needs for upstream storage in ways that generally benefit all parties. If such credits were allowed, perhaps irrigators could meet their OCAP target. The point for policy is not only that, in a system generally open for tradeoffs, opportunities should be open to all, but more fundamentally that taking a benefit without offering a tradeoff benefit (other than to assure that the status quo with respect to Project water use) is only likely to generate resentment and entrenched opposition.

Again, the purpose here is not to advance a recommendation for the Truckee-Carson, but to suggest how, as a case study, the Truckee-Carson example indicates an important lesson for western water policy. The concepts of storage and exchange of credit water are often cited as one of the most important lessons learned in the Truckee-Carson basin. Considered in the context of the irrigators needs, the further lesson suggested here is that where a river basin is opened to such new and innovative practice, all major players should be actively encouraged and given opportunities to participate

in the advantages conferred to the full extent allowed by applicable law and regulation.

Interior responds: these issues are still under discussion in the TROA context. For instance, Truckee Division, Carson Division, Donner and water quality conjunctive use are all potentially viable options so long as the storage does not include carryover storage and the OCAP are adhered to. . .TCID's proposal for Carson Division storage, however, currently insists that the storage be above OCAP levels, that it include carryover storage, and that its storage be senior to everyone else's credit water. There is no mandatory signatory party at the table willing to accept that arrangement. . .

The Tribe responds: from the Tribe's standpoint, there are three obstacles to providing TCID with credit storage under TROA. First, as previously noted, credit storage in federal reservoirs has carried a price in the form of benefits to the Pyramid Lake fishery. That was true of the original credit storage arrangement with Sierra under the PSA and it has been carried forward to the other credit storage provisions included in TROA.²²⁸ The Tribe sees no reason for treating TCID differently in this regard. Indeed, if TCID were treated differently, Sierra, California, Reno, Sparks, Washoe County and other parties might very well seek to renegotiate the terms and conditions of their credit storage arrangements.

Second, the Tribe, the federal government and Sierra have insisted that all entities who receive storage benefits under TROA must sign TROA, relinquish any claims they have that are adverse to TROA and agree not to challenge TROA or to support someone else's challenge to TROA. In the case of TCID, among other things, that would mean that TCID would have to withdraw its application for Truckee River "unappropriated" water since the Settlement Act provides (in Section 210(a)(2)(B)) that TROA cannot take effect until the Tribe's claim to that water is resolved in a manner satisfactory to the Tribe and Nevada. TCID has not shown any willingness to agree to this condition.

Third, the Tribe is unwilling to give up the enormously important OCAP gains for which it fought so long and so hard. TCID, on the other hand, seems to link its approval of TROA to a significant weakening (or perhaps even the elimination) of OCAP.

Positive Steps.—The following suggestions identify some ways in which the federal government could act in similar situations to opening the way for a positive, proactive involvement of the agricultural community by leveling the

playing field (some of these revisit some of the driving forces which have alienated the irrigators, as discussed above):

- ! The parameters of discussion must be drawn so that true negotiations can occur. As one veteran of the process put it, true negotiations cannot occur unless each party has something to gain and something to give. In the Truckee-Carson example, several of those interviewed (not irrigators) felt that the irrigators have been placed in the position of “everything to give and nothing to gain.”

- ! A line needs to be drawn to indicate where and when the federal government will have met (or has met) its tribal trust and endangered species recovery responsibilities. Where such measures as OCAP are implemented in a continually increasing incremental fashion to meet such responsibilities, the federal government needs to anticipate and answer up front such questions as “Where does the trust responsibility end?” (For example, in this situation, does the federal government share the Tribe’s goal of eliminating Derby Dam?) “Are such measures being implemented to get more water for these goals without having to purchase it?”

We suggest that the federal government should strongly consider drawing such lines so as to keep federal agencies and tribes out of micro-managing the day-to-day operations of its reclamation Projects. In the Truckee-Carson case, for example, that might entail delimiting jurisdiction to end at Derby Dam.

Fish & Wildlife Service Response: the Service has “drawn” the “line” for delisting cui-ui and Lahontan cutthroat trout in the form of recovery objectives as stated in each species recovery plan. These plans are not “set in concrete” but are periodically updated or revised as necessary to respond to new information about the species and changing environmental conditions. [Note: in terms of the irrigators concerns, this response does not address the critical question of providing certainty as to how much water this means.]

- ! Once fundamental responsibilities, such as tribal trust and endangered species recovery have been defined, it may be that the United States needs to step out of the fray and let the participants who have fundamentally differing interests negotiate any further changes among themselves. In the Truckee-Carson, experienced veterans of the Settlement negotiations observed more than once that the real issues lie between the Tribe and the irrigators, and that a true and final settlement

will never be reached unless and until these two parties sit down and negotiate it together. This model was followed by the Tribe with the Sierra Pacific Power Company and has become a foundation for the entire Settlement agreement.

Some federal officials and others question whether a lack of trust for the federal government may exist such that it may be difficult at the table when solutions are negotiated. Such a suggestion is sure to be equally difficult for well-intentioned civil servants who have labored long and hard in the service of larger objectives.

The federal government is here again in a double bind, as it must see to its various resource and facility management responsibilities. Nevertheless, the precedent has been set in which key participants negotiating without federal presence were able to achieve the breakthrough Preliminary Settlement Agreement between the Tribe and Sierra Pacific. If several such agreements are being negotiated separately, some neutral third party needs to monitor potential conflicts among the various agreements.

It should be noted as well that some federal representatives have achieved the trust of all sides. Perhaps it is the rarity of such individuals that limits the speed with which solutions can be achieved. Where such an achievement is made, the federal government should hesitate before moving such individuals on to new assignments while the outcome remains in the balance.

! If the federal government is constrained from stepping back from the fray, then the playing field might be leveled by committing a more equal amount of support to all sides in the negotiation. This is compatible with the suggestion made elsewhere that the various agencies of the federal government, rather than seeking “one voice,” each vigorously represent their interests before larger decision-makers, so that the debate is transparent, open to public view, and all sides are assured that they are heard and well-represented. In the Truckee-Carson case, both legal and technical assistance appears to have been provided in far greater quantity recently to the tribal and environmental interests at the table than to the reclamation side.

Recognition of Larger Forces at Work.—A final prerequisite to proceed toward a proactive settlement that includes the irrigators in a positive way is for the irrigators themselves to see the larger forces at work. As discussed above, these include the shift away from historical federal support for reclamation (and the larger objective of settling the West), and the

corresponding contemporary shift in cultural values toward remedying past inequities toward Native American tribes and toward environmental protection or restoration. Interviews with the irrigators indicate that their leaders, at least, certainly do recognize these processes.

Indeed, this is so much the case that they suggest that some redress of past inequities would be fair and justifiable. However, they add that such remediation cannot go so far as to simply return the situation to its pristine condition. As one state official put it, "Irrigators have slowly, bitterly, but finally recognized the change in the world around them and accepted it. They have succeeded in a very difficult change of attitude and perspective."

4.4 Water Management: TROA, OCAP and the Negotiated Settlement

This issues falling under this broad heading have been cast in such a way as to allow a family of related issues to be treated together. The negotiated settlement has profoundly affected the Truckee-Carson river basins both through its mandates with regard to a key existing regulation affecting diversion between the two basins (OCAP) and in its establishing the basis to work out a new framework for operating the "source basin" (TROA). A number of aspects of the negotiated settlement with respect to these two central water management initiatives are addressed here.

TROA

Evaluation of the TROA has been hindered by the inability to obtain a copy of the draft TROA for review. Many of the provisions of P.L. 101-618 depend upon the agreement of the parties to the settlement on TROA and its entering into effect. Additionally, much of the innovative consensus-building that has resulted in overall workable solutions from the perspective of most of the parties to the settlement, including water storage credits and exchanges and more flexible river operations to the benefit of tribal and fishery values, all depend upon the TROA.

The TROA is the centerpiece of Settlement Act implementation. Under negotiation for an extended period, it is nearing completion but is not yet signed. If the TROA is not signed by the required parties, the entire settlement is made much more uncertain. As described above, in order for TROA to enter into effect, it must be signed by the States of Nevada and California, the Secretary of Interior, Sierra Pacific Power Company, and the Pyramid Lake Paiute Tribe (the latter two signatories are required as a

function of the Preliminary Settlement Agreement). The TROA also has to be approved by both the Orr Ditch and Truckee River General Agreement courts.

At this time, the TROA is nearly complete, with most of the required and optional signatories appearing to be inclined to sign the agreement. Among the latter, TCID stands out as the most uncertain signatory. TCID will be given the opportunity to sign the TROA and the required signatories would like to have TCID on board. TCID representatives continue to attend TROA negotiating sessions. However, TCID may choose not to sign the TROA if they find their interests are not well served by doing so. For example, once the TROA is in effect, none of the signatory parties may challenge any of its provisions in court. TCID may want to keep its option open to do so. Moreover, TCID may ultimately challenge the constitutional validity of portions of the Settlement Act. TCID also believes that, as a signatory to the Truckee River Agreement, it ought to be a required signatory to TROA.

Also, the State of California recently notified the TROA committee that, “despite considerable efforts made over the recent months, California cannot approve a draft Truckee River Operating Agreement. . .until several significant remaining issues affecting California are resolved.” These include the “definition of diversion” issue, on which California submitted proposed language, which was rejected. California states that “we believe that representatives of the Pyramid Lake Paiute Tribe and Sierra Pacific Power Company are attempting to limit the use of California’s allocation beyond what is specified in P.L. 101-618, and this is unacceptable.” Apparently, other parties to TROA characterize the issue as one of “accounting.”

California went on to note that “every unsettled issue is, to at least one major interest on one side of the border or the other, a critical issue. . .[and accordingly, California will not approve a TROA to accompany the Draft EIS/EIR until these unsettled issues (in addition to the “definition of diversion”), the “water well,” “mid-course correction,” and possibly other TROA issues are worked out to the mutual satisfaction of the parties. This means that representatives of the State of California must and will take the necessary time to consult with local interests in the California portion of the Truckee River Basin so they may support the draft TROA without significant reservations.” California representatives interviewed for this report indicated dissatisfaction with the TROA having “dragged on way too long” and being “stalled.” The concern expressed by California representatives is stated to be based in part on a perception that Interior and the Tribe are

attempting to extend control on river operations to benefit the Tribe and Pyramid Lake fish beyond what has been agreed under P.L. 101-618.

The Use of Models

Many involved in the TROA negotiations pointed to the development and use of good, flexible models for water quality and water quantity as a key to negotiating a new TROA. The following comment to the draft report was received from USGS:

The feasibility of proposed operations and sometimes original concepts were the direct result of model simulations. The exact amounts and timing of credits and exchanges, their consequences and so forth were the product of modeling efforts. Of course, long hours in meetings and compromise were also necessary to come to agreement, but if not for modeling simulations which provided some assurance to agreement signatories that, 'Yes, this will work,' or 'No, this will not work,' negotiations would not have advanced nearly to the point where they now stand.

Unfortunately, the only available model was not physically-based, had a monthly time-step, and was not documented. The first two deficiencies make accurate analysis of dynamic water issues such as water quality, instream flows, ramping and short-term flood waves (to name but a few) impossible to examine. The third deficiency (lack of model documentation) has made all parties dependent upon a single person (a consultant to Sierra Pacific) to make the changes to the rather unwieldy model that he (the consultant) has created. Although most parties say they are 'comfortable' with his results, no one really knows the details in his code nor how he has cast the gray areas of law and agreements, some of which are only now being discussed. How were such aspects simulated two years ago, when the details are only now being discussed?

Several federal efforts have been launched to document this model, none of which have been successful due to the extremely convoluted nature of the coding and the lack or inadequacy of internal comments within the model code. This situation in which all parties are dependent upon a single person and a single model has prevented each individual party from making their own computer runs and developing their own positions. Instead of simultaneous runs, each party had to wait for the consultant to work their idea into his model

and then had to trust that their idea was being adequately characterized in simulations. In our estimation, this delayed the development of a TROA and was a constant source of nagging distrust.

One benefit of the model being developed by the USGS for use in the public domain is that it will be well-documented and supported, thus allowing federal expertise and a legal defense that will not require the only federal expert witness to be the consultant for the opposition, such as is the case now. . . One of the problems USGS is experiencing while developing a daily operations model of our own is that a comprehensive listing of decrees and agreements dictating current (pre-TROA) operations is not available. . . The lack of formal definition for system operations slowed the development of our own model and any verification one would want to undertake with the monthly model. Further, because the negotiating parties do not fully understand the whole system, there were not always sufficient checks and balances in interpretation of the monthly modeling results or within the negotiations.

A series of memos written by a group of software engineers and modeling specialists employed by Interior to review and attempt to document the Negotiation Model for TROA raise serious questions about whether the Truckee-Carson settlement is in fact proceeding with the assistance of the type of “good model” noted by participants to be essential. The following are excerpted from the comments made by these experts:

I think the model is in such a state that it is essentially impossible to go through with understanding. Furthermore, I could not and would not defend it in court. Because it is so difficult to understand I have reached the point that I think proceeding would be unreasonable. . .

The Negotiation Model has. . . grown in an out-of-control fashion, often in pressure-cooker situations that required major revisions and results in a day or two. The code is now extremely convoluted. One cannot tell what parts of the overall program perform a certain function, or even which parts of a single subroutine might. In going through the code we often heard, when we questioned a seemingly invalid operation, that the problem was probably fixed up somewhere else. There was no clear, understandable path through the code and ever arriving at understanding of the model's operation would, I think, be next to impossible.

It is extremely difficult to separate whether operations are simply personal estimates (usually with little justification) on processes and constants, or whether the choices are actually based on rational analysis or dictated by court cases. The model has almost no internal documentation describing [its] operation, the reasoning behind choices, the flow of logic. . .

Yet another aspect of the coding style, which makes the code almost impossible to understand, is that the program uses local variable names of “dog, cat, rat, cow, hog, fox. . .[so that] it is nearly impossible to read through a subroutine and make sense of it. The meanings of these variables can change many times (even as many as 20 times) within a single subroutine. . .

Because of the lack of a clear understanding of the model’s operation, I do not think that one can assure the model results are valid. . .

