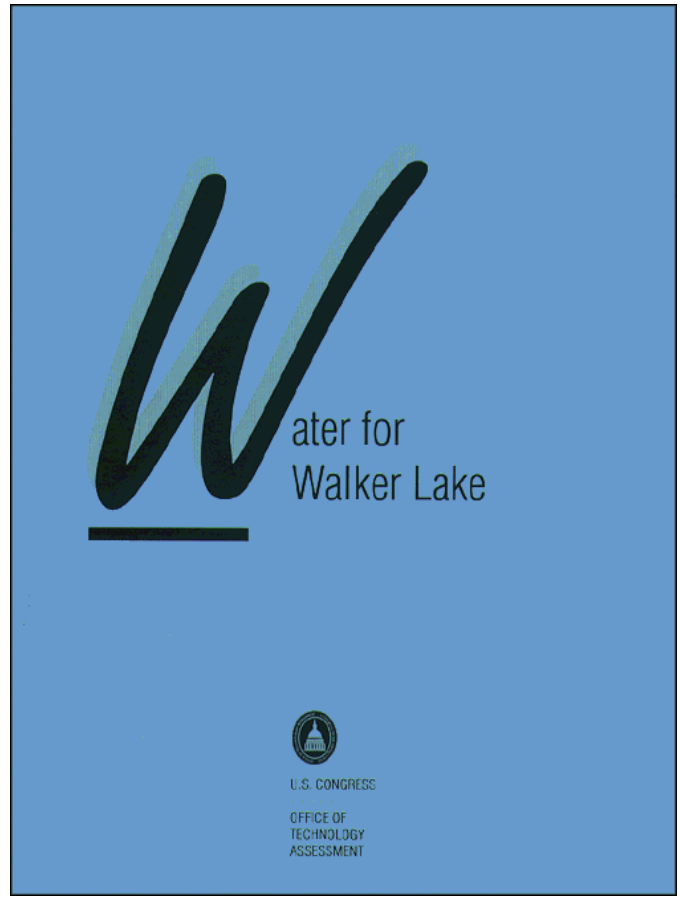
Water for Walker Lake

September 1993

OTA-O-584
NTIS order #PB94-107596





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Clyde Behney, Assistant Director, OTA
Health and Environmental Sciences Division

Robert W. Niblock, Oceans and Environment Program Manager

William E. Westermeyer, Project Director

Administrative Staff

Kathleen Beil
Kim Holmlund

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WASHINGTON, D.C. 20510

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Background

The Walker River flows through an arid and sparsely populated part of the western United States. Water in general is scarce in this region, and even in years of above average snowpack in the Sierras, there is little water available in the watershed for all those who would like to use it. Agriculture is by far the major user of Walker River water. Water began to be diverted from the river for agriculture in the last half of the 19th century in the Smith and Mason Valleys in Nevada and Antelope Valley in California.

Several water rights decrees, culminating in Decree C-125 in 1936, have allocated water rights according to the prior appropriation doctrine. Typical of most early water rights agreements, instream beneficial uses of water were not protected. Thus, in allocating rights to Walker River water, little thought was given to the effect that diversions would have on Walker Lake at the terminus of the river. As a result largely of agricultural diversions, the level of Walker Lake has fallen more than 120 feet since the early 1900s. The Nevada Department of Conservation and Natural Resources (NDCNR) has estimated that the average annual deficit (i. e., the difference between water entering the lake and water evaporating from it) over the last 30 years has been about 33,000 acre-feet per year. [1]

Since 1930, the average annual rate of decline of the surface elevation has been about 1.4 feet, according to the Nevada Department of Wildlife (NDW).[2] However, there is some disagreement and/or confusion over the rate at which the lake is falling, and indeed, the rate calculated depends on the span of years used for the calculation. The Walker River Irrigation

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[1] See State of Nevada, Department of Conservation and Natural Resources, Water River Basin Water Rights Model, June 1993 (Draft).

[2] M. Seven, Supervising Fisheries Biologist, Nevada Department of Wildlife, "Walker Lake, 'An Endangered Ecosystem, ' How Much Time is Left for the Lahonton Cutthroat Trout Fishery?" draft report, July 1993. p. 5.

