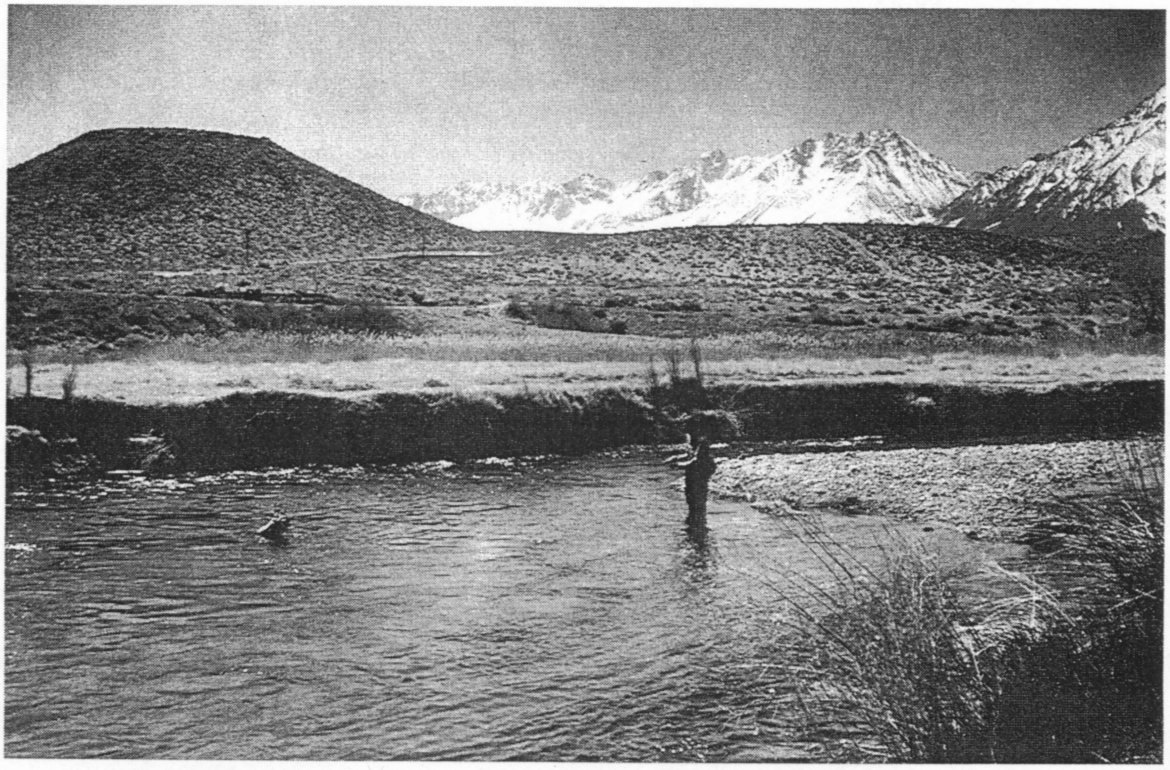
State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

LOWER OWENS RIVER WILD TROUT AREA MANAGEMENT PLAN
1993-1997



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GENERAL RECOMMENDATIONS

To perpetuate abundant wild trout populations in the lower Owens River for the use and enjoyment of the angling public, and to insure that trout habitat in the lower Owens River will be maintained or improved, the California Department of Fish and Game (Department) recommends that:

I. The Department should:

1. Conduct the monitoring and evaluation studies necessary to maintain fishing opportunities attractive to wild trout anglers.

2. Maintain, operate, and monitor the Pleasant Valley Spawning Channel.

3. Support and participate in coordination efforts to redesign the Pleasant Valley Campground by establishing a 50-foot corridor between campsites and the river.

4. Coordinate efforts to have anglers park along the Chalk Bluffs Road rather than drive across the meadows to the streambank.

5. Pursue a program of restoring native riparian trees to their former abundance.

II. Waste discharge and projects which could adversely affect water quality in the Wild Trout Area (WTA) should be conducted in compliance with the Lahontan Regional Water Quality Basin Plan.

III. Inyo County should seek to operate the Pleasant Valley Campground in a manner which is compatible with use and protection of the wild trout resource.

IV. The Los Angeles Department of Water and Power (DWP) should:

1. Continue to allow public use of the (WTA).

2. Manage the lands along the river to maintain a natural setting, free from incompatible encroachments.

3. Maintain flow-release policies beneficial to the wild trout resource.

4. Continue in cooperative efforts to maintain and improve wild trout habitat.

V. Coordination should be maintained between all agencies whose activities directly or indirectly affect the WTA.

PREFACE

The California Wild Trout Program (WTP) was established by the Fish and Game Commission (Commission) in 1971 to provide quality wild trout angling. Under the program, productive lakes and streams are identified for wild trout management during an ongoing statewide inventory. If suitable for management as quality fisheries, these waters are recommended by the Department to the Commission for wild trout designation. Waters in the WTP must be open to the public and capable of producing, with appropriate fishing regulations, satisfactory trout angling in terms of the number and/or size of fish caught. Stocking of domestic strains of hatchery-reared, catchable-size trout in these waters is prohibited.

Commission policy states: "Wild trout angling is considered a quality experience which provides the angler an opportunity to fish in aesthetically pleasing and environmentally productive waters over trout populations whose numbers or sizes are largely unaffected by the angling process" (Commission Policies, Fish and Game Code, 1995). Three goals for managing designated wild trout streams were established at the outset of the statewide WTP:

1. To maintain wild trout populations at levels necessary to provide satisfactory angling opportunities.
2. To maintain and enhance, where possible, the habitat required for optimum wild trout production.
3. To preserve the natural character of the streamside environment.

The Commission has supported these goals through a directive in its policy that states "All necessary actions, consistent with State law, shall be taken to prevent adverse impact by land or water development projects on designated wild trout waters" (Commission Policies, Fish and Game Code, 1995). Once a stream is designated as a wild trout water by the Commission, the Department is required to develop a plan for managing the fishery.

The lower Owens River from Pleasant Valley Dam to Five Bridges Road was designated a Wild Trout Stream in 1972. A management plan for the river was completed in 1978 (Ponder and Deinstadt, 1978), and, though it served as a status report and guide for future management, it was not published. The following updated version of the 1978 plan is intended to cover management of the lower Owens River WTA for the five-year period, 1993-1997.

The lower Owens River in the WTA flows almost entirely through land owned by the DWP. The plan identifies the Department's long-standing and proposed cooperative efforts with DWP to manage the WTA. Management programs to be undertaken with Inyo County and others are also part of the plan.

It should be emphasized that this document is meant to direct the Department's program, but not limit its flexibility or mandate its responsibility or actions. Unanticipated problems (i.e. the 1987-1992 drought or the State's fiscal problems) may require a revision of stated programs or policies.

RESOURCE STATUS

Description of Area

The Owens River originates approximately 15 miles east of Yosemite National Park and flows southward roughly paralleling the scarp of the Sierra Nevada Mountains (Figure 1). From its origin at Big Springs, the river flows through Long Valley and into the Owens Gorge. There the river drops 2,400 feet through a steep-walled canyon to the Owens Valley. From the mouth of the Gorge, at 4,300 feet elevation, the river travels a meandering course southward through the Owens Valley, terminating in a sink called Owens Lake.