In many places the code is extremely convoluted, making it difficult to tell where or how or under what conditions a particular calculation is made; many calculated quantities are constrained by a number of upper and/or lower limits, some of which appear either superfluous or irrelevant; some switches, which prescribe the path the computer follows through the code, are undefined or incompletely defined, so that the conditions under which a particular path is followed are unclear; some portions of the code are apparently never used, but nevertheless remain in place; many temporary variables are assigned names which have no connection with what they represent; in many cases, the same temporary variable name is used over and over within a subroutine to represent different quantities; and in a number of subroutines, hydrologic quantities are calculated using coefficients or factors which, apparently, are not explained or justified anywhere. . .

The TROA model is such a patchwork of assumptions, physical and political simplifications, and convoluted code that it is difficult to say what the output results might represent or whether they approach a realistic representation of the water system. . .

No mere human could in good conscience profess to understand [the TROA model] in detail and prove that the results are “right.” . . . On the other hand, it is probably difficult to prove that it is “wrong” in any overall sense, even though it is not hard to point out specific

instances of inordinate sensitivity, small errors, arbitrary assumptions. . .

Rarely have I seen a case where the need to start over is more clear-cut. The TROA model cries out for a new start when viewed from any number of perspectives. . . The model is hopelessly complex for anyone to understand. . . There is not adequate internal documentation. . . Documenting the overall strategy is probably impossible given the lack of an overall design. . . Our work showed various sensitivity problems where tiny differences caused substantial differences in paths through the code. . .

As the TROA world regards the present model much as a religion, no matter how good a new model is, it will be measured against the old TROA “King James” version with the burden of proof resting on the new, not the old.

. . . the present model is not understandable, and probably not defensible at any deep level. . .

. . . the Negotiation Model represents, I think, a political document, not a scientific one. It is telling the principals. . . what they want to hear. Any time this was not true, the model was examined to see if the “problem” could be “fixed.” No more clear example of this phenomenon occurred than. . . when the model said. . . that the cui-ui were better off without the TROA than with it. . . [they] went into the model and found the “problem” and—surprise—now the cui-ui do better under TROA. I suspect this happened a lot. Any time the results were not favorable, they would look hard for a problem, or change a process or parameter to give the politically acceptable “more reasonable” result. By contrast, I suspect that if the model were telling them what they wanted to hear, errors would go undetected.

Among the recommendations made by these experts, with possible application elsewhere, are these:

- ! Differentiate whether a model is to be used for negotiation or actual operations. Very different requirements may characterize these, for example a monthly time-step may be sufficient for most negotiation needs, but is grossly inadequate for controlling actual operations.

- ! Thorough investigation and documentation of existing system operation, including a process flowchart, are strongly recommended.
- ! A suggestion was made to simplify TROA by setting aside the question of who owned water at particular locations in the system, and simply operate the system in the most efficient way possible, not worrying about where who's water was in the system and all of the associated exchanges, credits and "types of water." Storage amounts and priorities would be maintained, water rights protected and decrees satisfied, but with much greater simplicity and flexibility, according to proponents of this idea.

Federal Leadership

Federal leadership was exercised in an unusual way, through congressional apportionment, to create the Settlement Agreement, and continues to be exercised in forging the Truckee River Operating Agreement (TROA). According to E. Leif Reid, this means of interstate water allocation had been used only once before, in settling a dispute between Arizona and California regarding lower Colorado River water.²²⁹

Checchio and Colby state that the Truckee-Carson water settlement highlights the crucial role of effective leadership in resolving water disputes, with specific reference to the role played by Senator Harry Reid.²³⁰ E. Leif Reid argues that the use of congressional apportionment in allocating disputed interstate waters is more efficient, less expensive, more flexible, and more likely to fairly accommodate all legitimate interests, leading to a substantively better outcome. However, given the situation with the Newlands irrigators described above, it is difficult to wholeheartedly affirm his conclusion that "congressional apportionment differs significantly in that it can achieve a positive outcome irrespective of whether all the disputants reach agreement. Thus congressional apportionment has a greater potential for success than compacting."

Congress can impose its will, as it has on the irrigators in the Settlement Agreement, but can this be construed as success when an unwilling party surrenders its resources under duress and continues to challenge the outcome and the process? Is it success even if a relatively powerless contestant is forced to accede? An argument in favor of greater exercise of federal power in settling interstate water disputes, particularly in today's West, would seem hard to sustain. E. Leif Reid adumbrates the concerns that arise when he states, "settlement negotiations are as yet fraught with distrust and animosity [but] parties negotiating under. . .the shadow of

congressional intervention would be more inclined to deal with each other in good faith.” It is doubtful that the Newlands irrigators would agree that they have experienced an increase in good faith. Equally questionable is whether casting a longer congressional shadow, with its attendant implied coercion, is a good idea in western water problem-solving at this particular moment in American history. Certainly, state officials interviewed do not feel that this is a model that ought to be repeated throughout the West.

At the same time, it must be acknowledged that but for the exercise of federal power, the California-Nevada interstate compact would have neglected the legitimate interests of the Native American tribes. On the other hand, the Settlement Act is felt by the irrigators to similarly neglect their interests.

Thus, in comparing congressional apportionment and interstate compacting, it appears that neither is inherently superior in assuring that all interests are protected. This appears to be more a matter of social consensus at the time the instrument is used than an advantage of one form of interstate water dispute resolution over another. Either is quite capable of overlooking important interests, and, unless pushed to extinction, such interests never go away. One cannot fully agree, with E. Leif Reid, that “The Truckee dispute saw a seemingly intractable situation resolve itself in relatively few years” so long as the rural communities and Newlands irrigators have not joined that agreement.

Significant leadership was also exercised below the level of Congress, in the Department of Interior and its administrative agencies. The evaluation of this leadership, not surprisingly, depends upon the positions of the various interests involved and the degree to which the actions of Interior leaders furthered the agenda of the one doing the evaluation. The leadership of some individuals, such as Betsy Rieke, was noted by many players for achieving the trust of all sides and thus significantly advancing the process towards solutions.

However, the prevailing feeling is that success in the settlement negotiations required “joint leadership.” Both Sierra Pacific and the Tribe took on a substantial initiative to lead. Late in the process, California is said to have brought about a change in its representation that resulted in better top-level communications and support in California, and brought better cohesiveness and leadership to the process.

The Preliminary Settlement Agreement, negotiated without federal involvement by two of the key players in the Truckee-Carson conflict provided a breakthrough foundation on which the subsequent Settlement Agreement could be erected and raises interesting questions as to the role of federal leadership. Should similar negotiations, without federal involvement, be encouraged in other western water situations? The answer appears to be a qualified “yes.”

Federal leaders themselves applauded the initiative taken by the Tribe and Sierra Pacific, and said they would consider allowing non-federal parties to work out solutions involving the use of federal facilities in the future so long as federal approval were then obtained and costs were within reasonable bounds. This was a relatively low-cost solution that gave the federal government an opportunity to develop funds (storage charges which go to fund to restore Pyramid Lake and Lahontan Valley wetlands), assisting in meeting an obligation that the federal government was going to have to take on anyway. Further, TROA negotiations were built on this base.

Some federal officials see the history of federal presence in the Truckee-Carson River basins as a legacy of broken promises: “many promises have been made, but not kept, both to the tribes and the irrigators.” Overall, the assessment of federal role and presence by federal officials themselves is a mixed report card. Some point to the Newlands Project as a success, and to management plans for the upstream reservoirs on the Truckee River to serve recovery of the cui-ui, recreation, flood control, water quality as well as providing some security for M&I water users. Others find Newlands a failure.

When the issues leading to the Water Quality Agreement arose, federal leadership actively promoted regional solutions and settlements. Secretary Babbitt expressed an interest in “broadening the range of settlement” and Interior made the proposals that brought this solution to table, along with the Pyramid Lake Tribe.

Insofar as the federal government needed to speak with “one voice” (see above for a discussion of this initiative), leadership was exercised quickly and effectively to coordinate the various agencies of Interior and to look beyond the PSA to identify other problems that could be solved in the process of TROA negotiations. Principal benefits of the Truckee Carson Coordination Office (TCCO) included establishment of good rapport with all players and provision of local staff to deal with issues on ground, facilitate resolution, and achieve open communications. This model should be considered elsewhere in

west where multiple bureaus are involved in water conflicts. Without such coordination, as one Washington leader put it, delegation of responsibility to multiple field bureaus results in their doing a good job of vetoing one another without resolving the issues. This yields “least common denominator” solutions. Washington also recommended that a local coordination office be paired with a D.C. official not beholden to any of the bureaus or Assistant Secretaries. Still others felt that the principal benefit of TCCO was that it “allowed [them] to get to ‘no’ quicker.”

Role of Justice Department

The role of Justice is to handle litigation, represent federal agencies, establish the government’s position on legal issues and advise client federal agencies when a decision is made to pursue litigation. The role includes conducting settlement negotiations either to settle existing litigation or to avoid future litigation. Justice has a commitment to and devotes extensive efforts to Alternative Dispute Resolution (ADR) processes and seeks to facilitate settlements of issues by agreement rather than through litigation. Justice is also charged by law with the enforcement of federal laws, including the Endangered Species Act and antitrust laws.

Along with the Executive Branch, Justice has the power to resolve agency conflicts to establish a coherent government position where litigation is at issue. The exercise of this considerable power has left many local players feeling that Justice overstepped the boundaries of its role in protecting the legal interests of the United States, to the extent that it sometimes made technical decisions beyond its competence and often inappropriately drove management policy.

From the point of view of Justice, the Department has tried to be very careful to take positions on legal, not technical issues. The Truckee-Carson and Lake Tahoe are all managed pursuant to federal court orders on cases in which, in all three instances, the United States brought action as plaintiffs (the Alpine, Orr Ditch, and Truckee River General Electric decrees). This situation is unusual, according to Justice, as compared to other western rivers not having this level of federal control, and Justice must assure that actions and decisions taken in the basins are consistent with those decrees.

Justice also points to the long history of litigation over operation of Newlands project. Hardly an issue exists that has not been litigated or may be. Virtually any conflict raises the potential of going back into court regarding interpretation of existing decrees; Justice estimates that the United States

has been in court 10-15 times. Some of these suits have been resolved and others remain active. In this context, Justice asserts that proactive care and preparation is warranted. Also, under P.L. 101-618, TROA is mandated but contingent upon settlement of all outstanding litigation relating to those solely dependent for water on the Truckee River (this does not include TCID because it also gets water from the Carson). Such litigation cannot be resolved without the active participation of the Justice Department.

Notwithstanding, the view was widely-expressed among participants on many sides of the issues, including all levels of government involved in the negotiated settlement and a significant proportion of the federal representatives interviewed, that the involvement of the Department of Justice in the process was at times counterproductive. Only at the highest (Washington, D.C.) levels did we find the role exercised by the Department of Justice unequivocally supported. This view of Justice was so widely held that it suggests that there should be very careful assessment of the role of the Justice department where it is involved in western water controversies, to avoid its overtaking the legitimate roles of the federal management agencies and decision-makers.

Particularly in its influence on Interior, Justice is seen as driving what issues would be developed and pursued, and how they would be developed and pursued. State and local officials (and locally-based federal officials) are not shy in expressing the view that the situation would be much improved and more amenable to final solution if Justice could be limited to a less intrusive role. Examples include decisions and positions taken on the level of NEPA compliance allowed, the investigation of groundwater issues, and river management and operations.

Often, irrigators feel they are held to the strict letter of laws and decrees when the ability to be more flexible is basis of settlement and the TROA. The federal government has an opportunity to carefully consider the tradeoffs against strict, legalistic interpretations and strategies in western water policy-making, to facilitate movement on the issues and avoid unproductive disputes that may stifle creative solutions. While narrow interpretations are doubtless defensible, where more flexible interpretations may be allowable they might better open doors to final resolution.

OCAP and Recoupment

Effects of OCAP.—Interviews and comments received indicate that the 1988 OCAP are being largely adhered to, and are substantially reducing

diversions of water from the Truckee River and improving flows into Pyramid Lake. Federal officials and tribal representatives assert that this is occurring with little or no adverse impact on the irrigation of validly water-righted land.

OCAP, in combination with several court cases, is said to have served to significantly reduce Newlands Project diversions from the Truckee,²³¹ in order to provide as much water as possible to Pyramid Lake. According to information submitted by the Tribe, *from 1915 through 1967 (prior to OCAP), an average of approximately 240,000 acre feet of Truckee River water per year was diverted at Derby Dam to the Newlands Project. Under existing conditions and the 1988 OCAP, the average annual Truckee River diversions are approximately 110,000 acre feet.*

The Tribe goes on to state that, if the proposed Adjusted OCAP are adopted, average annual Truckee River diversions to the Newlands Project would be further reduced to an annual average of approximately 90,000 acre feet. This would be a reduction of more than 60%, with virtually the entire reduction (approximately 150,0000 acre feet per year) going to the lower Truckee River (below Derby Dam) and Pyramid Lake.

The Tribe further asserts that, with the increasing urbanization of the Town of Fernley, the continued conversion of Truckee Division agricultural water rights to M&I purposes, and the anticipated Truckee Division water right acquisitions pursuant to the 1996 Water Quality Agreement, there is expected to be a further reduction of as much as an additional 30,000 acre feet per year. If so, that would bring the average Truckee River diversions down to an average of approximately 60,000 acre feet per year, a 75% reduction amounting to about 180,000 acre-feet, on an annual average, from the pre-OCAP period.

Therefore, the Tribe believes that reductions required under the OCAP are directly responsible for ameliorating the drop of Pyramid Lake level even during severe drought. Before implementation of OCAP, Pyramid Lake reached a low point of 3783.9 feet in elevation. As noted above, the current elevation is about 3808 feet, a gain of 24 feet in spite of severe drought during the late 1980s and early 1990s. Under the 1988 OCAP, model runs predict the lake will eventually reach an elevation of 3838.8 feet, which is 54.9 feet higher than the historic low.