District suggests the historic rate of decline is 0.9 feet per year. Between 1987 and 1992, a period of severe drought throughout the West, the level of Walker Lake fell about 3.7 feet per year.[3]

The current maximum depth of Walker Lake is about 110 feet. The U.S. Geological Survey estimates that Walker Lake will eventually stabilize at a maximum depth of about 40 feet absent any changes in how water is allocated among competing users.[4] At that point, the lake would have a much smaller surface area, and inflow would balance evaporation. However, since minerals become concentrated in terminal lakes through evaporation, Walker Lake would slowly become saltier than seawater.[5]

Long before the lake level stabilizes, however, the concentration of total dissolved solids (TDS) will become too high for the Lahontan cutthroat trout and other fish species in the lake to tolerate. The NDW has calculated that at historic levels of decline, the fishery could be lost in from 5 to 11 years; at levels of decline experienced during the 1987-92 drought, the concentration of TDS could be too high for the fish in as few as 2 years.[6]

The potential disappearance of the cutthroat trout fishery has served as a "wake up call" to recognition of the inherent problems associated with current management practices on the Walker River. Although Walker Lake has been declining for decades, concern had been minimal, probably because no vital interests had been threatened. Now that the threshold lake

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[3] Seven, op. cit., p. 5.

[4] See California Department of Water Resources (DWR), Walker River Atlas (Sacramento, CA: DWR, 1992), p. 34.

[5] Note that even if extra water is allocated to Walker Lake, the concentration of minerals through evaporation will continue, although this process may be stretched out over a much longer time span.

[6] Seven, op. cit., p. 5

level, below which fish will not be able to survive, appears to be rapidly approaching, the situation has changed. As with other western water problems, different interest groups have a stake in the management of the river, and their interests are not always compatible.

Farmers in the Walker River Irrigation District. Agriculture is long-established in the Mason and Smith valleys, and towns such as Yerington depend heavily on an agricultural economy. Farmers have acquired senior rights to irrigate some 80,000 acres and to divert almost 300,000 acre-feet of water per year (afy).[7] Pasture irrigation and alfalfa production are the largest agricultural water uses. Like some other rivers in the West, water rights on the Walker have been overallocated. The Walker River Task Force notes that during a normal water year (i. e., when the snowpack is 100 percent of normal) only 84 percent of agricultural water rights can be satisfied. A snow pack of 120 percent of normal is required to provide the full allocation of water rights, and historically this situation has occurred only 45 percent of the time.[8] Overallocation of water rights may make finding a solution to Walker Lake's decline more difficult, since the rights of more senior water users may have to be satisfied before additional water could be made available for the lake.

Water now used in agriculture is likely the largest potential source of additional water for Walker Lake. Additional water could be made available through improvements in irrigation practices, retirement of some marginal land, and conjunctive management of ground and surface water. How much additional water might be acquired through these means has not been determined. In its Walker River Atlas, the California Department of Water Resources notes that water rights purchases sufficient to yield an average of 60,000 to 85,000 afy would be needed to maintain the lake at close to or slightly above its 1992 elevation. This represents roughly 20 to 30 percent of water currently consumed by a combination of agriculture, other

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[7] State of Nevada, op. cit. See table 3-4, p. 57.

[8] Walker River Task Force, draft discussion paper, April 1993.

vegetation (i. e., phreatophytes), and evaporation from 3 small lakes.[9] Of the amount consumed, 60 percent is through irrigation, 34 percent through phreatophyte evapotranspiration, and 6 percent through lake evaporation.

Farmers and farming communities understandably wish to preserve their way of life and will likely resist any fundamental changes that could affect that. However, they appear willing to discuss water problems with other interest groups in the watershed. They recognize that irrigation efficiencies can be improved. They also note that some marginal agricultural land could be retired, but prefer to be compensated for doing so.