The natural course and flow patterns of the river have been changed to meet the water and power needs of the City of Los Angeles. The most significant changes have been the importation of water by tunnel from the Mono Basin into the upper river, the closure of Lake Crowley (183,500 acre feet capacity) in the early1940's, the diversion of water from the gorge into a series of powerhouses, the impoundment of Pleasant Valley (16,500 acre feet capacity) in 1954, and the transfer of water from the river channel into the Los Angeles Aqueduct about midway down the Owens Valley (originally completed in 1913 and enlarged in 1970) (Figure 1).

The 16-mile WTA of the river is in the northern end of the Owens Valley between 4,320 feet and 4,134 feet elevation. Pleasant Valley Dam marks the upstream boundary of the WTA about 7 miles west of Bishop (Figure 2). The downstream boundary at Five Bridges Road is 2.5 miles north of Bishop.

As the river flows from the mouth of the gorge downstream from Pleasant Valley Dam, it turns eastward and meanders through a broad floodplain. A steep bluff of the Bishop Tuff volcanic formation bounds the north side of the valley, while sandy terraces lie along its southern edge. The average river gradient in the WTA is estimated to be 11 to 15 feet per mile. Numerous old meanders across the floodplain attest to the dynamic processes controlling river form and location. The current river course lies to the north of most of the abandoned meanders (Figure 3).

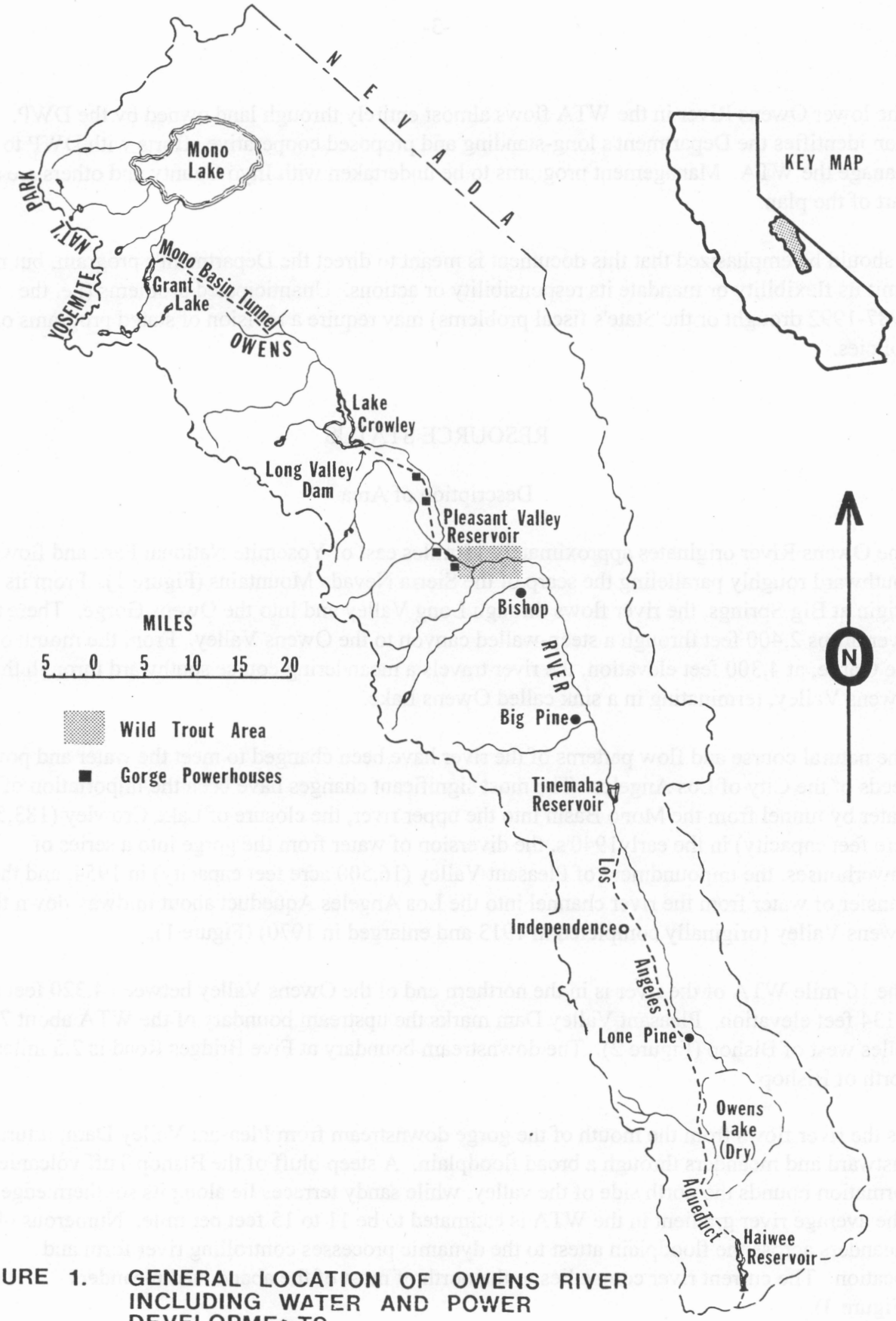

FIGURE 1. GENERAL LOCATION OF OWENS RIVER INCLUDING WATER AND POWER DEVELOPMENTS.