The enforcement of the OCAP also has reduced the outflow of water from the Carson Division of the Newlands Project to the adjacent wetlands. In the Settlement Act, Congress determined that the best way to obtain and secure a

reliable supply of good quality water for the Lahontan Valley wetlands was through the acquisition of water rights, rather than by depending on Project outflows and inefficiencies. Approximately 20,000 acre feet of water rights have been purchased by the federal and state governments from willing sellers within the Project and transferred to the wetlands since 1988. The current program calls for the purchase of at least 55,000 acre feet of additional water rights from willing sellers both within the Carson Division of the Project and from the Carson Valley above Lahontan Reservoir.

Reclamation reported to Congress at a 1994 hearing on P.L. 101-681 oversight that the OCAP efficiencies in place since 1988 were tested in only two full-supply years (1989 and 1993). In both years, TCID failed to meet the OCAP target efficiency. The efficiencies achieved in both years were similar (58.4% in 1989 and 58.8% in 1993), while the phased-in target efficiency continued to increase (from 62.1% in 1989 to 66.4% in 1993). In no year but 1989 did net diversions exceed expected diversions, and then by just 3,000 acre-feet. Thus, the anticipated shortage was not realized. Reclamation indicated that “it is expected that diversions to the Project will remain less than expected in the OCAP as a result of fewer acres irrigated in the Project than predicted by the OCAP.”

Further testimony at the 1994 Congressional oversight hearing indicated that the end-of-June storage target in the 1988 OCAP for Lahontan Reservoir (215,000 acre-feet) was nearly met in 1989 and was exceeded by 34,000 acre-feet in 1993 (due to Carson River runoff well in excess of forecast in both March and April of that year). Thus, the testimony states, in April 1993 diversions from the Truckee River to Lahontan Reservoir were restricted for the first time under this OCAP. The OCAP prevented diversions from the Truckee River through August 1993 and again in October of that year.

The fact that diversions were not actually restricted under OCAP until 1993, plus the relatively low correlation between the actual efficiency reported in the 1994 Congressional testimony and the net diversions reported in the same testimony and the relatively small efficiency gains (about 4% since 1988), all leave the question unclear as to how much of the change in Truckee diversions and Pyramid Lake levels is due to OCAP and how much to other drivers such as drought (reducing the amount available for diversion from the Truckee), high flows (increasing the relative amount available from the Carson), water rights acquisitions (reducing irrigated acreage), other reductions in irrigated acreage, or other factors. Statements drawing a direct

correlation between OCAP and reductions in diversions and increases in lake levels have not provided this analysis.

According to Interior, the proposed Adjusted OCAP should have minimal impact on irrigation operations and then only as a somewhat greater shortage in severe drought years because of reduced carryover storage. Interior comments to the draft report states that the lion's share of reduced diversions comes from reduced spills, evaporation and seepage. The proposed Adjusted OCAP would lower the efficiency target to 66%, approximately one percent lower than the 1988 OCAP (at present, the Newlands Project achieves about 62% efficiency). Other OCAP effects include those on Lahontan Reservoir (a recreation facility), wetlands (less water) and socioeconomic impacts.

The proposed Adjusted OCAP notes that proposed storage targets are based on the TROA model, which assumed reduced Project water demand, lower efficiency targets, current Truckee River operations, and Project shortages consistent with the 1988 OCAP. Among other things, the model runs held the frequency and magnitude of Project shortages consistent with the 1988 OCAP. (However, as noted, the projected shortage under the 1988 OCAP never materialized.) The rule states that shortages to the Project are reduced under the proposed storage targets by approximately 2,500 acre-feet compared to the 1988 OCAP regime applied to 1995 water use. Comments received on the draft rule included a question asking why the end of June storage target in Lahontan Reservoir was reduced by 19% when the project acreage is only 9% less than anticipated in the 1988 OCAP. The reply is not entirely intelligible, but asserts that a lesser demand in the Carson Division justifies the reduction.

Irrigators feel that, because of drought followed by high waters, the 1988 OCAP has not been adequately tested and the proposed Adjusted OCAP will be much more severe in terms of diversions and reservoir target levels. In their view, it attempts to capture a shortage that had been expected from the 1988 OCAP but was not realized, and the effort to make this revision a federal regulation is intended to place hurdles between it and the judicial system, and to do so before December 31, 1997. (The 1988 OCAP were approved by U.S. District Court subject to a hearing on objections raised by various parties and the 1990 Settlement Act directed that the 1988 OCAP remain in place through 1997, hence it was never published in the *Federal Register*.) Comments on the Adjusted OCAP strongly oppose the regulation.

Nevada officials and Newlands irrigators commenting on the proposed Adjusted OCAP objected to the short time allowed for comment, particularly since it included the holiday season and coincided with the January 1997 floods. TCID's attorney wrote "The methods employed by BOR and Interior in this process are foreign to any concept of a democratic government and reflect a dictatorial attitude designed to disenfranchise the water rights owners most affected by the OCAP." The comment period was extended by an additional 60 days.

Issues Associated with OCAP.—The controversy over OCAP appears to turn on the issues of water rights, conservation and the definition of "waste" under conditions of water scarcity and competing federal responsibilities, including tribal trust, endangered species, and serving the water rights held by the individual farmers comprising the Newlands Project. Because the federal government (Reclamation) contracts TCID to operate and maintain the Newlands Project, federal water priorities and responsibilities come into play in determining issues of water use, and conflicts with state law and regulation have resulted.

Under Nevada water law, beneficial use is the limit and extent of a water right, a principle often cited by all sides to water disputes. State water law does not provide for government to intervene in determining that a water user may not "need" all of the water used under a perfected right, but this is just what OCAP, in effect, does. Nevada water law does provide, as do other western states, a criterion of "reasonableness" with respect to water use, but it does not specifically prohibit "waste" as do some other states. State law states that "rights to the use of water shall be limited and restricted to so much thereof as may be necessary, when reasonably and economically used for irrigation and other beneficial purposes. . . ." however this does not clearly support a determination, such as that upon which OCAP is based, that an inefficient water system is wasteful and that those who use that system should have their water rights reduced accordingly.

Therefore, the irrigators view OCAP as a "taking" (as discussed above). In that regard, it is interesting that the proposed Adjusted OCAP includes the following statement: "The proposed rule does not represent a government action that would interfere with constitutionally protected property rights and does not require a Takings Implication Assessment under E.O. 12630."

The OCAP have been resisted and challenged by TCID and the water users on the Newlands Project. The courts have upheld both the regulatory authority of the Secretary of the Interior over the diversion, use and

management of water within the Newlands Project and the validity of the OCAP. They have also held that the Secretary is obligated by virtue of his trust responsibility to the Tribe to utilize his regulatory authority to limit diversions of Truckee River water to the Newlands Project and away from Pyramid Lake to the maximum extent possible consistent with the applicable decrees and contracts. Congress ratified the 1988 OCAP, reaffirmed the Secretary's trust obligation and applied it to the implementation of the settlement in Section 209(j) of the Settlement Act.

TCID's unsuccessful challenge to the OCAP and refusal to comply with the OCAP (until 1988) also gave rise to the recoupment action (discussed above) in which the United States and the Tribe are seeking recovery of more than one million acre-feet of Truckee River water. The Tribe and the United States claim that that amount of Truckee River water was deliberately and illegally diverted away from Pyramid Lake by TCID in violation of the applicable OCAP from 1973 through 1987.

OCAP as a Problem-Solving Tool.—Perhaps the most illuminating question that could be asked in evaluating the OCAP strategy is the degree to which OCAP and recoupment actions have worked to increase consensus and problem-solving in the basins. The Tribe and Interior assert that it is helping solve key resource management problems by limiting diversions from the Truckee River and increasing flows to Pyramid Lake (see above regarding the question as to the degree to which OCAP is itself responsible for the observed reductions in diversions and lake level increases since 1988). On the other hand, it is apparent that OCAP have worked to increase conflict between the irrigators and the other parties in the basin.

Overall, is OCAP the best way to achieve the goals of water conservation and reduced Truckee River diversions? Several of those interviewed felt that OCAP-style accounting measures and targets have diverted attention from larger questions and that the manner of implementation or negotiation of these measures probably has made both the overall settlement and the achievement of gains in efficiency more difficult than they needed to be. Market incentives and enlightened self-interest are cited as more effective motivators for desired behavior than onerous, mandatory rules.

Not everyone who supports the efficiency concept agrees that the OCAP are the best method to achieve that goal. The OCAP are seen by some as having been used as a handle to micro-manage the irrigators. The perception is that the screw was tightened and tightened to drive irrigators into becoming

“willing sellers.” Some feel that this is poor public policy: driven by accounting measures and targets (e.g., acreage base, water duties, efficiencies, etc.), these targets became the object of contention, losing sight of the more fundamental larger issues. One person said “everyone got so caught up in the numbers game that it becomes obsessive. It also raised the level of bitterness and frustration with the federal government.”

One suggestion was to create a fixed water budget and let farmers keep any savings they can achieve beyond meeting that budget—cut the link between water and land and allow water to move flexibly in a genuine market. Allowing water to move around will let the best farmers farm under this theory.

The continued federal pursuit of stringent OCAP is positive from many points of view but counter-productive to a Truckee-Carson River Basin solution that includes irrigators. Negotiating under the cloud of OCAP was bound to heighten the feeling of unfairness on the part of the irrigators and hence shorten the field of compromise available to the participants in the process. There was nothing in the nature of a negotiation in the federal demand that water be wrung from existing practice—no matter how reasonable it was to curtail waste—and thus the sincerity of the stated objective to *negotiate* a solution was brought into question. So long as OCAP was pursued in tandem with a negotiated settlement, the one appeared to put the lie to the other.

According to senior federal officials who were involved in the 1988 OCAP it was based on Section 7 consultation under the Endangered Species Act and received a “no jeopardy” opinion, meaning that it represented an agreement on water use that would protect fish. The proposed Adjusted OCAP raises a question as to what federal trust responsibility requires it, if the existing OCAP already avoids jeopardy to the listed threatened or endangered species.

The Fish and Wildlife Service, in comments to the draft report, cites Section 2(c)(1) of the Endangered Species Act to the effect that federal agencies are required to conserve listed species and use their authorities to further the purposes of the Act, which include conserving ecosystems of listed species and providing programs for conserving listed species. Conserve, under the Act, means to use all methods and procedures necessary to bring a listed species to the point where the protection of the Act is no longer required. To this end, one of the purposes of refining OCAP is to help satisfy the federal government’s responsibilities under the Act to recover listed species.

This response appears to again raise the question of the open-ended nature of the federal government's responsibilities (as defined here) with respect to the demand for water and the irrigators need for some certainty in that regard. It also does not show how the lesser standard of "conserve" as opposed to "no jeopardy" provides sufficient basis for reducing water delivered under perfected rights.

Also, as noted earlier, the Adjusted OCAP does not take account of land idled in contested water transfers in the computation of water-right acreage. Further, the federal government has not allowed irrigators to receive credit for water used for environmental purposes, such as Fernley Wildlife Management Area. OCAP are regarded by the irrigators as forced decreased diversions from Derby Dam, thus promoting a counterproductive focus on the issue of rights and "takings" when solutions lie in the direction of a focus on interests.

Beyond these issues, the goals set by Congress for the *Newlands Project Efficiency Study* raise more questions. P.L. 101-618 requires investigation of the feasibility of achieving 75% efficiency. The Nevada State Engineer commented, "I don't believe that there is an irrigation district in the West using flood irrigation that can achieve 75% efficiency. It is an unrealistic goal." The conclusion that these efficiencies are achievable stands in contrast, and may open the door for further reductions in water rights deliveries, however the cost of such achievement may be prohibitive.

When parties interviewed were asked for examples where such efficiencies had been achieved, the only known examples of irrigation districts that could be cited used center pivot irrigation. Elimination of a few outliers could increase efficiency toward the 1988 OCAP standard of 68%, but it was felt to achieve 68% would require extensive heavy lining of canals (which would raise issues regarding recharge).

Reclamation is charged to supply decreed water in each irrigation district, but new modeling by the State Engineer indicates that greater shortages would occur during times of drought (see Comment Response 21 as well). This elicited the comment "I never heard of a regulation that would short farmers in time of drought."

The federal government is felt to have been inflexible and unrealistic on OCAP. There appears to be a feeling on both the local and state levels that these requirements are rammed through by the federal government with little consultation or consideration of their impacts. The federal view is that

OCAP responds to court orders tied to specific Indian trust issues (Pyramid Lake tribe).

In summary, the federal government appears to be locked into pursuing a course that has long been open to question as to whether it truly serves the needs of the larger process. The lesson to be learned for western water policy would appear to be the value in stepping back from the consuming drive to enforce compliance and revisit larger objectives. In this case, the need for the Adjusted OCAP appears not to be well documented in terms of a clear definition of ultimate water requirements needed to meet endangered species and tribal trust responsibilities. It raises unproductive questions of underlying motives with regard to forced water rights sales and an unproductive renewed focus on rights in general. Given that a number of those interviewed felt that TCID could probably accept the 1988 OCAP, the usefulness of asking for more water must be tested against the effect it will have on the ability to achieve an overall workable solution in the Truckee-Carson River Basins.

Interior responds: TCID was offered the opportunity to provide OCAP alternatives for examination in the effort to develop a new, long-term OCAP, but has declined to submit any proposals. . . . Interior has held extensive discussions with Newlands water right holders on various alternative approaches to conserving water on the Newlands Project. . . [including] four half-day meetings set up by Interior to specifically discuss, address, and take comments on federal proposals related to the four technical issues that are proposed for change in the “new OCAP.”

Water Budget Alternatives.—A more tenable solution may be to negotiate a fixed water budget with the irrigators, allowing them to keep any savings in excess of the target. This approach, which has been suggested by others involved in the settlement process over a number of years, might promote better relationships and result in a more effective program as well.

Consideration of such an approach should include the tradeoffs in focusing efficiency policies on operations versus water delivery efficiency improvements and the degree to which a mix of these measures be implemented. A means of monitoring and evaluation would need to be defined, including decision as to who should be involved in these activities and the responses that should be taken to adjust requirements or incentives if efficiencies do not improve as desired.

Such a solution might be facilitated if future legislative and/or negotiated solutions allow irrigators to more flexibly transfer water rights among themselves as best meets their requirements, overall efficiency goals, and the upstream storage flexibility requirements discussed above. Substituting a self-governing, incentive-based system for the current OCAP, which grinds against a final resolution, together with the removal of the federal government and Tribe from micro-managing the irrigators, could well provide both an improved performance and the basis for a proactive solution.