Walker River Paiute Indian Reservation. After leaving Mason Valley and just before entering Walker Lake, the Walker River flows through the Walker River Paiute Indian Reservation. The Walker River Paiutes divert a relatively small amount of water to irrigate some 2,100 acres of land on their reservation. As with the Walker River Irrigation District, accounting for water flows on the reservation is not very accurate. NDCNR has estimated inflows and outflows to the reservation, but their estimates do not accord with amounts the Indians say they are diverting nor with recent observations about the amount of water reaching Walker Lake. Lack of streamflow data in the area greatly limits an understanding of water movements on the surface and in the ground.

The Indians are concerned about the decrease in size of Walker Lake and wish to work with other groups to help stem the decrease. At the same time, they feel they have been unfairly treated by past water rights rulings and would like to expand the amount of irrigated land on their reservation. They also believe the Walker River Irrigation District, upstream, has not been delivering the amount of water specified in Decree C-125 (i.e., 26.25 cubic feet per second (cfs)) to the reservation.

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[9] State of Nevada, op. cit., Table 2-10

Residents of Hawthorne. The residents of the town of Hawthorne, to the south of Walker Lake, are concerned about the effect the potential demise of the Walker Lake fishery could have on their local economy. Recreational boating and fishing are major sources of revenue for this small town and are seen as the key to economic development in an area that doesn't have many alternatives.

Some citizens of Hawthorne have organized into the Walker Lake Working Group. The goal of this group is to seek a guaranteed volume of water to maintain the lake at a suitable level to sustain fish life. They hope to be able to convince upstream water users to change water use practices so the lake can be saved.

The environment. Preservation of Walker Lake is deemed desirable by all interest groups. However, local habitat preservation per se has not, until recently, had its own champion, and offstream users have at least a partial conflict of interest with environmental concerns. Nationally, concern about environmental preservation has grown dramatically in recent years, and it has become increasingly difficult to neglect environmental (or instream) uses of water. The recent examples of water reallocation for environmental purposes in California's Central Valley, in the Mono Lake area, and in the Carson and Truckee watersheds of California and Nevada point to a trend that, to one degree or another, is likely to continue in the Walker River watershed.

Several environmental groups have recently become concerned about Walker Lake. These include the Nature Conservancy, the Sierra Club, and the Environmental Defense Fund. Members active in Walker Lake discussions have, for the most part, also been involved in the Truckee-Carson negotiations. Environmental organizations are at an early stage in assessing Walker Lake's environmental problems, and to OTA's knowledge no group has yet formulated detailed policy proposals.

Recommendations

Technically, many opportunities exist to increase the inflow of water to Walker Lake and to reduce the concentration of total dissolved solids in the lake, thus improving the habitat for the lake's threatened fish (see table 1). Some opportunities could be implemented without penalizing the water usage of any stakeholders; other opportunities would require the sacrifice of some water (although not necessarily significant amounts) on the part of one or more stakeholders, usually irrigators; still other opportunities might call for significant sacrifice on the part of certain groups and would likely be vigorously resisted. The costs to implement these opportunities have not been evaluated, but some would be less expensive than others. In its cursory investigation, OTA noted several problems that need to be addressed in order to lay the groundwork to take advantage of available opportunities.

First, the various interest groups in the watershed need to begin talking with one another 1) to develop a common understanding of the problem, 2) to more precisely identify areas of agreement and disagreement, 3) to promote development of information that can reduce factual disputes, and 4) to identify solutions and seek ways to implement them. A Walker River Task Force has been formed, but its structure and composition do not appear to be ideal for fostering trust among stakeholders. A principal concern is the fact that the chairman of the task force is the manager of the Walker River Irrigation District rather than a neutral party.

One possibility to make progress in addressing Walker Lake's problems would be to convene a workshop or forum at some neutral location in Nevada, bringing together representatives of all stakeholders and technical agencies. Ideally, the workshop should be convened, sponsored, and chaired by a neutral, mutually acceptable third party. Among those who should be included are representatives of: 1) Hawthorne and Yerington, 2) the Walker

River Irrigation District, 3) the Walker River Paiute Tribe, 4) environmental groups such as the Nature Conservancy and the Sierra Club, 5) the Nevada State Engineer, 6) the Nevada Department of Wildlife, 7) U.S. Geological Survey, 8) U.S. Soil Conservation Service, 9) U.S. Bureau of Land Management, 10) U.S. Army, 11) California Department of Water Resources, 12) U.S. Board of Water Commissioners, and 13) any others with a stake in resolving the problem. A minimal goal would be to clarify any misunderstandings among stakeholders and to share and jointly assess relevant information about the river's water budget.