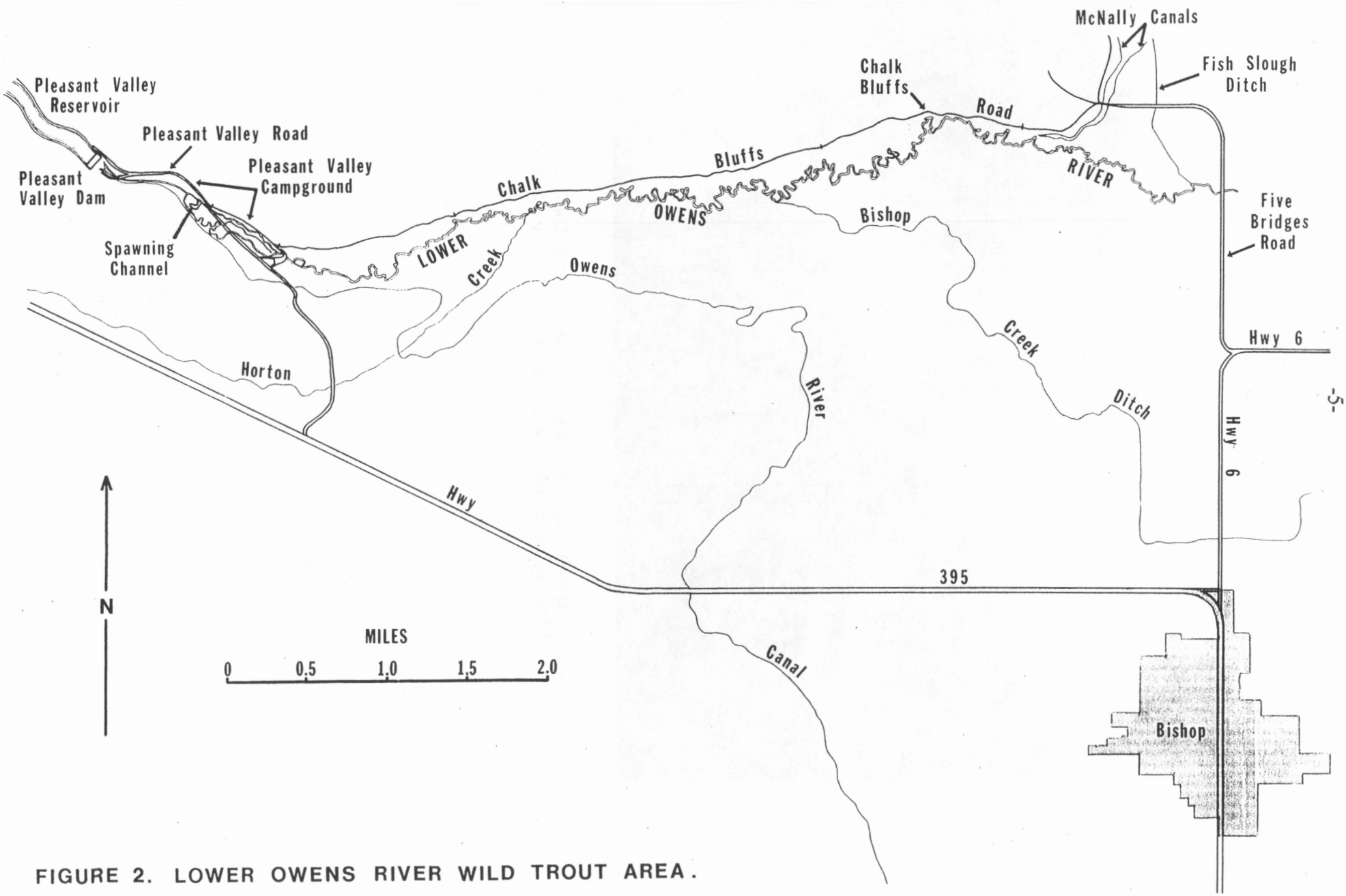

FIGURE 2. LOWER OWENS RIVER WILD TROUT AREA.

Figure 3. Meandering course of the lower Owens River on the floodplain below Pleasant Valley Campground.

The WTA is in the rain shadow of the Sierra Nevada Mountains, towering at elevations above 13,000 feet only 12 miles to the west. Annual precipitation in nearby Bishop averages only 5.8 inches. The lower Owens is a desert river with an open canopy, allowing considerable aquatic vegetation growth. Submerged aquatic growth include pondweed (*Potamogeton* sp.), water weed (*Elodea canadensis*), coontail *(Ceratophyllum* sp.), horned pondweed (*Zannichellia* sp.), watercress (*Rorippa* sp.), duckweed (*Lemna* sp.), water fern (*Azolla* sp.), and filamentous green algae. Oxbows host emergent vegetation, including cattails (*Typha latifolia*), tule (*Scirpus acutus*), and reed (*Phragmites australis*). The riparian zone is dominated by sand bar willow (*Salix exiqua*), with scattered trees of Gooding willow (*Salix goodingii*) and Fremont cottonwood (*Populus fremontii*) providing a limited overstory and source of rare large woody debris. More sparsely vegetated banks support saltgrass (*Distichlis stricta*), Great Basin sage (*Artemisia tridentata*), wild rose (*Rosa intermontana*), rabbitbrush (*Chrysothamnus nauseosus*) and greasewood (*Sarcobatus vermiculatus*). The surrounding floodplain is a well-drained rangeland consisting of saltgrass (*Distichlis spicata*), Great Basin wildrye (*Elymus cinereus*), beardgrass (*Polypogon monspeliensis*), foxtail grass (*Hordeum jubatum*), rush (*Juncus* spp.), and sedge (*Heleocharis* spp.). Surrounding vegetation is typified by greasewood, shadscale (*Atriplex confertifolia*), Mormon tea (*Ephedra viridis*), and pygmy cedar (*Pseucephyllum schottii*).

Horton Creek and Fish Slough Ditch are the only natural tributaries to the river within the WTA (Figure 2). Inflow from both tributaries is usually minor. The Bishop Creek Ditch and the McNally canals are used to divert water from the river. In recent years, only the Bishop Creek Ditch has carried outflow from the river. The Owens River Canal is a historic distributary which is no longer functional.

One artificial bifurcation in the river course, the Pleasant Valley Spawning Channel, was constructed by the DWP in 1954 to mitigate for loss of spawning habitat above the newly completed Pleasant Valley Dam. The channel is now operated and maintained by the Department. The channel is 1,000-feet long and 16-feet wide (Figure 4). A concrete barrier above the spawning channel outfall prevents upstream moving trout from bypassing the channel. During the winter low flows of 1991-1992, spawning success in the channel was eliminated due to blockage of inflow by a beaver dam constructed during the incubation period. Subsequent electrofishing in the river indicated excellent recruitment of young-of-the-year, suggesting that lack of spawning success in the channel is not limiting trout production in low water years. However, during high water conditions, the spawning channel may provide important spawning habitat for brown trout. At high flows, water velocity increases across the river, which probably forces spawners to use sub-optimal areas near the banks. If flows subsequently drop, redds in those areas may be lost through freezing or drying. No evaluation of the contribution of the spawning channel to young-of-the-year recruitment during high flow years has been performed.

With the exception of two points where U.S. Bureau of Land Management holdings touch the north bank of the stream, the entire designated area is owned by the DWP. A portion of the

Figure 4. Pleasant Valley Spawning Channel.

riparian land is leased to Inyo County for a campground. The remainder is leased for cattle grazing and is open to the public for day use. Fishing, camping, and cattle grazing are now the primary human activities within the WTA.

Changes in Stream Characteristics Since 1947

Stream Flow

The importation of Mono Basin water, and storage capacity created by Long Valley Dam, have caused significant changes in the flow patterns of the lower Owens River. Monthly flows prior to completion of these projects averaged 245 cubic feet per second (cfs). From September through May, the average monthly flow ranged from 177 to 283 cfs (Figure 5). Annual snowmelt runoff peaked in June, averaging 443 cfs, then dropped to 340 cfs in July. With the completion of Long Valley Dam and the Mono Tunnel, the average annual flow increased from 245 to 355 cfs. Average monthly flows throughout the year were increased above preproject levels, while maximum flows were reduced.

In 1971, completion of a second aqueduct increased the capacity to export water from the Owens Valley by 48%. Part of the additionally exported water was scheduled to come from the Mono basin, and part from groundwater pumped in the Owens Valley. The average annual flow at Pleasant Valley from 1971 through 1988 was 447 cfs. This represents an 82% increase over recorded historical flows and 26% above the average flow from water years 1948-1970.

Regulation of the Owens River system has attenuated peak runoff events so that maximum flows from the dam do not exceed 700 cfs, base flows have been reduced, and the frequency of fluctuation between high and low flow levels has increased in the WTA.

Beginning in 1989, an injunction prohibited export of water from Mono Lake tributaries to the Owens River basin. The State Water Resources Board ruled in 1995 that restoration of minimum lake levels in Mono Lake will be achieved before substantial water exports may resume. Depending upon precipitation levels, this recovery period has been predicted to last less than 30 years. Even after minimum lake levels are recovered, augmentation of Owens River flows will average significantly less than during the period 1971-1989.

Channel Morphology

Average river widths in the Pleasant Valley area, computed from aerial photographs by the U.S. Geological Survey (USGS), were 40.5 feet in 1947, 46 feet in 1967, and 50 feet in 1971. The accelerated erosion rate between 1967 and 1971 is directly attributable to increases in the flow regime. While the USGS study has not been updated, observations showed a high bank erosion rate continued through most of the designated area after 1971.