Interior comments to the draft report state that “a fixed diversion limit was on the table in the facilitated negotiations. While there are attractive features to such an approach, great care needs to be exercised to assure that water rights are protected or waived when providing flexibility between delivery system conservation and on-farm conservation. A small group of irrigators can block use of a system based on on-farm efficiencies.

4.5 Watershed Management and Carrying Capacity

Issues of fairness and rights dominate the efforts to implement PL 101-618. With the settlement as the foundation for TROA, other negotiations are taking place to address issues not directly resolved by the settlement or by TROA. There have been suggestions that more comprehensive planning may be an alternative to the on-going process which continues to generate litigation—a sure sign of a lack of perceived unfairness and unresolved issues. Three alternatives for basin-wide resource management are discussed in this section: watershed resource ecosystem-based planning, land management and the federal program known as LESA.

Watershed Management

Water resource managers are increasingly relying on watershed management to protect and restore water quality and to manage water supply. Watershed management is an integrated, holistic strategy for more effectively ensuring water quality, water supply and flood management. Water quality means meeting the objectives for the chemical, physical and biological integrity of water requiring a dynamic and inclusive system of planning and management. Watersheds are defined by hydrologically defined drainage basins, rather than political boundaries. Creating a watershed planning area encompasses not only the water resource, such as a stream, river, lake, estuary or aquifer, but all the land from which water drains.

Because watersheds include vast land areas, resource management addresses land uses ranging from timber harvest to urban development. These disparate land user groups must work together if planning solutions for watershed management are to be made possible. The stakeholder or interest-driven process has been used successfully in local and regional resource management efforts, and relies on collaborative and cooperative planning. The approach emphasizes the involvement of all affected stakeholders and fosters the cooperation of federal, state and local organizations. This comprehensive method provides an integrated management plan upon which different resource managers and land use planners develop specific management strategies.

The strength of the watershed management approach is based on several benefits:

- ! Governmental and non-governmental agencies can accomplish more through cooperation with all stakeholders than by acting independently;
- ! Limited resources are shared and spent more efficiently because of the coordination;
- ! Those most likely to affect and to be affected by watershed management participate as stakeholders and bring local knowledge and noninstitutional solutions;
- ! The burden of resource protection is more evenly distributed among all parties.

In an era of seeking environmentally sensitive and sustainable economic growth and development, watershed management furthers these goals. Evaluation of the Settlement Agreement and its implementation process suggests that it has been limited by its focus. This focus has not served to incorporate all the stakeholders within the Truckee-Carson basin who could contribute to solutions, including providing multiple benefits for new programs necessary to supply water to the wetlands and tribal interests. Currently, the burden for implementation (in terms of water) is centered on the Newlands Project/Churchill County area. Opportunities for new partnerships in sharing the challenge of meeting environmental and tribal needs could be met by a Truckee-Carson basin watershed management or integrated resource management program.

Commentators to the draft report assert, however, that the facilitated negotiations did focus on the entire watershed of the two basins in Nevada and that, between the Lahontan Valley Water Rights Acquisition EIS and the TROA EIS, the environment of both river basins has been described and analyzed (and that a third EIS is being prepared that deals holistically with the lower basins of the two rivers).

Steps for Watershed Management.—The planning area or boundary of a comprehensive watershed management process should be based on the issues compelling the need for watershed management. Strictly speaking the watershed is the entire drainage zone contributing to the surface and groundwater. However, several watershed planning process are applied to smaller areas sometimes called hydrologic units, but more commonly called “watersheds”. Such watershed segmentation limits solutions to problems of the study area even if the source or cause of water degradation in quality or supply may be within another segment.

The settlement and negotiations have focused on water supply to the wetlands and tribal interests. Expanding the “problem area” to include the basin might increase opportunities to:

- ! Describe the hydrological system and its historic function;
- ! Describe the fluvial geomorphology and its relationship to proposed solutions;
- ! Identify flood management needs and opportunities which could be used conjunctively for off stream storage for water efficiency and integrated operations;
- ! Describe the natural history, its historic role in the landscape ecology and potential resource management alternatives; and
- ! Describe the carrying capacity of the basin for a water budget to meet the water supply needs for urban, environmental, tribal and agricultural users.

The Truckee-Carson basins, like most watersheds functions and systems, have been altered by human activities, most notably transbasin water diversion. To begin to prepare for comprehensive basin-wide watershed management several steps are necessary:

- ! Public education about the need for watershed management is essential to attract people where they live and work and connect their quality of life and economic well-being to the watershed. The public education effort for the Truckee-Carson is partially met *de facto* by newspaper articles, and local “group” initiatives. There is no basin newsletter, or clearinghouse for news relating to watershed management.

- ! Involve a variety of people or stakeholders in the planning process including those who are directly affected, and those who are indirectly affected. The participation during the negotiations and settlement has been broadly inclusive, but there may be additional stakeholders may wish to be part of a watershed management effort as well as some who have felt unsatisfied with the process that has gone on to date.

- ! Demonstrate an understanding of the socioeconomic issues associated with watershed management. The settlement does not address the socioeconomic issues in a comprehensive manner. The LESA program discussed below provides criteria for considering these issues, but its application is limited to the Newlands Project/Churchill County region. Key people interviewed for this report noted a lack of an economic plan to address the effects of the water rights acquisition on long-term agricultural production. While LESA uses criteria for suitability for land conversion, this does not address the overall socioeconomic structure within the whole basin.

- ! Ensure objective fact-finding process to confirm facts so that participants trust the information and do not betray agreements about such facts. This should not be interpreted as an exercise in developing consensus about science, but instead an effort to bring the facts and knowledge of science to the public to foster decision making based on science as well as socioeconomic values.

There appeared to be no systematic joint fact-finding during the settlement negotiations, although federal documentation was readily available to participants. Since the settlement, individual groups and governmental agencies have shared information. The basin-wide watershed approach could be a framework for confirming information, gaps in information and methodology for gathering new information necessary to make system-wide decisions for resource management. The EIS process does provide information and public review, but this a reactive process and does not contribute the value of joint fact-finding.

- ! The planning process must succeed in developing trust between the participants. A facilitator is often necessary to gain comfort in the fairness of the process. The facilitator helps participants have a voice in the process, fosters respects for participants' values and interests, and maintains focus on the mission of the watershed management process. The facilitator may need to balance the power at the table by inviting appropriate parties, make arrangements for technical assistance and strategies for the organization and planning process. (In Section 4.3 above, there is further discussion of problems with the facilitated negotiations that have been held to date.)

- ! The watershed management process should develop a vision supported by goals and policies and an action plan. The level of detail should match the ability of the participants to agree in general and to reach common ground on goals and policies. With the policy plan accepted and adopted in some fashion, depending on the governing framework, strategic plans can be developed to refine the policies and implement programs for reaching the goals of the watershed management plan.

The Truckee-Carson settlement set forth goals for water supply to the wetlands and tribal interests. However, the process did not produce a vision for the entire basin. Individual group efforts vary in having a mission or goals which serve as vision statements, and may be limited geographically in their application.

- ! A management entity might be created to monitor action programs, audit performance and assess the level of success, and reconvene the policy body if necessary to provide modifications and corrections for the plan. The entity may act as a power broker and present a single representative for a large region when funding requests are for state and federal funds. The Truckee-Carson Coordination Office is restricted to a geographical region and has limited responsibilities. TROA's task is directed by the settlement agreement and is likewise limited. There is no basin-wide entity for a resource management process.

Watershed Management in the Settlement Agreement.—Watershed management has not been implemented *de facto* on the Truckee-Carson basins as a result of the Settlement although some have suggested that the Settlement Agreement, TROA and even the Environmental Impact Statements (EISs) address watershed management issues. This is true, but only for instream flows in designated river segments and not the entire watershed basin. TROA efforts address storage and timing, recreational

pools and instream flows, and water quality. Water rights acquisition programs have entailed review of water use rather comprehensively throughout the Nevada portion of the basins. Other fragmented efforts include the mitigation funds for stream enhancement directed to the upper Truckee River, with competing and sometime conflicting management goals for game and native fish.

A comprehensive, ecosystem-based watershed management planning process might have been useful in the Settlement Agreement, but to what extent would have been determined by the time constraints at that time. If time constraints were not restrictive, the watershed management process as described above and based on the guiding principle of consensus decision-making, may have been useful to address each river segment and its individual interests. A conflict resolution process using focused issue sessions or other consensus building solutions may have been able to better address some of the divisions of interests and feelings of exclusion that arose on the part of some parties to the settlement process (see, e.g., Section 4.3 above).

The issues and concerns that contributed to them might have benefitted from the respect given them in the planning process as well as the need to find solutions so the whole process could move forward. This takes time and requires incremental decision making rather than a forced majority vote. The negotiated settlement efforts raised issues associated with watershed management, but not within an entirely successful collaborative and consensual framework. This had the unfortunate result that the process is suspect in some eyes, and weighted with a sense of betrayal, lack of trust, feelings of being left out due to the exercise of political power, and perception that values and opinions are so entrenched as to be barriers to an effective planning process. Whether a comprehensive watershed management could have overcome the barriers to trust and cooperation that the settlement negotiations experienced is open to question.

Key players in the Settlement Agreement and its implementation disagree about the value of implementing a watershed management program. Some suggest that it may make sense to bound federal implementation actions based on evidence that the native fish would suffer no adverse effects. A watershed management process undertaken now might give stakeholders a chance to develop local partnerships, participate in joint fact finding and explore all avenues thoroughly. With the Settlement Agreement and TROA in place as a management scheme, there might be sufficient motivation to solve the remaining issues guided by the watershed principles iterated above.

Others suggest that any effort at watershed management planning is a waste of time and, in fact, a tactic to derail the Settlement Agreement's implementation. These sentiments in part reflect the difficulties which the settlement process itself has encountered to date. This effort has left participants with opinions about the watershed approach. However, each constituent to the settlement and TROA process offer solutions that indeed represent the principles of watershed or integrated resource planning. As noted above, one of the individuals involved in implementing the Settlement Agreement, observed the need for a more inclusive and comprehensive implementation program to improve and coordinate management actions for the agreement.

Those involved in watershed management elsewhere would recognize the themes expressed above regarding the strength and weaknesses of watershed planning. It is not that watershed planning or indeed land use planning were inadequate in the Truckee-Carson, but rather a question of using these tools to their full extent. Following are a few guiding principles for conducting such a process to solve water resource problems:

- ! **Local Partnerships and Federal and State Incentives:** Planners need to balance local actions and management with partnerships and incentives provided by federal and state programs. Control and command and “we know best” approaches by well-meaning governmental and non-governmental organizations leaves out the interested parties at the local level who need to feel that they can have some control and responsibility in the solutions. This principle recognizes that sometimes the implementation of law or regulations may be the motivation for local interests to begin to address the problem. However, it is clear that without agreement and acceptance of the problem, there will be little cooperation in joint problem solving.

- ! **Consensus versus Power by Majority:** Power politics may be tempting, but for long term, durable resource management programs, all those who have a stake in the success of resource management need to accept if not support the program. Watershed planning and management creates opportunities to build consensus among potential adversaries, including tribes, farmers, environmental interests, resource managers, resource users, and landowners. The consensus process emphasis is on recognizing concerns of others and finding acceptable, creative and sustainable solutions with the fair distribution of burden. Defining the terms “acceptable, sustainable and fair distribution” is an avenue to reaching an understanding of the fears and concerns and forming

alliances for meeting those concerns. Again it should be stressed that the motivation for problem-solving is usually because the status quo is worse and there is expectation that solutions may be more palatable.

- ! **Flexibility and Trust:** There must be local “ownership” in the concept of watershed conservation; a program promulgated and imposed by the federal or state governments will not be likely to be well-received. Confronted with the need for new tools, government can learn to be more flexible and custom-design solutions for each situation. Government funding and incentives are fundamental to giving local people a sense of responsibility for seeking change. Brokers who establish partnerships for balanced watershed management need to be trusted. Credible and trusted organizations are often non-governmental (NGOs) and should be considered by the government for a significant role in resource management.

- ! **Stakeholders:** The term “stakeholder” conveys a sense of having a share in the resource and its management. Determining who has a stake in the long-term management of a given watershed is an inclusive process and will involve people not usually associated with water resources. Gathering all the parties to the table means all issues are likely to be exposed, and solutions and burdens have a greater chance of fair distribution. The most contentious player may begrudge those who are less directly involved in resource management, but water resources are more than an extractive resource—they are also a sustainable element for the economic and environmental well being of the region.

- ! **More is Better:** The more people involved in watershed management, the better chance the programs will survive and succeed with changing political and economic pressures. Reliance on education, volunteers and participatory activities increases the overall constituency for long-term watershed management.

- ! **Paying versus Incentives:** There isn’t enough money in the federal and state treasuries to buy watershed management strategies. More innovative cost sharing including those costs associated with regulation need to be considered. Incentive programs that foster responsibility and participation may encourage desirable behavior at all levels and increase partnerships.

- ! **The Role of Science:** Watershed management should be based on sound science. Science by its definition never has all the answers and

shouldn't be expected to supply all the answers before planning and actions are implemented. Scientific principles should prevail in decision making. To avoid using science as a weapon, the watershed management process should initiate a joint fact-finding process to assure all stakeholders are making decisions with information they trust. This principle challenges the scientific community to communicate effectively and clearly with the parties to the watershed management process. Such a process acts as insurance against future charges of "poor" science.

- ! **Leadership:** Leadership is the key ingredient for the time consuming and lengthy consensus process to develop a watershed management plan. Leaders are people who are adept at looking at a process, identifying potential bumps in the road and providing strategies to stay on the path to the destination. Leadership should not be confused with control but should be recognized for keeping the consensus process going and for all parties to feel included including having their ideas represented in the management plan.

The question has also been raised as to what extent a basin-wide commission would be useful in furthering solutions for critical water problems. Because each federal agency in the Truckee-Carson Water Basin has a constituency, some of those affected by the settlement might wish to establish a new entity which would help address perceptions that the federal government has been biased and has not provided a fair forum for consensus decision making.