If a workshop (or series of workshops) is deemed desirable, one possibility would be to utilize the services of the newly established Environmental Conflict Resolution program at the University of Arizona's Udall Center for Studies in Public Policy. Managing this program is one function of a new national foundation established by the "Morris K. Udall Scholarship and Excellence in National Environmental and Native American Public Policy Act of 1992" (P.L. 102-259). Among the foundation's purposes are to foster greater recognition and understanding of the role of the environment, public lands, and resources in the development of the United States. Congress has recently appropriated $10 million to endow the foundation, but the conflict resolution program has not yet begun operations. Among the advantages of convening a workshop under the auspices of this new foundation would be its neutrality and the substantial expertise on western water problems that currently exists at the Udall Center.

It would be prudent to hold a workshop at the earliest possible date (e.g., in late 1993 or early 1994), since the stress on the fishery is steadily increasing, and, according to the Nevada Department of Wildlife, the fishery may collapse in 5 years or less if changes are not made soon in how the water resources in the basin are managed.

Second, some of the differences of perceptions of the problem and possible solutions that currently exist among interest groups can be accounted for by lack of good streamflow data. The State of Nevada's Department of Conservation and Natural Resources has used what data are available to estimate a budget for water inflow and outflow at various points in the watershed. 10 However, lack of streamflow gauges at key points along the river and deterioration of at least one key gauge make it impossible to know with precision what is happening in the system. Better understanding of how much water is being diverted at particular points and how much water is reentering the river after diversion is essential in order to identify and assess the best measures for managing the river.

Three data problems seem especially important to address. First, estimating inflow to Walker Lake is problematic because the nearest streamflow gauge is more than 30 miles upstream at Wabuska and significant irrigation diversions and channel losses occur along the river below this last gauge. 11 A gauge much nearer the lake would be desirable--if, given the meandering nature of the river along this stretch, a suitable location can be found.

Second, the key Wabuska gauge north of the Walker River Indian Reservation needs upgrading. [12] Over the years, a shifting channel and sedimentation has rendered data acquired from the gauge less and less accurate. The USGS rates the accuracy of this data as only "fair to poor." The readings at the Wabuska gauge are important because it is here that the water allocation for the Indian Reservation is measured. Indeed, the Indians prefer to move the gauge closer to the north end of Weber Reservoir (or to construct an additional gauge) because they believe significant charnel losses occur between the Wabuska gauge and Weber Reservoir

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10 See State of Nevada, Department of conservation and Natural Resources, Water River Basin Water Rights Model, June 1993 (Draft).

11 California Department of Water Resources (DWR), Walker River Atlas (Sacramento, CA: DWR, 1992), p. 32.

12 R Hayes, U S Geological Survey, Carson City, NV., personal telephone communication, August 12, 1993.

for which they are inappropriately being charged. Others believe--even though no streamflow data are available--that substantial losses are occurring on the reservation itself. (Note that the USGS believes that even though a gauge can be installed in this area, the accuracy of the data will be no greater than plus or minus 20 percent, given the shifting nature of the stream).

Finally, it would be extremely helpful to install small gauges at irrigation diversion points. Farmers in the Walker River Irrigation District have not been concerned with irrigation operating efficiencies and hence do not have good information about where adjustments might be made to improve efficiency. Installation of gauges would help identify where blocks of water are unnecessarily being lost. 13

The cost of new gauges could be substantial relative to available funds. The USGS notes that upgrading the Wabuska gauging station could cost several hundred thousand dollars. It seems likely that the cost of installation of additional gauging stations on the main stem of the river would also be in this range. Installation of gauges to measure irrigation diversions would cost on the order of 3 thousand dollars each, and several dozen would likely be needed. The USGS has a small amount of money available for matching State funds budgeted for installing gauging stations. The USGS has indicated, however, that all available "co-op" funds for this program have already been committed. If new gauges are to be installed, additional funds may need to be appropriated for the USGS's Nevada district's gauging program. The State would, of course, have to come up with matching funds. Also, if a workshop is held, one topic of discussion might be how to pay for additional gauges, especially those needed at diversion sites.