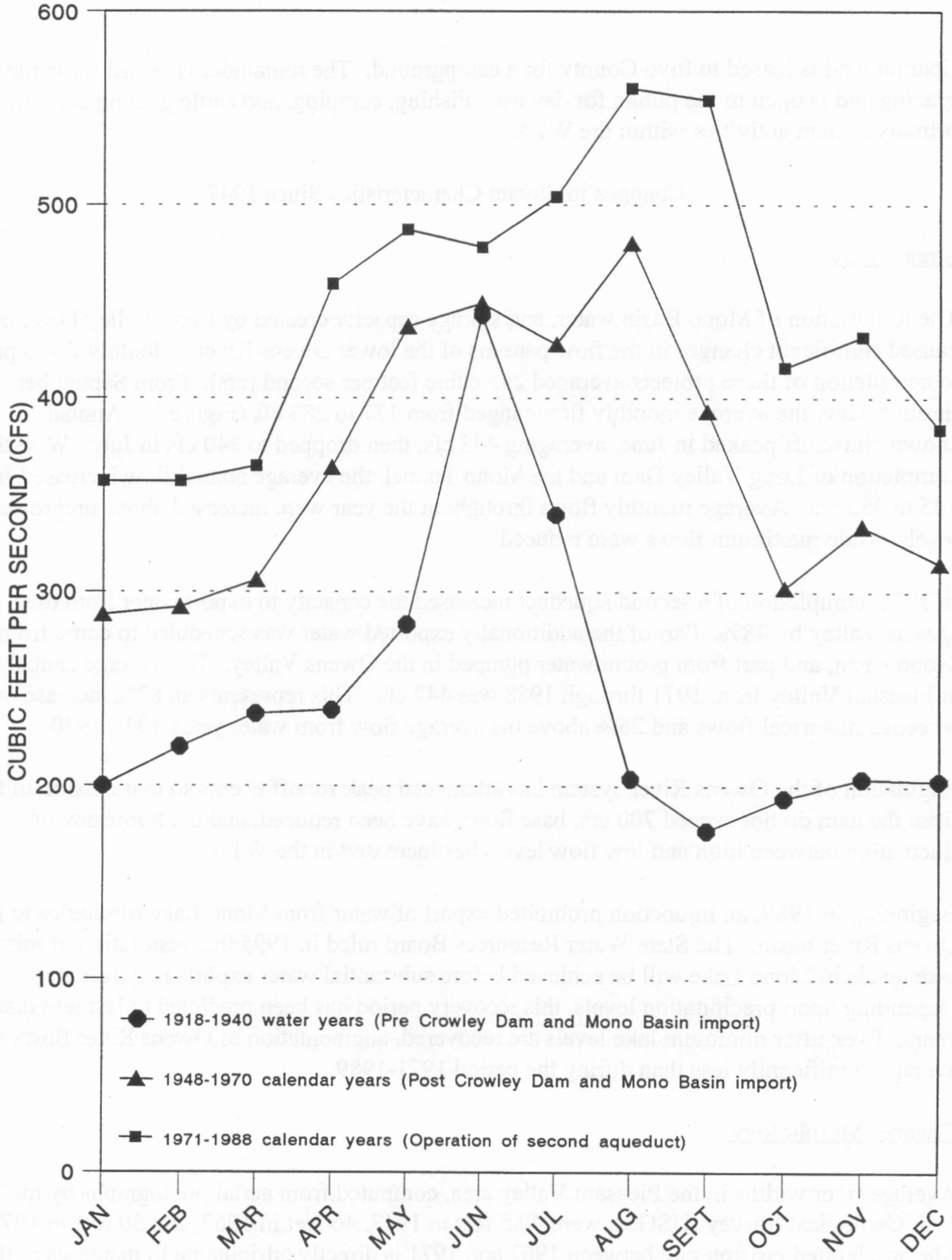

Figure 5. Mean monthly flows before and after the completion of Long Valley Dam, Mono Basin tunnel, and the second aqueduct.

It is likely that loss of vegetation has weakened bank strength, making them more susceptible to failure when rapid flow reduction leaves saturated soils unsupported. Changes in the configuration of the banklines have accompanied increasing stream widths. Prior to 1967, erosion rates were moderate and undercut banks comparatively stable. By 1971, sustained high flow caused many existing undercut banks to collapse. Some areas were undermined and sloughed into the stream several times. By 1977, the historical undercut nature of many banklines had been replaced by an almost vertical configuration. This condition has remained essentially unchanged up to the present time. A comparatively low percent of the stream, at least in the first 4.4 miles below the campground, has fairly stable undercut banks (Figure 6).

Hickerson and Hecht (1992) assessed stream widths using 1967 and 1990 photos and corrected for differing discharges at the time of photography. Their results fail to indicate any change in average width. Unfortunately, use of different data sets and methods in the earlier USGS study and the 1992 study precludes reconciliation of their opposing results.

River sinuosity and length have remained relatively unchanged during the period 1944-1990. Hickerson and Hecht (1992) showed that river length increased about 2% from 1944-1967, and declined less than 1% subsequently. Recent cutoff events which isolated single large meanders are offset by the growth of other meanders.

Riparian Vegetation

Streambank vegetation was reduced along much of the WTA from the 1950's through the early 1970's. Willows were removed with a dragline from the north bank of the stream by the DWP in the 1950's. Willows were sprayed and burned by lessees to improve cattle grazing along the south bank from the Chalk Bluffs area upstream in the early 1960's. In 1968, willows on the south bank below Pleasant Valley Campground were aerially sprayed. The planned follow-up burn by the lessee was halted by DWP. A subsequent control burn by the lessee in 1970 went out of control due to high winds and destroyed most of the riparian vegetation sprayed in 1968. Another fire apparently started by a camper just below the campground in 1971 burned the remainder of the area sprayed in 1968.

These streambank vegetation control programs have left long stretches of the north bank, below the campground, denuded. The life span of the few large, picturesque cottonwoods in this reach was substantially shortened when beavers chewed rings of bark off their trunks following the 1968 and/or 1970 fires (Figure 7). The sprayed and burned streambanks near Chalk Bluffs have largely been revegetated by willows. Hickerson and Hecht (1992) reported that the occurrence of dense riparian vegetation in the lower 9 miles of the WTA had increased 263% between 1967 and 1990. Little change in this type of vegetation was realized in a 4.4-mile reach of stream below the campground. Since the last aerial application of herbicide in 1968, no riparian vegetation control projects are known to have occurred in the WTA below the campground.