Consideration might be given to having the Council of Environmental Quality (CEQ) organize, fund and lead a comprehensive resource management program. Another agency with experience in region-wide resource management and not party to the settlement negotiations is the Environmental Protection Agency (EPA). This agency has considerable experience in organizing and development comprehensive conservation management plans involving all sectors. However, both these candidates are federal agencies themselves, and would seem only to exacerbate questions of the federal role and voice (see Section 4.3 for further discussion).

A basinwide commission, if implemented, should adopt resource management as its mission, and not focus narrowly on settling claims. The process should not be less than five years, at the end of which would be a consensus document for resource management. All sectors would have interest problems identified and addressed based on status and trends reports developed by technical advisory committees with each sector having representation.

Local Watershed Initiatives

Local watershed groups play an important role in the issues of the Truckee-Carson basins. Although the groups have disparate interests and goals, they have taken the initiative to gather information and to focus on issues affecting their segment of or interests in the basin. These initiatives sharpen the issues and are a catalyst for others who may be affected by management actions for the settlement, but want to part of the group so that their interests are represented. The stakeholder groups include state and federal resource managers, local land use authorities, landowners, Native American Indians, agriculturalists, anglers, the academic community, environmental and community interests, water and power purveyors, recreationists, timber harvest interests, urban and municipal interests, and building industry and development interests.

The local watershed groups involve many of the listed stakeholders but not all. Some of the people involved in the settlement agreements or required to implement the agreements believe that only people with direct of use or vested right to the resource are legitimate stakeholders, and that participation should be limited to that criteria. Others believe that the success of the implementation of the agreements is dependent upon being inclusive especially for those not directly affected and yet whose activities indirectly influence the implementation of the agreements. These include the Forest Service, Bureau of Land Management and other state and municipal public lands as well as private lands adjacent to management areas.

There are both formal organizations and informal groups in the Truckee-Carson whose purposes and missions partially meet watershed management programs requirements. The following is a brief general inventory:

Truckee River Watershed Protection Project.—EPA initiated the Truckee River Strategy for watershed planning to end litigation. EPA coordinates various program activities and agencies to focus restoration efforts on the Truckee River Strategy. In particular, EPA provides grant assistance to Native American tribes to assess problems, develop water quality models, and implement both nonpoint and point source controls. The existing stakeholders could be expanded to include the Newlands Project/Churchill County interests, Fallon Tribe and Washoe County Water Conservancy to address water supply issues, effluent from the Truckee Meadows and water quality concerns. This group is not regarded as a leader of a watershed initiative because not all stakeholders are at the table. The group is perceived as another federal effort to implement its will on others and it

would not be prudent to try to reconstitute the Strategy for a comprehensive watershed management process.

Lower Truckee Restoration Project .—P.L. 101-618 directs the Secretary of the Army, in consultation with the Pyramid Lake Paiute Tribe, State of Nevada, Environmental Protection Agency, Secretary of the Interior and other interested parties, to study the rehabilitation of the lower Truckee River for the benefit of Pyramid Lake fisheries.

In addition, Washoe County is attempting to restore Steamboat Creek to improve water quality in the creek and in Truckee River. A group exists to focus on Steamboat Creek and to identify its role, propose solutions for restoration and help define water needs.

Lahontan Valley Environmental Alliance.—This group has a Board of Directors and is funded. The Alliance is considered a “stakeholder” group with all entities engaged in discussions, planning and development. The group has no statutory or legal authority but its recommendations are being heeded by some entities. The formation of this group was in reaction to the Settlement Agreement. While it would be a valuable participant in a watershed management process, it could not take a leadership role because of its perceived interests.

Truckee River Operating Agreement Committee.—TROA is seen as a watershed initiative although its project area is limited and it addresses a narrow range of issues. The TROA Committee has been suggested by some key players to be a lead for a watershed management process. The TROA Committee would have to expand its jurisdiction to include the basin watershed and would have to expand its stakeholder members. TROA’s leadership would have to be evaluated for its acceptability by others and in the event such acceptability does not exist, it should be considered a “stakeholder” participant because of its authority as well as to share its knowledge and experience in implementing the agreement.

Upper Carson River Watershed Plan.—The Carson Valley Conservation District is the lead in Douglas County to prepare a management plan. Federal and state agencies, water agencies, affected parties in Fallon, environmentalists, farmers, ranchers, landowners, recreationists, anglers and hikers meet every other month to identify problems and to find solutions. The first product of this group was a report titled, “Upper Carson River Management Plan” (issued August 1996) which makes findings on the watershed issues, identifies the need for implementation of Best

Management Practices (BMPs), and provides a history of the natural resources and the existing environment, a complete list of the permitting process and general funding sources available for watershed projects. Although the Conservation District is applying fundamental principles of watershed management process, the District is regarded as too regional and not representative of other interests. This group is experienced in the information gathering and interest driven process and would contribute to a basin-wide program.

Middle Carson River Coordinated Resource Management Group.—The Coordinated Resource Management Group is tasked with identifying problems and solutions for the Middle Carson River and seeks agency technical help in its efforts. It is made up of landowners along the river, with limited involvement from the governmental agencies, and concerned citizens. This group is similar to the Alliance and would not be regarded as a leader of a comprehensive watershed management program for the same reasons.

Evaluation of Local Watershed Initiatives.—Watershed groups consist of a variety of types: from ad hoc associations of landowners and concerned people who initiated an effort to advise decision-makers on actions which directly affect them to more formal, regionally based groups consisting of governmental and non-governmental organizations, with broad representation of affected people within a watershed.

Watershed groups define problems and solutions from single issues to the broad spectrum of comprehensive watershed elements. Whether focusing on parochial or regional interest, they do so without land use planning approaches because of the lack of confidence in land use planning or a strong philosophical aversion to regional and regulatory land use authority.

In the Truckee-Carson basins, local watershed initiatives have not historically been an important component of the negotiations leading toward the Settlement Agreement and its implementation. The extent to which they can or should be integrated with and contribute resolution of basin-wide problems is open to question.

The local watershed groups and initiatives are approaching resource management with a list of limited issues and fragmented segments of the watershed. However, the groups have developed working relationship among and between themselves and federal agencies. The level of information and scope of planning areas varies, but is a basis for confirming such gathered information in a comprehensive resource management planning effort. Local

watershed groups or initiatives should be represented in and share information and possible solutions for any basin-wide management plan.

Land Management Planning

Current land use planning and management in the Truckee-Carson basins, as everywhere, affects property in which individuals have an interest. Their ownership and other interests are held as sacred individual rights and infringement upon these rights is considered threatening. This was not always the case. The settlers of the American colonies brought European traditions, values and laws to the new land as is, such the establishment of communities with town squares providing common land for all. By the late 19th century, much of the sense of community good had evaporated with the wealth and competition generated by successful land development and industry. Cities jammed housing together lacking a common square or park and adjacent to factories. Farmland conversion enabled cities to grow to accommodate rapid population growth relying on the notion there was always more farmland to the west.

Around the turn of century, the public conscience took a turn toward reform and social justice. During this century, land use regulation developed from health and safety concerns addressing how housing should be built and how activities affecting neighborhoods and communities should be located. Zoning regulations set standards for structures so that there is adequate space for light and air and sufficient distance from noisy, smelly and noxious activities. These early zoning regulations addressed the most egregious incompatible and unhealthy development, while concepts of beautiful cities were the province of public works, public land use or barons willing to fund beneficial projects.

Patterns of land use after World War II emphasized suburban development providing communities with individual amenities of house and yard, without the common pool of land and land use associated with the colonies. The perceived mistakes of the uncontrolled sprawl development of the 1940s and 50s became apparent to the social activists generation of the 60s, spawning the advent of serious planning and environmental controls.

Driven by concerns for public health and safety and quality of life, Congress and state legislatures passed laws for clean water, clean air, environmental assessment, regional land use (mostly coastal protection) and endangered species. In general, people believed that land is an exhaustive resource, not

just a commodity, and is essential to the economy, environment and general well-being of the community.

The concept of the public welfare is broad and inclusive . . . The values it represents are spiritual as well as physical, aesthetic as well as monetary. It is within the power of the legislature to determine that the community should be beautiful as well as healthy, spacious as well as clean, well-balanced as well as carefully patrolled. [Justice William O. Douglas, state in *Berman v. Parker*, 348 U.S. 26 (1954).

The police power is not confined to elimination of filth, stench, and unhealthy places; it is ample to lay out zones where family values, youth values, and the blessings of quiet seclusion and clean air make the area a sanctuary for people. Justice Douglas, *Village of Belle Terre v. Boraas*, 416 U.S. 1, 9 (1974)

As the consequences of implementing these expanded laws and regulations began to affect people's activities, resistance grew and the good intentions of rational land use for environmental goals were challenged. In many sections of the country but especially in the West, land use planning is depicted as a governmental scheme to deny the use of vested property rights.

Regional Land Management Planning in the Truckee-Carson Basin.—Although there are regional and statewide land use Planning programs, such as the Tahoe Regional Planning Agency, neither California nor Nevada have a state master plan nor adequate programs for land management.

Comprehensive land management planning for the implementation of the negotiated agreements in the basins is recognized by almost all entities as a necessity for coping with increasing demand on land and water and its effect on development, agriculture and the environment. The conundrum for people is how to reconcile commonly held values of clean water, environmental values of open space and wildlife, the quality of life including housing, jobs and modern amenities and the closely held belief in vested rights.

As described in greater detail below, the LESA process is facilitating decisions for lands more suitable for selling water rights and thus undergoing a land use conversion. The LESA process is agriculturally based although it has been modified to accommodate wetland values. But other land uses are used for criteria to assess agricultural land conversion and not for its suitability for other uses. In concept, LESA demonstrates that resource management is acceptable to most, signifying a comprehensive land

management system *may* be used to facilitate and improve implementation of environmental laws and in particular, negotiated agreements.

Key person interviews showed that overall resource management process is regarded favorably in the Truckee-Carson basin but implementation through land management is not regard highly. Several caveats render the process ineffectual. The smaller the planning area, the more likely people would participate in a resource management effort. The smaller area would limit the stakeholders which has the advantage of not having to address all issues directly and indirectly related to the management needs of the area. The disadvantage is perpetuating the parochial geographical interests and limiting the potential solutions that might otherwise be available within a larger planning area. Other caveats include the standard of participation which some have suggested excludes those without existing water rights. This restriction limits the issues to be addressed and again the potential array of solutions. And finally, while resource management is endorsed by many, the necessary land restrictions through land management are resented.

Defining the mission for a land management plan is essential. It may be possible to involve all parties in a watershed resource management planning process where the goals are ecosystem restoration, water use efficiency and conservation, water supply and quality and reduction of flood threats. The goals would have to refined with policies to help define restoration targets and performance expectations, best management practices for water use and water quality, assurance criteria or long-term reliable water supply, and expected effective flood management. To implement the subsequent goals and polices requires planing tools to ensure durable land use designations based on the resource management needs.

Implementing Land Management.—Truckee-Carson basin land management would involve the planning process and public participation, developing a vision or the planning area, identifying issues, and in addition, must include the following:

- ! Map, for purposes of environmental constraints and not just jurisdiction, and describe watershed lands, resources and natural habitats.

- ! Describe the current condition of the land and resources. (e.g., an inventory of wetland and riparian vegetation and a description of the general health of such vegetation, any known species habitat, description

of habitat linkages for biodiversity, known or suspected historic sites and other resources).

- ! Describe and map the extent of the panning area (e.g., the affected reaches of a river system and the area's natural history, function, use, value and extent of the effects of human activity).
- ! Describe existing scenic resources.
- ! Describe relevant acts, plans, policies, programs and regulations that may affect the area and its resources.
- ! Analyze carrying capacity to identify potential cumulative impacts to watershed lands and resources and to establish the appropriate uses and limitations on those uses within an affected area such as an ecological landscape region, watershed or riverine system. (e.g. a discussion of the watershed functions and values).
- ! Prepare background reports on the physical, social and economic characteristics of the planning area.

The Natural Resources Conservation Service comments, with respect to the above, that "many of the inventories suggested are currently completed and available. NRCS has completed soils surveys and conservation plans on much of the privately owned land in the United States, and much of the land in the Truckee-Carson Basin. In addition, a great deal of the public land has completed soils surveys, including all the lands within the Truckee-Carson Basins in Nevada. TCID and Reclamation have extensive information concerning the Newlands Project, county and state governments have a great deal of information concerning infrastructure, water use, water needs, land use, and other resources. Numerous other land management agencies within Interior have extensive databases of information, as well as local and state agencies, and private sources. There is probably little need for more data collection, but rather a greater need for compilation of available information."

Action plans would be needed to implement the plan elements. The following are planning tools useful for implementation:

- ! **Adoption of Planning Documents and Zoning Standards:** These planning documents are subject to change by the decision making body and are often considered as long lasting as the next election.

- ! **Transfer of Development Rights:** Individual landowners can enter into negotiations whereby the owner (sender) of open space, or habitat land sells or transfers “development credits” to a landowner-developer (receiver) wishing to increase the density on a developable parcel. This approach requires comprehensive land plans to identify sender sites, reserved sites and receiver sites. Separate land banking accounts may be necessary.

- ! **Multiple-Owner Specific Plan (Open Space Land Dedication Financed by Open Space Assessments or Impact Fees):** Through a specific plan or area plan process, protection costs are spread over all landowners in the plan area, and are financed by land-secured debt or benefit area fees, giving smaller landowners the benefit of a large-scale specific plan.

- ! **Land Readjustment Through Joint Venture Partnerships:** Under a land readjustment program, multiple landowners transfer their properties into a single entity in exchange for a proportionate interest in the entity.

Because within the Truckee-Carson Water Basin there has been such fierce fighting about water, and because the latest steps toward settlement changed nearly a century of agricultural practice and arrangements, it would seem necessary to have a legislative charter to establish a comprehensive land management system. The charter would need to clearly define its purpose, the process and guiding principles or rules of the game. An example of such a charter is given in the Tahoe Compact.