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13 Jim Weishaupt, Walker River Irrigation District, personal communication, August 5, 1993.

It should be noted that it generally takes a number of years to develop good data from a newly installed gauge and that the longer the time series of data available, the more accurate the determination of average flow will be. USGS says, however, that it can begin publishing data 1 to 2 years after installation of a gauge. Given the precarious nature of the Walker Lake fishery, it would be prudent to install additional gauges soon.

Third, negotiations leading to an interstate compact between Nevada and California concerning allocation of water in the Walker River watershed should be reconvened. In 1990, Public Law 101-618 established a framework for an interstate allocation of waters of the Truckee and Carson rivers, the two other rivers with headwaters in California that flow into Nevada. The Walker River was not included in the final legislation, ostensibly because "pressure created by proposed water development projects [in the watershed] had abated by the 1980s. "[14] Indeed, the portion of the Walker River watershed in California has very few people in it, and major increases in water use in that area are not anticipated. Nevertheless, California still has a potential right to use additional water in the Walker River watershed and could some day assert rights to a portion of the water now being used in Nevada. Any agreement concerning Walker River water reached by interest groups in Nevada could potentially be undermined if California some day claims the right to use additional water, and, as the saying goes, "a shovel upstream is better than a decree downstream. " A compact would clarify the water rights of both states and ensure that efforts to protect Walker Lake and the various Walker River stakeholders in Nevada would not later be undermined.

A final comment

Saving Walker Lake, and especially doing so without affecting other longstanding interests in water from the Walker River, is not likely to be easy. In OTA's view, saving the lake will likely require more than just implementation of the relatively easy steps that could be

[14] California Department of Water Resources, op. cit., p. 70.

taken, but saving it does not appear to be a hopeless cause. The problems experienced in the Walker River watershed are similar to those that have been faced with some success in the Carson and Truckee watersheds to the north. That the Walker situation does not appear to be as complex is a hopeful sign. Other recent water rights settlements (e. g., regarding Mono Lake and California's Central Valley) are beginning to firmly estabish the principal that the environment matters, and these precedents make it increasingly difficult for major water users to conduct business as usual. The best solution attainable may well be one that entirely pleases no one--farmers may have to change water use practices more than they are currently willing to do, Indians may have to forego irrigating significantly increased acreage, and environmentalists and residents of Hawthorne may have to be satisfied with a somewhat lower lake level than they would prefer.

Table 1

Possibilities for Increasing the Flow of Water to Walker Lake

A. Relatively Easy:

- o Line diversion ditches: ditch lining would help prevent some seepage losses
- o Upgrade distribution systems: improved valving systems would also increase irrigation efficiency; installing pipes in selected parts of the system possible but more costly
- o Schedule irrigation: would regulate irrigation so crops receive water only when they need it
- o Establish a water bank: would allow water to be bought from farmers in drought years that could be used for environmental purposes; has been successful in California
- o Remove non-native plants from the stream channel: high-water-using-plants, such as salt cedar, have proliferated in the stream channel; their removal would make more water available but would also affect some (non-native) habitat
- o Manage ground water and surface water conjunctively: would help improve efficiency and flexibility of system and enhance yields through less conservative operation of storage facilities

B. More Difficult

- o Purchase existing agriculture rights (e. g., in marginal areas): a potentially important option, but funds could be a problem
- o Change crops, e.g., from alfalfa to onions: alfalfa uses much more water than crops such as onions, but the market is not large for such crops
- o Renegotiate Decree C-125: although desirable from the point of view of residents of Hawthorne and Indians, would likely be strongly resisted by farmers
- o Line river channel between Wabuska and Weber Reservoir: much water is apparently “lost” in this area, but turning the river into a canal would likely be resisted by environmentalists

C. Other types of options--not shown to be technically feasible

- o Breed a strain of hatchery trout that can tolerate Walker Lake’s high alkalinity
- o Install devices on side streams to control alkaline minerals from entering Walker Lake