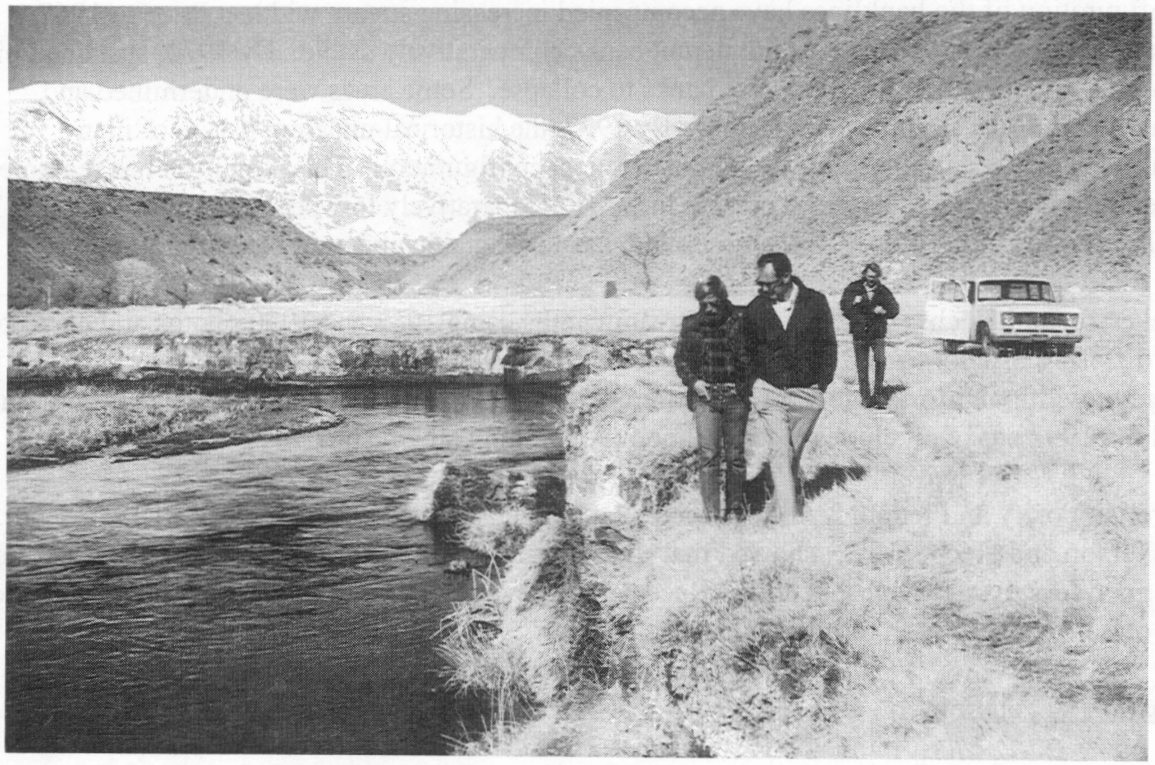

Figure 6. Observing the accelerated rate of bank collapsing and subsequent loss of most undercut areas during the 1970's.

Figure 7. Examining a large streamside cottonwood tree damaged by beaver.

Over several years, streambank willows were cut to near ground level within parts of the Pleasant Valley Campground. This practice is considered detrimental to bank stability, removes needed trout cover, and creates a harsh, barren environment. Department concerns regarding this practice have been discussed with those responsible for maintaining the campground and the pruning has now been largely curtailed.

Dissolved Oxygen

Low dissolved oxygen (DO) concentrations have occurred sporadically in the past and seem to result from high oxygen consumption rates during and following algal blooms in Crowley Lake. In August 1974, a complete fish kill occurred from Pleasant Valley Dam downstream to the campground. A similar event occurred in 1977, but extensive fish loss did not occur. In late July, 1992, the oxygen concentration of waters leaving Crowley Lake dropped to zero, and trout died at the head of Pleasant Valley Reservoir. Further fish loss was averted through the cooperation of DWP, which modified powerplant operations to maximize re-aeration of the water.

Description of the Fishery

Fish Species

Trout are not native to the Owens River drainage. Brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) have been introduced into the lower Owens River. Brown trout are well adapted to stream conditions and have maintained abundant naturally reproducing populations. Rainbow trout reproduce in limited numbers, if at all, and are restricted primarily to the lower portion of the wild trout section. Other introduced fish include bluegill, largemouth bass, brown bullhead, carp, and three-spine stickleback. Smallmouth bass and channel catfish have not been observed in the wild trout section, but may be present.

Four fish species are native to the lower river. The Owens sucker is still common. An undescribed subspecies called "Owens dace" is present, but apparently in very limited numbers. The two other species are now extinct in the lower river. The Owens tui chub has hybridized with an introduced tui chub. The Owens pupfish was lost from the river fauna by a combination of exotic fish introductions and habitat change.

Species composition has been assessed four times over the past 16 years. On the average, brown trout were the most abundant, comprising 86.3% of the fish captured, followed by Owens suckers (5.3%), and carp (3.6%). Six other species observed accounted for less than 5% of the population (Table 1).

TABLE 1. Species Composition of Fish Collected in the Lower Owens River During Electrofishing Surveys Conducted in 1977, 1979, 1980 and 1992.

	Numbers of Fish				Percent of Population			
Species	1977 a/	1979 b/	1980 c/	1992 c/	1977	1979	1980	1992
Brown trout	946	596	1,346	2,555	92.5	76.6	86.4	89.8
Owens sucker	49	30	118	134	4.8	3.9	7.6	4.7
Carp	12	80	40	4	1.2	10.3	2.6	0.1
Largemouth bass	2	13	5	1	0.2	1.7	0.3	<0.1
Brown bullhead	9	5	12	0	0.9	0.6	0.8	0.0
Bluegill	0	44	4	1	0.0	5.7	0.3	<0.1
Dace	3	5	5	1	0.3	0.6	0.3	<0.1
Three-spine stickleback	2	4	26	149	0.2	0.5	1.7	5.2
Rainbow trout	0	1	1	0	0.0	0.1	0.1	0.0
Total	1,023	778	1,557	2,845				

a/ Collected from eight sites in the first 7.4 miles of stream below Pleasant Valley Campground.
b/ Collected from 12 sites between Pleasant Valley Dam and Five Bridges.
c/ Collected from six sites between Pleasant Valley Dam and Chalk Bluffs.

Trout Habitat

The lower Owens River is largely a pool, deep run, and riffle stream. The majority of the riffles are in the first 7 miles of stream, but productive riffles are found throughout the length of the wild trout section. Aquatic insects, especially caddis flies (*Trichoptera*), are abundant in riffle areas. Deep pools, usually found on the outside of river bends, overhanging willows, rooted aquatic vegetation, and historically, undercut banks provide cover for brown trout.

Water temperatures one mile below Pleasant Valley Dam in 1968 ranged from a high of 64°F in August to a low of 36°F in December. Fifteen miles downstream, the highest temperature recorded in July 1968 was 70°F. Based on conductivity (170-180µS) and alkalinity (130 mg/l) readings in October 1980, the river is considered very productive in relation to most of its tributaries.

Changes in instream conditions during the recent 1987-1992 drought indicate how much the importation of water and its regulation have altered brown trout habitat in the river. Aquatic plants in many reaches of the WTA are widely scattered during high flow years. However, during the prolonged low flow periods of the recent drought, aquatic plants often covered much of the streambed in these reaches. Brown trout spawning sites, which during the majority of the last two decades were observed in low numbers and generally just along the edges of the stream, were reported to be abundant in many areas of the river. These changes are attributable to lower flows and water velocities. Earlier studies have shown that, at high flows, mean velocities across much of the river channel are commonly 3 to 4 feet per second or higher. The lower flows are believed to have substantially increased the areas of the river suitable for both juvenile and adult brown trout.

Trout Populations

Estimated brown trout densities in the first 4.4 miles of stream below Pleasant Valley Campground in the fall of 1977, 1979, 1980, and 1992 were 3,057; 679; 1,414; and 7,422 fish/mile, respectively (Figure 8). The sharp decline in brown trout density, especially young-of-the-year fish, from 1977 to 1979 is attributed to sustained high flows during the fall migration and fall-winter brown trout spawning periods (Deinstadt and Wong, 1980). The abundant brown trout population in 1992 was produced during a prolonged period of substantially lower flows.