An existing entity which could take a leadership role is the TROA Committee, although it would have to be expanded for basinwide coverage, its purpose expanded to be more than water distribution, and all stakeholders representing interest throughout the basin and affected by watershed management and land use planning.

If comprehensive land use were initiated, planning could be applied to address concerns about water being bought for urban uses. The planning process could help define a secure, planned commitment to agriculture in the basins, within the constraints of the overall system, including tribal trust responsibilities and environmental goals. It can build local partnerships, identify all the issues, involve the public, develop comprehensive background reports, and support constraints and opportunities mapping based on physical criteria of soil, water, infrastructure and land form.

Up-front land use planning is seen by many to make sense, but current planning seems to be disconnected from the realities of the land. Most participants in the process encourage the adoption of physical standards, but some were concerned that stakeholders would not be part of the decision making for establishing standards.

Land use planning and management is the preferred alternative to litigation, but there is frustration about the local planning process which seems driven by politics and growth pressures. The repeating process of master planning an area and then amending the plan or worse ignoring the plan to accommodate immediate market needs of development is a barrier to full participation and acceptance of land use planning.

Land management can be a prudent and fair approach to address competing demands for resources. The process of planning is preferred over litigation by being an inclusive process with consensus decision making. But the implementation of the plan is often viewed as flawed and unreliable. A key problem is lack of planners involvement in resource management initiatives. Land use planners are often not employed by resource agencies where this type of project is initiated. They are aware of more creative ways to get things accomplished, rather than relying on acquisition as do so many in the land management field.

Land Evaluation and Site Assessment (LESA)

The LESA system is a tool developed by the Natural Resource Conservation Service to implement the Farmland Protection Policy Act of 1981 (Public law 97-98). LESA provides systematic and objective ratings of the agricultural suitability of land as compared to other uses. It uses soils soil and assessment of soils capability and productivity together with a social and economic site assessment to create a comprehensive planning tool. It has been suggested as a means to focus agricultural use in the Newlands Project areas under the pressure of water rights acquisition and transfers, to preserve the most productive areas and focus acquisition on more marginal lands.

The land evaluation (or LE) is a process to rate soils to a specific parcel for agricultural use. A relative value is determined for each soil type. In practice the LE relies on the land capacity classifications, important farmlands classifications, soil productivity ratings, or soil potential ratings. The site assessment (SA) component of LESA scores the site for attributes such as parcel size, relationship with nearby land uses, land-use regulations, farm-use taxation status, impacts of proposed use, compatibility with local

comprehensive or general plans, and proximity to urban areas. The scoring of the parcel based on the LE and SA ratings indicate the parcel's relative agricultural value.

LESA is considered a land use-planning tool for agriculture. Too often the land use planning process sets goals and objectives, including standards, for open space, residential development, highway alignments and public services, and uses agriculture lands as reserve lands without regard for the capabilities and productivity of the agriculture. LESA is intended to identify the best land in the most valuable agricultural regions, allowing local government to direct development to non productive or less productive lands and areas avoiding adverse impacts to agriculture.

Land Evaluation.—In evaluating land for crop production, soils are rated by one or all of three systems listed above.

Land Capability Classification: The U.S. Department of Agriculture (USDA) uses land capability classification system for classifying soils according to potential for field crops or pasture. Eight classes and four subclasses indicate the limitations of each type of soil. This system is the most widely used land rating scheme in farmland protection. The soils are classes according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment.

Important Farmland Identification: Important farmland identification is a USDA rating system that places land in one of four groups: prime farmland, unique farmland, land of statewide importance, and land of local importance. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods.

Unique farmland other than prime farmland is used for the production of high-value food and fiber crops. Examples of such crops are citrus, tree nuts, olives, fruit, and vegetables.

Additional farmland of statewide importance is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. Criteria for defining and delineating this land are to be determined in the appropriate state agency or agencies.

Additional farmland of local importance, where appropriate, are identified by the local agency or agencies concerned.

Soil Productivity: Soil productivity is the capability of a soil to produce a specified plant or sequence of plants under a physically defined set of management practices. This determination is more an economic than a soil science concept.

Soil Potential: Soil potential ratings are classes that indicate the relative quality of a soil, compared with other soils in the area, for a particular crop.

Site Assessment.—The site assessment portion of LESA is designed to rate factors other than the soils and overall agricultural productivity of the land. Site assessment involves the human influence on the land, such as the proximity of the land to urban centers and the amount of on-farm investments.

The site assessment is designed by the state or local land use permitting government. The types of factors that may be included in site assessment include the following:

- ! Percentage of land in urban use within a few miles of the proposed site, as well as the percent of land in urban use adjacent to the site, and the distance of the site from an urban area.
- ! The percentage of the site that has been farmed in the past few years.
- ! The extent to which the site is protected by state and local farmland protection policies and programs.
- ! The size of the farm containing the site, as compared to the average farm size in the county.
- ! The extent to which the conversion of the proposed site causes the conversion of other farmland to non-farm uses.
- ! The extent to which agricultural support services exist in the area, and whether the conversion of the proposed site would reduce the demand for such services.
- ! The extent to which on farm investments have been made and maintained.

- ! The extent to which the proposed land use is compatible with agricultural uses in the area.

The maximum scores for each factor are assigned according to the importance of the factor.

LESA's use of technical information is combined with information associated with land use planning to provide a mechanism by which as much information as possible can be gathered about a site and its surroundings before taking any actions to change the existing land use.

LESA Applied to Land Acquisition for Agreement Water.—The Natural Resource Conservation Service (NRCS) modified the standard LA evaluation criteria to evaluate lands subject to water purchase program pursuant to the Settlement Agreement. The LESA team was led by NRCS and consisted of representatives of the Bureau of Reclamation, Agricultural Extension Service, the Navy, Fallon Paiute-Shoshone Tribe, Nevada State Lands, City of Fallon, Churchill County, Truckee-Carson Irrigation District, Lahontan and Still Water Conservation Districts, The Nature Conservancy, Lahontan Valley Alliance, and Newlands Protective Association. Invited but not participating were the Farm Bureau and the Fish and Wildlife Service (the latter attended some meetings toward the end of the process).

The team developed the SA to provide an objective criteria for the water rights purchase program. The custom-designed criteria takes into account the value of wetlands, which in many instances are adjacent to prime farmland. LESA ordinarily would evaluate the wetlands as open space contiguous to prime farmlands resulting in a high score for the farmland thus not suitable for "conversion" or sale of water. By modifying the criteria the farmlands near wetlands received a lower score based on the water use efficiencies.

This modified LESA has been adopted by Churchill County planning and can be used by the FWS as a base map for identifying opportunities for conversion. The FWS claims not to have an ability to target purchase (which appears contrary to Section 207(c)(2)(B) of the Settlement Act) and so has resisted using the LESA map to identify potential willing sellers. Currently the only agency subjected to the restrictions of LESA scoring is the FWS, which feels this is inequitable application of a planning tool that should be required for others seeking to convert agricultural land.

Future Uses For LESA.—LESA is similar to a land based opportunities and constraints analysis used by planners (see McHarg, *Design With Nature*) County planners are using the parcel scoring for land use determinations for future growth. This experience is instructive for land management whose objectives are efficient resource management. The base map depicts the most suitable soils for agriculture thus directing urban development away from these sites. With modification, LESA can incorporate wetland and other habitat factors into the rating system to define land use designations for urban development, open space, agricultural lands, wildlife habitat, flood plains, forest lands, and mineral resources.

LESA could be used aggressively to focus irrigation on the most efficient canals, best soils, and most productive farmers, shrinking it to a tight core while using land swaps to trade outliers back into the center. Leadership for this approach should be by the Natural Resource Conservation Service which is a trusted agency experienced in the land evaluation process. The cost of this endeavor could be funded through a water transfer fee at the time of water right acquisition as well as real estate transfer tax. However, these funding mechanism should be developed in the overall process.

Carrying Capacity

It is easy, in following the consuming story of the Truckee-Carson River Basin water conflicts and settlements, to lose sight of the rather elemental overarching goal of all this activity, which is simply to adjust human use pressure to the capacity of the resource. Do the negotiated agreements and water adjudications well prepare the basins to live within their long-term carrying capacity for water?

As was noted in the Phase I report, carrying capacity considers the ability of a resource to *sustain* a given level of use, in *good condition*, in *perpetuity*. Obviously, under such a definition, the capacity of water to sustain use in the Truckee-Carson basins while remaining in good quality (and maintaining associated resources in good quality) has been a fundamental driving factor which has motivated Interior, the Tribe, the irrigators and Sierra Pacific (among others) to pursue their various agendas over the past decades. In essence, water-related problems in the Truckee-Carson Basins arise from exceeding carrying capacity with respect to this critical, limiting resource. With Nevada growing at an unprecedented rate (4% to 5% annually) and heavy urban growth in the Truckee Meadows, the long-term sufficiency of basin resources to meet water demands is a key objective addressed by

TROA and the other agreements and actions that are being undertaken to implement the negotiated settlement.

Once carrying capacity is reached, the key question is no longer resource development, but reallocation, a fact with which the Truckee-Carson Basin has been grappling for some years now. This situation is characteristic of water throughout the West today. However, “carrying capacity” with respect to total demand on a resource is far from a final, static answer so long as means exist to move the resource from one use to another. Viewed from the perspective of economics, this leads to discussion of water markets and the ability of the resource to move from lower value uses to higher value ones. This also raises the question of whether so-called “lower-value” uses are in fact of such low value or whether subsidies have kept the price artificially low.

Many of those involved in the settlement negotiations over the past decade made similar comments with regard to carrying capacity. They feel that the period of growth covered by TROA is about as far as water can be pushed to serve the competing demands in the Truckee-Carson basins. Limits and constraints are perceived to be very real. TROA is planned to accommodate a certain amount of water supply growth in Truckee Meadows and, after that is reached, it is not clear where additional water would come from. Irrigated agriculture continues to consume a large proportion of the Truckee-Carson basins’ water supplies and can look forward to continued pressure in competition for that water so long as the economics involved favor the use of water in other ways.

In a way, TROA serves as a growth plan, and perhaps one lesson to be taken here is that more attention might be given to careful documentation of the growth projections upon which it is based. Not just the future that is likely to be experienced should be considered, but also the future that is desired. In general, the long-term questions of planning for growth and accommodating the carrying capacity of the resource are not directly addressed by the process that has gone on over the past decade. It would be well for future generations and the long-term economic and environmental health of the Truckee-Carson basins that they be more explicitly addressed, both here and throughout western water policy.

Notes

¹ Don DeLong, Fish and Wildlife Biologist, Stillwater National Wildlife Refuge, personal interview, October 23, 1996, Fallon, Nevada.

² Ibid.

³ Sierra Pacific, in comments on the draft report, states that this statement is not correct. The Sierra Pacific comment goes on to state that its Resource Plan “identifies 36 alternative water supply options, including the Negotiated Settlement, which would extend the community’s water supply for over 50 years. None of these options call for use of Newlands’ water rights...The predominant use of water in the basin is still agricultural...and water supply planning for Reno/Sparks contemplates the continued conversion of Truckee Meadows agricultural rights to municipal use. Based on projected growth rates and the total number of water rights in existence, this conversion process can continue for approximately 50 years.”

⁴ *Water Market Update* (published by Western Network, Santa Fe, New Mexico) (1988).

⁵ *Pyramid Lake Paiute Tribe v. Washoe County*, 112 Nev. 743 (1996)

⁶ Nevada State Engineers Office, 1987.

⁷ Maurer, 1986; Prudic and Wood, 1995

⁸ Bohman, Berris, and Hess, 1996, Hess 1996

⁹ Arteaga, 1982

¹⁰ USDOJ 1996 *op. cit.* p. 1-19

¹¹ Truckee River Water Quality Agreement, October, 1996

¹²U.S. Department of Interior, Fish and Wildlife Service, *Water Rights Acquisition for Lahontan Valley Wetlands, Final Environmental Impact Statement*. Region 1: Portland Oregon, September 1996, p. 1-1.

¹³USDO I, *op. cit.* p. 1-5.

¹⁴Don DeLong, Fish and Wildlife Biologist, Stillwater National Wildlife Refuge, personal interview, October 23, 1996, Fallon, Nevada.

¹⁵Estimates we have seen range from 80 percent to 95 percent, but no credible estimate indicates less than a four-fifths loss of this habitat type.

¹⁶USDO I, 1996 *op. cit.* P. 1-5

¹⁷*Ibid.*

¹⁸USDO I, 1996 *op. cit.* p. 3-75; George Laycock, "What Water for Stillwater?", *Audubon* 1988. Refer to USDO I 1996 for detailed, up-to-date technical studies regarding the status of waterfowl and shorebirds on the Lahontan Valley wetlands.

¹⁹USDO I 1996 *op. cit.* p. 3-76

²⁰*Ibid.*

²¹*Ibid.*, 1-14, 1-23

²²*Ibid.*, 1-14

²³Nevada Division of Water Planning, *Truckee River Chronology*, July 1996 update, prepared by Gary Horton.

²⁴USDO I, 1996 *op. cit.* P. 1-2

²⁵USDOJ 1996 *op. cit.* Table 3.6.A. See the FEIS for detailed discussion of the wetlands of the Lahontan Valley.

²⁶USDOJ 1996 *op. cit.* p. 1-5. Don DeLong, SNWR biologist, estimates that of the 125 TAF of water rights to be purchased, only about 102 TAF could be delivered owing to carriage water losses. The difference would need to be made up with drain water and other purchased or leased water.

²⁷USDOJ 1996 *op. cit.* p. 1-18

²⁸Sue Oldham, attorney representing Sierra Pacific Power Company, personal interview, November 8, 1996, Reno, Nevada. The referenced agreement, the Preliminary Settlement Act, has of course many more benefits and much broader scope (see discussion below).

²⁹John Slaughter, Washoe County Planning Department, cited in comments to draft report submitted by Sierra Pacific.

³⁰Local governments in Carson City and the former Ormsby County merged to create one countywide entity called Carson City.

³¹University of Nevada, Tech. Report UCED 93-11, 93-14, and 94-12

³²USDOJ 1996 *op. cit.*

³³USDOJ 1996 *op. cit.*, Appendix 7, "Socio-Economic Effects of the Water Rights Acquisition Program Authorized for Lahontan Valley Wetlands," Meyer Resources Inc.