Young-of-the-year brown trout populations in the reach below the campground ranged from an estimated low of 298 fish/mile in 1977 to a high of 3,757/mile in 1992 (Figure 8). Densities of trophy-size brown trout (≥12 inches) ranged from 133/mile in 1979 to 942/mile in 1992.

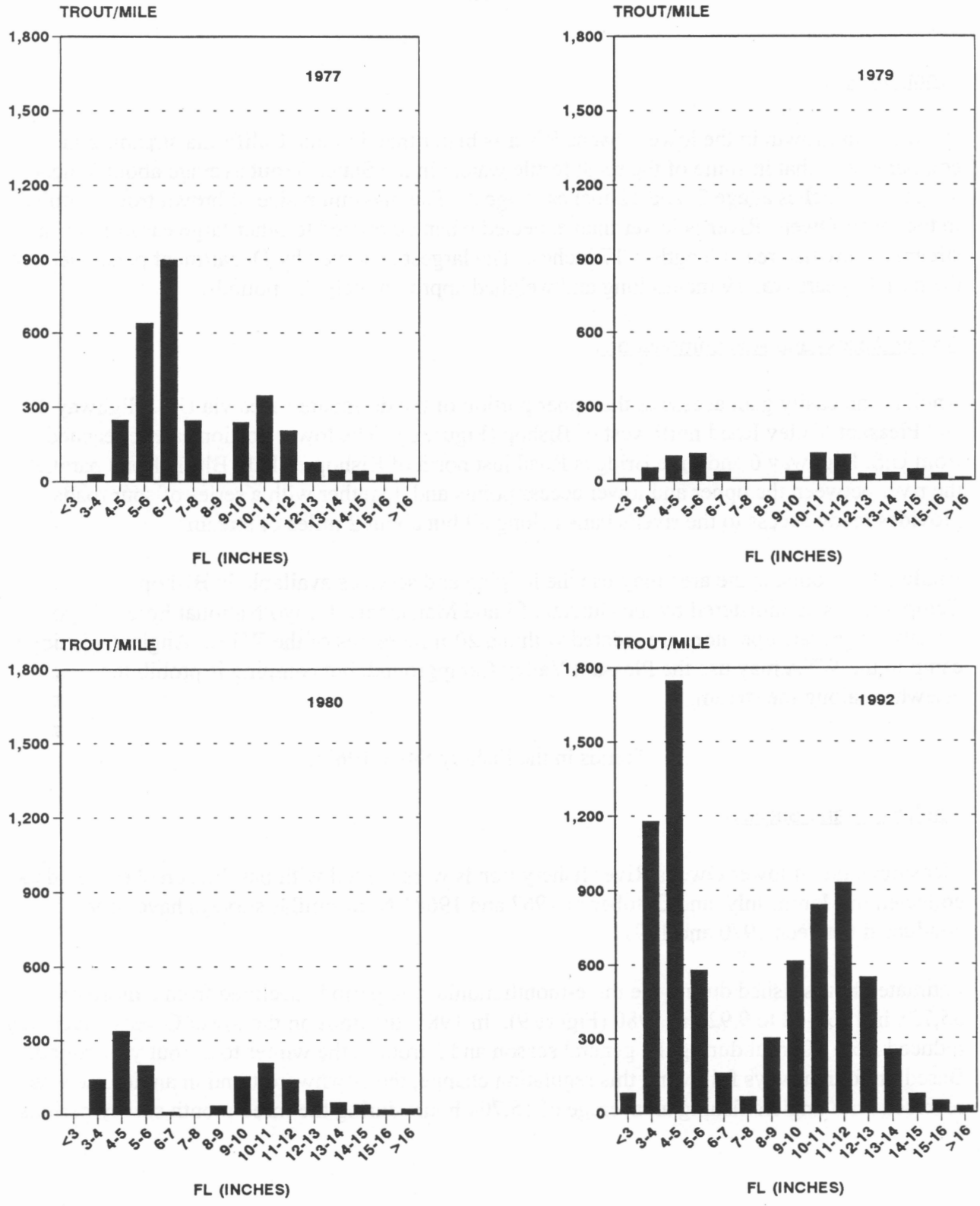

Figure 8. Comparison of brown trout populations in the first 4.4 miles of stream below Pleasant Valley Campground based on electrofishing surveys in 1977, 1979, 1980, and 1992.

Trout Growth

Brown trout growth in the lower Owens River is better than in most California streams and comparable to that in some of the most fertile waters in the State. Trout average about 5 inches at age 1, 10 inches at age 2, and 12 inches at age 3. The maximum size of brown trout sampled in the lower Owens River is lower than expected when compared to other large eastern Sierra streams. Few fish reach lengths >17 inches. The largest observed by Department personnel over the past 25 years was 19 inches long and weighed approximately 2.5 pounds.

Angler Access and Accommodations

Anglers can easily gain access to the upper portion of the designated area via U.S. Highway 395 and Pleasant Valley Road northwest of Bishop (Figure 2). The lower portion can be reached from U.S. Highway 6 and Five Bridges Road just north of Bishop. Chalk Bluffs Road parallels the river between the upper and lower access points and, together with a series of spur roads, provides ready access to the river's banks along all but about 2 miles of stream.

Anglers from outside the area may use the lodging and services available in Bishop. Campgrounds administered by the Bureau of Land Management, Inyo National Forest, Inyo County, or private operators are located within a 20-mile radius of the WTA. Anglers wishing to camp in the WTA may use the Pleasant Valley Campground, but camping is prohibited elsewhere along the stream.

Trends in the Fishery Since 1967[1]

Angler Use and Success

Measurements of lower Owens River fishery trends were started with baseline creel survey data collected in March, July, and October of 1967 and 1968. Nine similar surveys have been conducted between 1970 and 1991.

Estimated hours fished during the three-month monitoring periods declined from a mean of 35,738 in 1967-68 to 9,926 in 1980 (Figure 9). In 1981, the limit on the lower Owens River was reduced from 10 trout during the general season and 5 trout in the winter to 2 trout year-round. Based on four surveys following this regulation change, the downward trend in angler use was reversed with anglers fishing an average of 15,704 hours during the three-month survey periods.

[1] Based on preliminary analysis.

The number of brown trout caught in the WTA from 1970 through 1981 declined along with angler use. The estimated catch decreased from a mean of 12,698 brown trout in 1967-68 to 3,330 in 1981 (Figure 9). In 1985 and 1988, the catch rebounded, averaging about 8,000 trout. Then, in 1991, the catch reached an all-time high of 19,507 brown trout.

A major difference in the percentage of brown trout released accompanied the two-trout limit. Prior to 1981, anglers in the WTA released an average of 18% of their catch. In 1981, anglers released 53% of the brown trout landed. By the mid-1980's, the release rate had increased to about 70%. And, in 1991, anglers released 88% of the brown trout landed.

Catch rates recorded from 1970 through 1980 did not follow the trends recorded for angler use and the number of brown trout caught. With the exception of the 1976 survey, catch rates during this period varied from 0.30 to 0.38 trout/hour (Figure 9). From 1981 on, the increased catch rates paralleled the number of brown trout caught reaching an all-time high of 1.02 trout/hour in 1991.