³⁴USDOJ 1996 *op. cit.*, Appendix 6, "Economic Impacts of the USFWS' Water Rights Acquisition Program for Lahontan Valley Wetlands," Professor David Sunding, Dept Agriculture and Resource Economics, University of California at Berkeley.

³⁵"Old Growth Forests on State School Lands. Dedicated to Oblivion? Private Trust Theory and the Public Trust," *Washington Law Review* 65:151, 1990

³⁶*Pyramid Lake Paiute Tribe of Indians v. Morton*, 1973

³⁷*Nevada v. United States*, 1983

³⁸National Research Council, *Water Transfers in the West*, National Academy Press, Washington, D.C. 1992.

³⁹U.S. Senate, *Providing for the Settlement*.

⁴⁰The Reno Gazette-Journal, March 4, 1995, pages 4A-5A

⁴¹Lahontan Valley News, September 5, 1995, page 1.

⁴²Sierra Pacific Power Company, *Water Resource Plan*, 1994, p. 4-2

⁴³Sierra Pacific Water Resources Plan, 1994

⁴⁴Water Intelligence Monthly, 6/94, p. 7-8

⁴⁵Sierra Pacific, *Water Resources Plan*, 1994

⁴⁶*Ibid.*

⁴⁷Janet Carson, Sierra Pacific Power Company, personal interview, November, 1996

⁴⁸Effect of Preliminary Agreement concerning Satisfaction of Conditions Precedent to Entry Into Settlement Agreement, signed by Sierra Pacific and Pyramid Lake Paiute Tribe, August, 1996

⁴⁹William D. Rowley, "The Newlands Project: Crime or National Commitment?" *Nevada Public Affairs Review* 1:39-49, 1992

⁵⁰Tarlock et al., *Water Transfers in the West*, National Research Council 1992.

⁵¹Rowley, *op cit*.

⁵²For lands above Lahontan Reservoir, served only by the Carson River, the net consumptive use was established at 2.5 acre-feet based on 4.5 acre-feet per acre diverted to the canal for the bottom lands, 6.0 acre-feet per acre diverted to the canal for alluvial fan lands, and 9.0 acre-feet per acre diverted to the canal for bench lands. [See Alpine Decree, Findings of Fact, Conclusions of Law, Tabulation and Administrative Provisions, *United States of America v. Alpine Land & Reservoir Company, a Corporation, et al.*, Civil No. D-183 BRT, Final Decree, United States Federal District Court for the District of Nevada, October 28, 1980, page 11.]

⁵³Further detail on the lakes and reservoirs is provided in the *Truckee River Atlas* (1991, Chapter 3).

⁵⁴Alpine Decree, Findings of Fact, Conclusions of Law, Tabulation and Administrative Provisions, *United States of America v. Alpine Land & Reservoir Company, a Corporation, et al.*, *op. cit.*

⁵⁵Benson, Larry V., "Fluctuation in the Level of Pluvial Lake Lahontan During the Last 40,000 Years," *op. cit.*, pages 303-306.

⁵⁶*Reno Gazette-Journal*, April 30, 1996, page 3B.

⁵⁷Water Resources Data, Nevada, Water Year 1994, *op. cit.*, page 513

⁵⁸Data collected under contract by Sierra Hydrotech, a consultant who tabulated Truckee Canal diversions from the Federal Water Master's gage for water years 1910-1966. This tabulation showed an average annual diversion of 239,700 acre-feet.

⁵⁹California-Nevada Interstate Compact Between the State of California and Nevada, *op. cit.*, Article VII, Paragraph E, page 20.

⁶⁰See Nevada Revised Statutes (NRS) 538.600 and Chapter 1480, California Statutes 1970.

⁶¹The Carson River Basin also receives some inflows from the Walker River Basin (via Adrian Valley) and from the Humboldt River Basin (via the Humboldt Slough from the Humboldt Sink). While the Walker River Basin inflows are typically infrequent and inconsequential, flows from the Humboldt Sink have, on occasion, been substantial. See, for example, entry for December 1986 in Part III of the *Carson River Chronology*.

⁶²Reno Gazette-Journal, April 30, 1996, page 3B.

⁶³The difference represents the consumptive use of the Truckee Division of the Newlands Project below the Truckee Canal, consisting of approximately 5,300 acres of primarily bench lands, as well as operational losses (evaporation, seepage, etc.). For a more recent period of record, 1988-1994, these figures showed an average of 167,760 acre-feet per year being diverted at Derby Dam into the Truckee Canal and 134,370 acre-feet per year entering Lahontan Reservoir, resulting in approximately 80 percent of total diversions reaching the Carson River.

⁶⁴Harrison Dunning, "The Public Trust: A Fundamental Doctrine of American Property Law", *Environmental Law* 19-515, 1989

⁶⁵*Ibid.*

⁶⁶Donald Connors, *The National Public Trust Safety*, 1990

⁶⁷Lyn Collins, USDOJ Solicitor General, personal interview, November 20, 1996, Sacramento.

⁶⁸*Morse v. Oregon Div. of State Lands*, (1979).

⁶⁹See *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, Prepared by Water Rights Study Group, Pyramid Lake Task Force, [for the] U.S. Department of the Interior, Office of the Solicitor, Sacramento Region, Sacramento, California, August 1971,

pages 92-95.

⁷⁰For a reprint of the Preliminary Settlement Agreement, see *TRUCKEE RIVER ATLAS*, *op. cit.*, Appendix 2, pages 119-126.

⁷¹Rieke, Elizabeth Ann, Assistant Secretary, Water and Science, U.S. Department of the Interior, Statements before the Subcommittee on Water and Power, Committee on Energy and Natural Resources, United States Senate, Oversight Hearing on Public Law 101-618, *The Fallon Paiute Shoshone Water Rights Settlement Act of 1990 and The Truckee-Carson-Pyramid Lake Water Rights Settlement Act*, April 1994.

⁷²Elsewhere, we have described the PSA as a breakthrough achieved by direct negotiation between the Tribe and Sierra. The Tribe's attorney adds the following amplification: Senator Laxalt had introduced settlement legislation based on a 1984-85 settlement effort, but it failed amid general disagreement, including internal differences on the part of the Tribe. Joe Ely then became tribal chairman. A tribal referendum opposed the Laxalt bill but supported continued negotiations. Ely and Bob Pelcyger, the Tribe's attorney, then created an overall settlement proposal which was carried to various interests. Extensive negotiations were held with Sierra Pacific in 1986. However efforts in May of 1986 by Senator Laxalt, who was retiring and wanted to make a final push to ratify the California-Nevada interstate, interrupted these negotiations as resources were diverted to oppose the compact. After Laxalt retired, Reid took office and in 1987 began to take interest and a leadership role in reviving the negotiations that led to the PSA. It remains accurate to state, however, that the parties directly negotiated among themselves the use of the federal facilities involved and then carried their agreement to the federal authorities for approval.

⁷³Since 1920 a state law had prohibited the installation of water meters on residences within Reno and Sparks. The PSA required as a condition precedent to its effectiveness that the Nevada legislature repeal or substantially modify this law. The legislature did so in 1989.

⁷⁴The local entities recognized the Tribe's independence and sovereignty and agreed that the Tribe would not be bound by the decisions of the commission.

⁷⁵*Reno-Gazette Journal*, November 2, 1995, pages 1B and 4B.

⁷⁶Pyramid Lake's threatened Lahontan cutthroat trout may be the best symbol of this comprehensive, top-to-bottom approach to the entire watershed. Prior to the dewatering of the lower Truckee River, the creation of the delta at the mouth of the River and the construction of Derby Dam and other obstructions, the trout migrated from their home in Pyramid Lake through the Truckee Meadows (Reno and Sparks) to spawn in the upper reaches of the Truckee basin in California. Tribal and California officials are working within the ambit of TROA to bring the trout back to their traditional spawning grounds to the extent compatible with existing conditions. The return of this magnificent creature to the headwaters of the Truckee River system could be the coup de grâce of the settlement.

⁷⁷*Pyramid Lake Paiute Tribe v. Morton* 354 F. Supp. 151 (D.D.C., 1973).

⁷⁸The Secretary's right to terminate the contract was upheld in 1984.

⁷⁹Personal communication, Al Olson, U.S. Bureau of Reclamation, Lahontan Basin Projects Office, Carson City, Nevada.

⁸⁰*Pyramid Lake Tribe of Indians v. Hodel*, 1989

⁸¹Water right application file 9330, Office of the State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada.

⁸²Water right application file 9330, Office of the State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada.

⁸³Reno Gazette-Journal, August 3, 1995, page 1B, and Olson, *op. cit.*

⁸⁴Turnipseed, *op. cit.*, and *Nevada Appeal*, Carson City, Nevada, November 14, 1995, page A9.

⁸⁵B. Saliba & D. Bush, at 139.

⁸⁶Robert Firth. "Policy statement regarding expansion of Sierra Pacific Power Company's Water Service Territory." Presented to the Nevada Public Service Commission, Carson City, August 24, 1979.

⁸⁷Nevada Public Service Commission. Rule 17, Docket No. 81-204 (February 8, 1982). Revised, Docket No. 84-665 (November 19, 1984).

⁸⁸City of Reno. Agenda Report No. 85-70, February 11, 1985. See also City of Sparks, Municipal Code, Section 17.12.075.

⁸⁹Personal conversation with Robert Firth, Manager of Gas and Water Engineering and Planning, Sierra Pacific Power Company, Reno, 1985.

⁹⁰Personal conversation with Sandy Landeck, City Property management Specialist, Sparks, Nevada.

⁹¹Personal conversation with John Collins, Chief Sanitary Engineer for Washoe County, Reno, Nevada, 1985.

⁹²Personal conversation with Louis Test, attorney, Reno, Nevada, 1985.

⁹³Personal conversation with Sandy Landeck, City Property management Specialist, Sparks, Nevada.

⁹⁴R. Turnipseed, *Environmental and Water Allocation: Truckee River and Lake Tahoe* at 3 (1989).

⁹⁵*Water Market Update*, Vol. 2-3 (1988-89).

⁹⁶Congressional Appropriation, *Water Market Update*, Vol. 2-3 (1988-89).

⁹⁷Nevada SB 189 (1989); *Nev. Rev. Stat.* § 538.600 (1987).

⁹⁸Nevada SB 332 (1989); *Nev. Rev. Stat.* § 244A.459 (1987).

⁹⁹*Water Strategist*, 1/91, p. 92, vol. 4

¹⁰⁰Assembly Bill 172, 1991; *Water Strategist*, 10/91. Vol. 5, no. 3, p.4

¹⁰¹*Water Strategist* 7/95, vol. 9, no.2, p. 8

¹⁰²*Water Market Update*, Vol. 2-3 (1988-89).

¹⁰³USDOJ 1996 *op. cit.*

¹⁰⁴FWS and NDOW personal communication, Nov., 1996

¹⁰⁵Richard Grimes, FWS, personal communication, November, 1996

¹⁰⁶*Reno Gazette-Journal*, August 3, 1995, page 1B, and personal conversation with Al Olson, U.S. Bureau of Reclamation, Lahontan Basin Projects Office, Carson City Office, August 29, 1995.

¹⁰⁷W. Turrentine Jackson and Donald J. Pisani, *A Case Study in Interstate Resource Management: The California-Nevada Water Controversy 1865-1955* (Davis, Ca.: California Water Resources Center, May 1973); W. Turrentine Jackson and Donald J. Pisani, *Lake Tahoe Water: A Chronicle of Conflict Affecting the Environment* (Davis, Ca.: Institute of Governmental Affairs, 1972).

¹⁰⁸*Ibid.*; W. D. Rowley, "The Newlands Project: Crime or National Commitment?" *Nevada Public Affairs Review* 1 (1992), 39-43.

¹⁰⁹*Ibid.*

- ¹¹⁰. *Truckee River General Agreement* (1915).
- ¹¹¹. California Department of Water Resources, *Truckee River Atlas*; Jackson and Pisani, *A Case Study*.
- ¹¹². *Ibid.*
- ¹¹³. Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Penguin Books, 1987); Reisner and Bates, *Overtapped Oasis*.
- ¹¹⁴. Timothy G. Haller, "The Legislative Battle Over the California-Nevada Interstate Compact: A Question of Might versus Native American Right," *Nevada Historical Society Quarterly* 32 (3, 1989), 198-221.
- ¹¹⁵. *Ibid.*
- ¹¹⁶. *Ibid.*
- ¹¹⁷. U.S. Senate, *Providing for the Settlement*.
- ¹¹⁸. Haller, "The Legislative Battle"; Mehl, Personal Interview; D. Snape, Lobbyist for Pyramid Lake Tribe, Personal Interview (May 22, 1991).
- ¹¹⁹. Elmer Rusco, "The Truckee-Carson-Pyramid Lake Water Rights Settlement and Pyramid Lake," *Nevada Public Affairs Review* 1 (1992), 9-14; U.S. Senate, *Providing for the Settlement*.
- ¹²⁰. Robert Pelcyger, Pyramid Lake Tribal Attorney, Personal Interview (March 6, 1991).
- ¹²¹. It should be noted here that the Lahontan cutthroat trout have been restored to Pyramid Lake through a hatchery program; the cui-ui have also benefitted from this program--indeed, it may have saved both from extinction. What had not been achieved by this program at the time

settlement negotiations began, however, was enough water to restore the fishery, which would have taken enough water to allow natural spawning to occur in the lake. See Rusco, "The Truckee-Carson-Pyramid Lake Water Rights Act and Pyramid Lake."

^{122.} 32 Fed. Reg. 3098 43 C.F.R. 418

^{123.} *Pyramid Lake Paiute Tribe v. Morton* 354 F. Supp. 151 (D.D.C., 1973).

^{124.} The Secretary's right to terminate the contract was upheld in 1984.

^{125.} While the U.S. Senate, *Providing for the Settlement* suggests that these illegal diversions were in excess of 800,000 acre-feet, that amount is currently estimated at 1,057,000 acre-feet; this is the amount of recoupment requested in the lawsuit filed on same in November 1995: *The United States of America v. Board of Directors, et al.*, CN-N-95-00757-HDM, November 22, 1995.

^{126.} Pelcyger, Personal Interview; U.S. Senate, *Providing for the Settlement*.

^{127.} Pelcyger, Personal Interview.

^{128.} Mehl, Personal Interview; Pelcyger, Personal Interview; P. Zell, Executive Director of Senate Select Committee on Indian Affairs, Personal Interview (May 22, 1991).

^{129.} Frank Dimick, Western Relations Liaison, Bureau of Reclamation, Personal Interview (May 21, 1991).

^{130.}

^{131.} Mehl, Personal Interview.

¹³² The important things about the outcome of years of litigation as it stood in 1987, when Senator Reid began his effort, was that all sides had won some victories but no one felt secure or saw a way to get more of what they wanted through litigation. This was as true for TCID as it was for the other players. It still had extensive legal rights to use of water of both the Carson and Truckee Rivers, but found its Truckee use being reduced by the courts. That they misperceived their situation and thought they didn't have to compromise further is another likely explanation for their withdrawal from the negotiations (Elmer Rusco, Personal Communication, December 1993).

¹³³ Mehl, Personal Interview; Pelcyger, Personal Interview.

¹³⁴ *Ibid.*

¹³⁵ Mehl, Personal Interview; Zell, Personal Interview.

¹³⁶ Tom Hebert, Water Resources Assistant, Senate Agriculture Committee, Personal Interview (May 23, 1991).

¹³⁷ *Ibid.*

¹³⁸ Hay, Personal Interview; Joseph Hunter, Deputy Assistant Secretary of Water and Science, Department of Interior, Personal Interview (May 21, 1991); Mehl, Personal Interview; Rose, Personal Interview; Snape, Personal Interview; Zell, Personal Interview.

¹³⁹ Staller, Personal Interview.

¹⁴⁰ Coalition for a Negotiated Settlement, *An Economic Analysis of Water Use on the Newlands Project* (1990).

¹⁴¹ *Ibid.*

¹⁴² Dimick, Personal Interview.

^{143.} Bill Bettenberg, Deputy Assistant Secretary of Indian Affairs, Department of Interior, Personal Interview (May 23, 1991).

^{144.} *Ibid.*

^{145.} Staller, Personal Interview.

^{146.} Hay, Personal Interview.

^{147.} Mehl, Personal Interview.

^{148.} Source requested anonymity.

^{149.} To be fair to the TCID, as Rowley has pointed out, "although hard choices remain ahead for the users of water in western Nevada....[t]he hardest choices [now] will have to be made by the farmers and ranchers of the Fernley-Fallon area." We must recognize, after all, that this "community," which was created on the "basis of diverted river water, rightly refuses to believe that its founding and development was a mistake. It was an experiment based on a rather grand dream which has nourished a stable community in a state that has rarely enjoyed stability." Although environmental and other problems did ensue, "these can be addressed by government and community efforts in the future" ("The Newlands Project: Crime or National Commitment," 43) Indeed, such efforts are currently underway. An attempt is being made to address the concerns of the community, and incorporate those concerns into the decision making process, as implementation of this act proceeds apace.

^{150.} 104 Stat.3289 (1990).

^{151.} Sec. 209(J)(2).

^{152.} It should be noted that there is now being developed a new Operating Agreement for the Truckee River which will include, among other things, the results of the tradeoff between Sierra Pacific and the Pyramid Lake Tribe embodied in the Preliminary Settlement Agreement. The new OCAP agreement must include provisions to alter the present court-ordered rules

(Floriston Rates) so as to provide maximum benefit to the Pyramid Lake fishery. See Elmer Rusco, "The Truckee-Carson-Pyramid Lake Water Rights Settlement Act and Pyramid Lake," *Nevada Public Affairs Review*, 1 (1992), 13.

¹⁵³ Gary A. Horton, "Truckee River Chronology: A Chronological History of Lake Tahoe and the Truckee River and Related Water Issues," Carson City, Nevada (July 1996):III-40.

¹⁵⁴ 104 Stat.3289 (1990).

¹⁵⁵ *The United States of America vs. Orr Water Ditch Company, et al.*, Final Decree, Equity No. A-3, D-NV, September 8, 1944:87

¹⁵⁶ *The United States of America vs. Alpine Land and Reservoir Company, et al.*, Final Decree, Ninth District Court, October 28, 1980.

¹⁵⁷ *Pyramid Lake Tribe v. California; United States v. Truckee-Carson Irrigation District; Pyramid Lake Paiute Tribe v. Lujan; Pyramid Lake Paiute Tribe v. Department of the Navy*; and all pending motions files by the Tribe in Docket No. E-9530 before the Federal Energy Regulatory Commission.

¹⁵⁸ U.S. Fish and Wildlife Service, Water Rights Acquisition Program for Pyramid Lake and Lahontan Valley Wetlands, Nevada: Report to the United States Congress, Truckee-Carson-Pyramid Lake Settlement Act (Washington, D.C.: U.S. Government Printing Office, 1993):8.

¹⁵⁹ *Ibid.*, p. 16.

¹⁶⁰ Douglas K. Maurer, Ann K. Johnson and Alan H. Welch, Hydrogeology and Potential Effects of Change in Water Use, Carson Desert Agricultural Area, Churchill County, Nevada (Carson City, Nevada: U.S. Geological Survey, 1994):33.

¹⁶¹ Graham Chisholm, Nevada Special Projects Director, The Nature Conservancy, Testimony before the United States Senate Energy and Natural Resource Committee, Subcommittee on Water and Power, "On the Contemporary Needs and Management of the Newlands Reclamation

Project” (Reno, Nevada: The Nature Conservancy, December 1993):16,1

^{162.} Truckee-Carson Settlement Negotiations Meeting Notes, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, April 1995.

^{163.} Faith Bremner, “Fallon Farmers Quit Deal”, *Reno Gazette-Journal* 3 March 1995:1A, 4A, 5A

^{164.} *Reno Gazette-Journal*, August 3, 1996, page 1B.

^{165.} Source wishes to remain anonymous.

^{166.} Unlike California, which typically mandates a minimum instream flow for fishery and environmental purposes, Nevada has no such law to maintain minimum flows in its streams and rivers. Twice in recent history (August 1992 and 1994) the Truckee River completely dried up between Sierra Pacific Power Company's Glendale water treatment plant and Steamboat Creek, i.e., the outflow of the Truckee Meadows Water Reclamation Facility, a distance of nearly four miles.

^{167.} This may be the first time ever in the United States that a community committed money to purchase water rights to dilute the effects of its effluent discharges rather than spend even more money on expensive plant and equipment. In this regard, it was noted by the U.S. EPA representative, Mike Schulz, Associate Director of the EPA's Region IX Water Division, that this water rights purchase for pollution dilution was "extremely unusual" and something that he was not aware of anywhere else.

^{168.} *Reno Gazette-Journal*, October 11, 1996, pages 1A and 8A.

^{169.} David Sunding, “Economic Incentives For Improved Water Quality In Nevada’s Truckee Carson Basin,” Report to USEPA, January 31, 1997, p. 59.

^{170.} Bonnie G. Colby, “Recent trends in southwestern water values,” *Appraisal Journal*, 59:488–500, 1991.

- ¹⁷¹. R.L. Gardner and T. Miller “Price Behavior In the Water Market of Northeastern Colorado,” *Water Resources Bulletin* 19: 557-562, 1983.
- ¹⁷². B. C. Saliba and D. Bush, *Water Markets in Theory and Practice: Market Transfers, Water Values, and Public Policy*, Westview, Boulder, CO, 269. pp., 1987.
- ¹⁷³. US Supreme Court, *State of Arizona vs. State of California*, Final Decree, March 9, 1964.
- ¹⁷⁴. J.J. Ross, “Valuation of water rights for acquisition, condemnation and taxation purposes,” paper presented at proceedings of the Rocky Mountain Mineral Law Institute, RMMLI, Aspen, CO 1984.
- ¹⁷⁵. *Water Strategist*, published by StratEcon Inc., Claremont, California, 1993.
- ¹⁷⁶. Saliba and Bush, 1987, *op. cit*
- ¹⁷⁷. Clyde E. Stewart, “Operations of the Utah Rental Market, Delta Area, Utah.” US Department of Agriculture, Economic Research Service, 1965
- ¹⁷⁸. Daniel Beard, Commissioner, Bureau of Reclamation, Memo in response to senator Ben Bradley’s request for information on the Newlands Project, January 26, 1994, p.4.
- ¹⁷⁹. David Sunding, “Economic Impacts of USFWS Water Rights Acquisitions For Lahontan Valley Wetlands,” Dept. Agric. And Resource Economics, Berkeley, 1996, Table 1.
- ¹⁸⁰. American Institute of Real Estate Appraisers, *The Appraisal of Real Estate*, Chicago, 1987.
- ¹⁸¹. Sunding, 1997, *op cit*. p 54-57

^{182.} *ibid.*

^{183.} Janet Carson, Sierra Pacific, personal communication, November, 1996

^{184.} Grant Chisholm, Testimony Before US Senate Natural Resource Committee, Subcommittee on Water and Power, December 11, 1993, p. 12.

^{185.} David Yardas, Environmental Defense Fund, Memo to Second Settlement Parties on Water Banking Possibilities, February, 1995.

^{186.} Mary Reid, Nevada Cooperative Extension Service, Land Use In Churchill County, April 1996, Nevada Cooperative Extension Fact Sheet

^{187.} Sue Oldham, Sierra Pacific, personal communication, November 8, 1996

^{188.} Clyde, 1986.

^{189.} Environmental Defense Fund, Restoring Instream Flows: Water Marketing in the Yakima Basin, 1993, p. 49-50.

^{190.} Water Strategist, 1993, *op. cit*

^{191.} A.L. Lieuwen, L., "An institutional and economic assessment of water reuse in the Tucson basin," Ph.D. Dissertation, University of Arizona, 1989.

^{192.} Williams D. Back and Jeffrey S. Taylor, "Navaho water rights: pulling the plug on the Colorado River," *Natural Resources Journal*, January, 1980, pp. 70-90.

^{193.} Saliba and Bush, 1987, *op. cit.*

^{194.} *ibid*

- ¹⁹⁵. Oregon Senate Bill 24, 1987.
- ¹⁹⁶. Richard W. Wahl, *Markets for Federal Water: Subsidies, Property Rights, and the Bureau of Reclamation*, Washington, DC: Resources for the Future, 1989.
- ¹⁹⁷. *Water Intelligence Monthly*, published by StratEcon Inc., Claremont, California, July/August 1996 and October 1995.
- ¹⁹⁸. Yardas, 1995, *op. cit*
- ¹⁹⁹. *Water Intelligence Monthly*, *op. cit.*, September, 1994 and April, 1993
- ²⁰⁰. Environmental Defense Fund and Water Strategist, *op. cit.*
- ²⁰¹. Environmental Defense Fund, *op. cit.* p. 50-55
- ²⁰². *Water Intelligence Monthly*, *op. cit.* January, 1997
- ²⁰³. Benjamin Simon and David Anderson, "Water auctions as an allocation mechanism in Victoria, Australia," *Water Resources Bulletin*, 26(3):387-394, 1990
- ²⁰⁴. Environmental Defense Fund, *op. cit.* p 43-47
- ²⁰⁵. *ibid*, p. 47-50
- ²⁰⁶. Yardas, *op. cit.* 1995
- ²⁰⁷. Richard Grimes, Senior Realty Specialist, USFWS, Phone conversation, February 14, 1997

- ²⁰⁸. Grant Chisholm, personal communication, November 11, 1996
- ²⁰⁹. University of Nevada, Tech. Report UCED 93-11, 93-14, and 94-12
- ²¹⁰. Meyer, Inc. , “Socioeconomic Effects of Water Rights Acquisitions for Lahontan Valley,” September, 1993.
- ²¹¹. Sunding, 1996, *op. cit.*
- ²¹². David Yardas, “Restoring Endangered Ecosystems: The Truckee Carson Water Rights Settlement,” Natural Resources Law Center, Boulder Colorado, 1992.
- ²¹³. Meyer, 1993, *op. cit.* p. 21
- ²¹⁴. Covay, et. al, *The Environmental and Hydrologic Settings of the Las Vegas Valley Area and the Carson and Truckee River Basins, Nevada and California*, Water-Resources Investigation Report 96-4087, 1996.
- ²¹⁵. *ibid.*
- ²¹⁶. See, e.g., Maurer et al, *Hydrogeology and Potential Effects of Changes in Water Use, Carson Desert Agricultural Area, Churchill County, Nevada*, USGS Water Supply Paper 2436 1996
- ²¹⁷. *ibid.*
- ²¹⁸. Covay et al, 1996, *op. cit.*
- ²¹⁹. Garcia and Carman, 1986
- ²²⁰. Gary Shellhorn, US Fish and Wildlife Service, personal communication.

²²¹. Nowlin, 1987.

²²². Maurer, et al, 1996

²²³. *ibid.*

²²⁴. The Tribe also objected to some provisions included in section 209, particularly the moratorium on OCAP litigation.

²²⁵. See Comment Responses 4 and 6 submitted to the Western Water Policy Review Advisory Commission for full response to this point.

²²⁶. Curiously, the several paragraph comment is worded precisely the same in both the Fish and Wildlife Service and Department of Interior Office of Policy Analysis letters.

²²⁷. Joy Ely, "Pyramid Lake Negotiated Settlement: Overview and Perspective," *Innovation in Western Water Law and Management*, Natural Resources Law Center, University of Colorado School of Law, June 1991.

²²⁸. The M&I storage for California is one part of a large package of California issues addressed and resolved in TROA. Storage of a portion of California's Truckee River basin surface water allocation in federal re-servoirs is specifically authorized and contemplated in Section 207(d)(3) of the Settlement Act.

²²⁹. E. Leif Reid, "Ripples from the Truckee: The Case for Congressional Apportionment of Disputed Interstate Water Rights," *Stanford Environmental Law Journal* 14:145-179

²³⁰. Elizabeth Checchio and Bonnie G. Colby, "Indian Water Rights: Negotiating the Future," *Water Resources Research Center*, University of Arizona, 1993.

²³¹. 32 Fed. Reg. 3098 43 C.F.R. 418.