Lengths of Brown Trout Caught

The percentage of larger brown trout (≥12 inches) in the creel of anglers fishing in the WTA varied from 1967 through 1985, but the overall trend was upward (Figure 10). In 1967, 10% of the 1,060 brown trout measured were in this size class. By 1972, the proportion of brown trout in this size-class had increased to 24% and in 1976 it was up to 40%. After the two-trout limit was imposed, the percentage of larger brown trout continued to increase, reaching 60% by 1985. The first major change in this upward trend occurred in 1988, when 34% of the trout sampled were ≥12 inches. The 1988 figure may have been related to a major increase in brown trout recruitment as a result of lower flows.

Measuring the lengths of fish in the creel was considered an effective method of assessing the size of brown trout caught when most of the fish landed were kept. However, when the two-trout limit was imposed and the majority of the brown trout landed were released, the effectiveness of this method was in doubt. It was assumed that at least part of the anglers in the WTA would keep the larger trout they landed and release the smaller ones. In 1991, a new method of assessing the size of trout caught was adopted. Anglers were asked the approximate lengths of the trout they released.

Anglers surveyed during the March 1991 creel survey reported that 30% of the brown trout they caught were ≥12 inches (Figure 11). Overall, anglers kept only 5% of the trout they landed and no fish <10 inches in length. Anglers checked in July 1991 reported a major change in the lengths of trout caught and the percentage and size of fish kept. About 75% of the ≥10-inch brown trout landed were kept. Seventeen percent of the 8- to 9-inch trout and a lesser percentage of the ≤7-inch trout they landed were also kept. Trout ≥12 inches comprised only 9% of the catch. Anglers fishing in the fall kept 10% of the brown trout they caught: 5% of the fish <12 inches and 21% of the fish ≥12 inches. Trout ≥12 inches accounted for 19% of the catch.

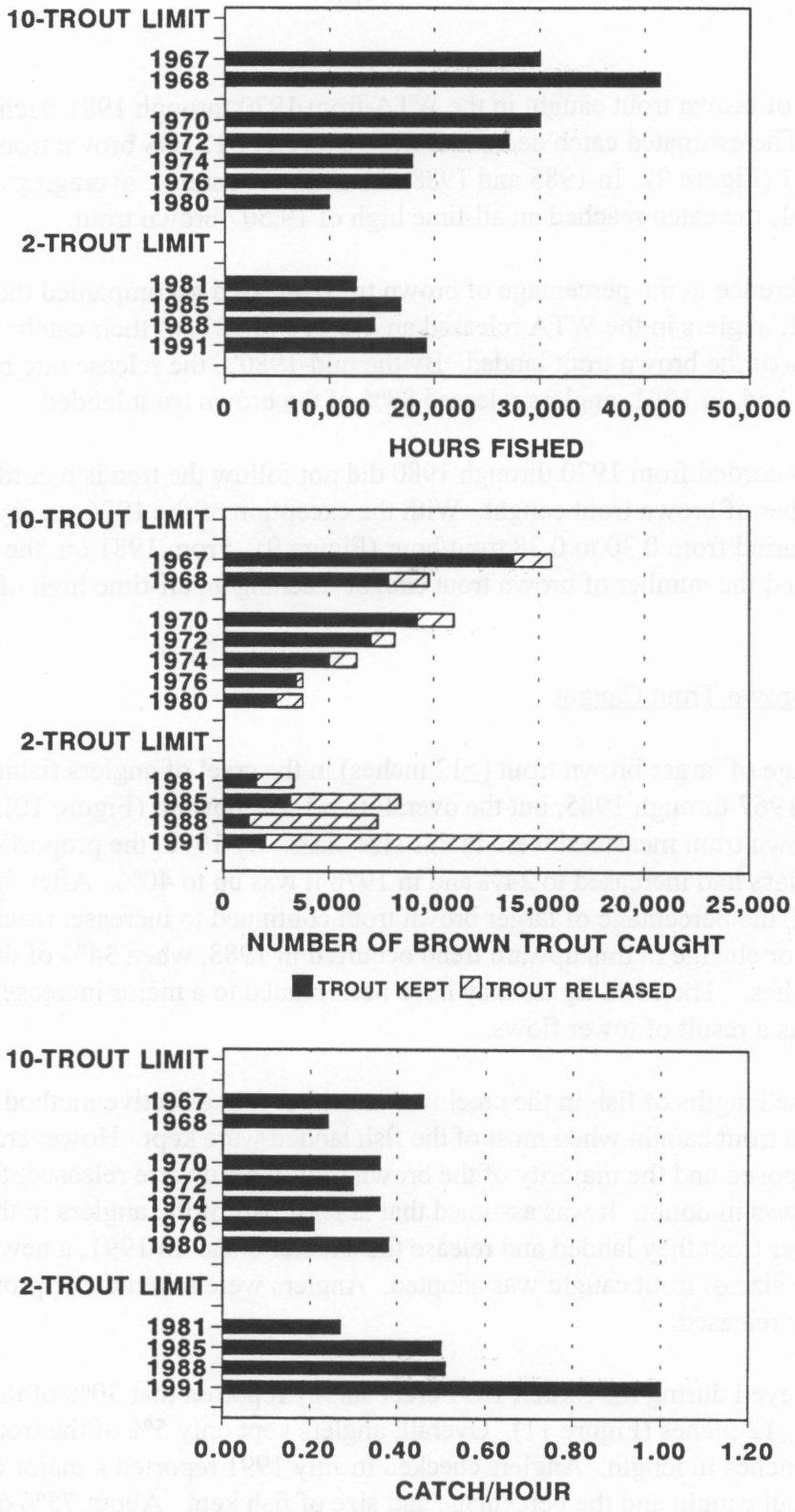

Figure 9. Preliminary estimates of hours fished, number of brown trout caught, and catch/hour in the WTA during March, July, and October, based on creel surveys conducted periodically from 1967 through 1991.

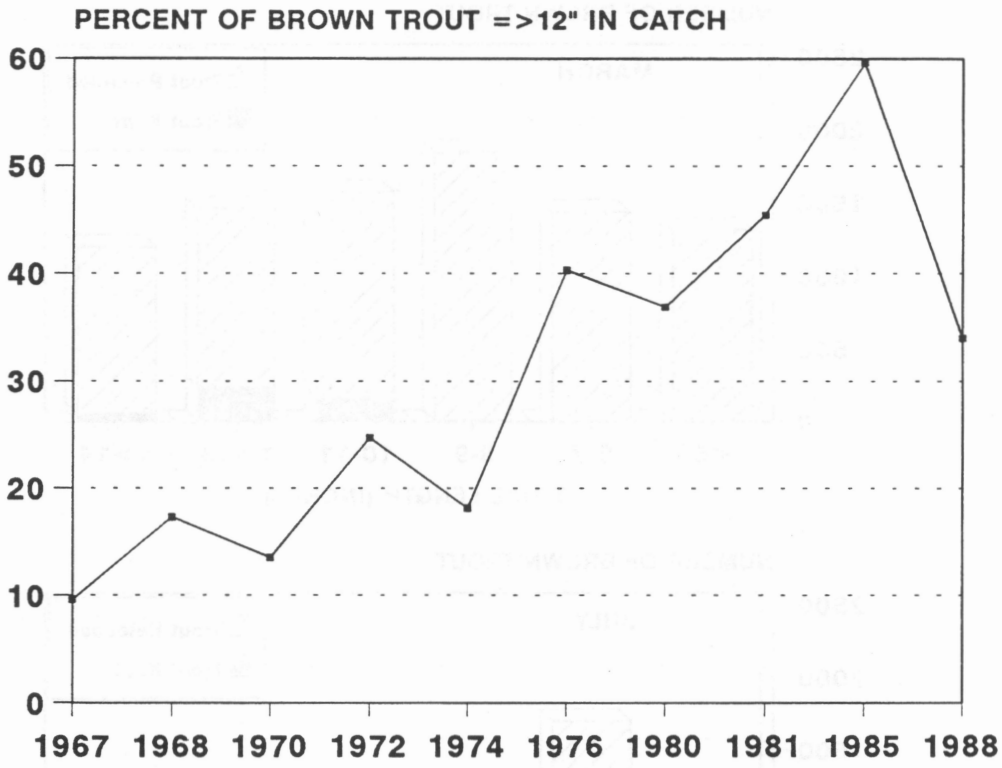

Figure 10. Percent of brown trout ≥12 inches measured from the creel of anglers checked during surveys conducted in the WTA from 1967 through 1988.

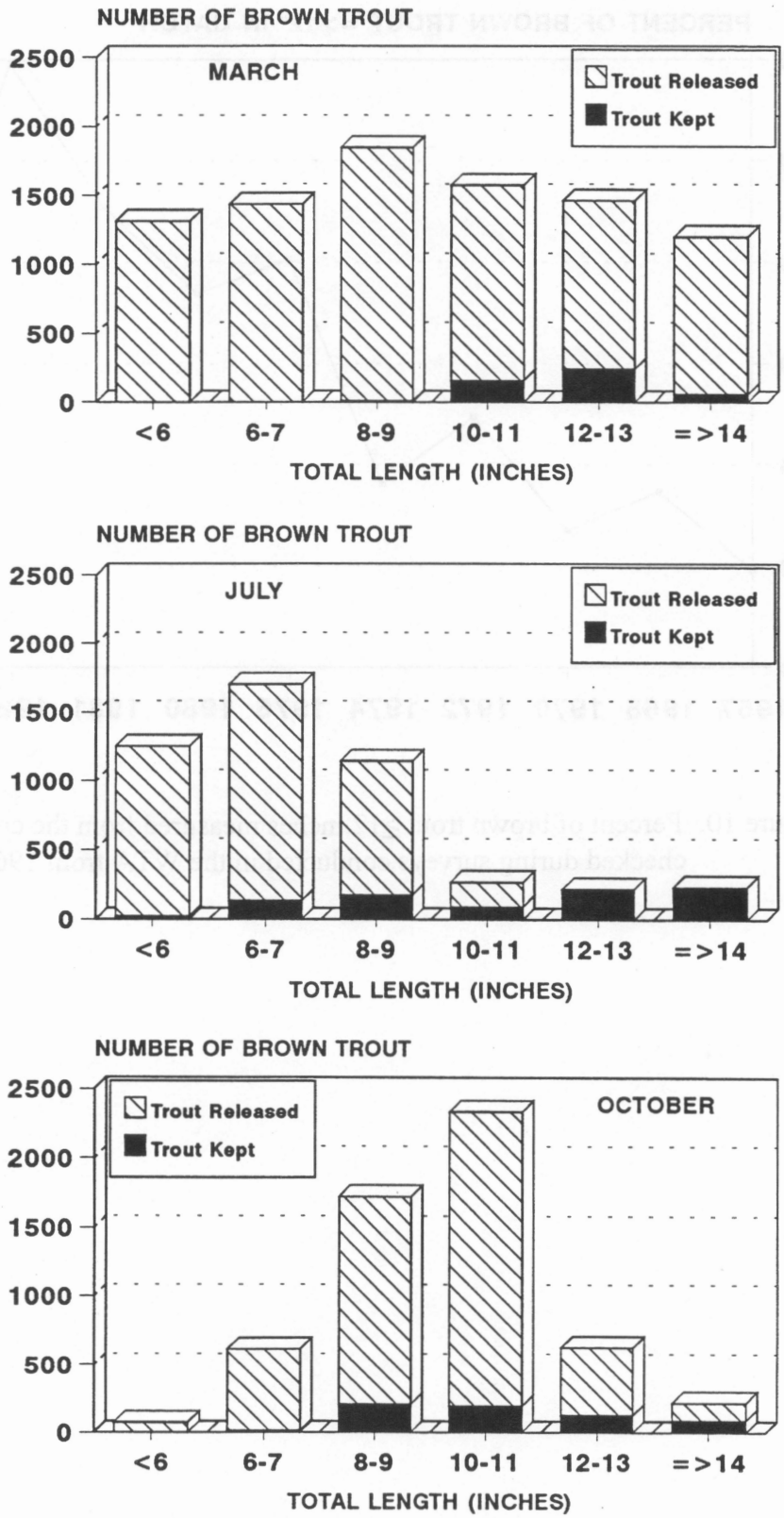

Figure 11. Seasonal changes in the length frequencies of brown trout anglers reported catching in the WTA in 1991.

Trout Harvest and Survival

A group of 365, primarily age 1 wild brown trout from the river, was tagged in October 1974. Tag returns show that an average of 41% of the surviving stock was harvested annually during the next two seasons. An average of 37% died of natural causes and 22% survived from one season to the next.

A second group of 379 wild brown trout was tagged in October 1979. Returns from this group were lower, totaling about 35% over a two-year period (118 tags the first year and 13 tags the second year). No tagging studies were conducted after 1979.

Spawning Stocks

Trends in the number of spawners from 1967 to 1976 were monitored by studies in the Pleasant Valley Spawning Channel. A total of 221 brown trout was trapped at the entrance of the channel in 1967 and 321 in 1968. Based on the number of redds (sites where trout eggs were deposited in the gravel), there were over 500 spawners during each run from 1970 through 1972. A redd count in November 1976 indicated the run was comparable to the 1970 through 1972 period. Based on reported observations in the WTA and the abundance of larger trout present during the 1992 population survey, there appear to have been thousands of spawning-size brown trout in the river during the latter stages of the recent drought.

MANAGEMENT PROGRAM

Management Goals

The goals of the wild trout management program for the lower Owens River are:

1. To maintain abundant, self-sustaining populations of wild brown trout capable of producing acceptable angling opportunities for both catch-and-release and harvest-oriented anglers.

2. To protect, maintain, and improve aquatic and streambank habitat of the lower Owens River within the WTA.

3. To maintain an attractive environment featuring vehicle-free streamside zones in the areas below Pleasant Valley Campground and open, naturally vegetated corridors along the stream within the campground.

Management Guidelines

The presence and location of the Pleasant Valley Campground and spawning channel have strongly influenced the goals for managing the WTA and the selection of current angling regulations. General guidelines for maintaining trout populations and acceptable angling have been established using the Pleasant Valley area as one of three management reaches.

1. Campground/Spawning Channel Area
    a. Protect the fall brown trout spawning run.
    b. Maintain the trout population at levels which will assure attractive angling.
    c. Provide an opportunity for campers and other anglers to harvest some trout.

2. Catch-and-release Area
    a. Maximize angling opportunities both in terms of the number and size of brown trout the river is capable of producing.
    b. If increased angler-use warrants, expand the catch-and-release area downstream.

3. Chalk Bluffs Area
    a. Allow bait anglers to continue to use the WTA.
    b. Allow harvest up to the general statewide limit if such harvest does not lower catch rates below acceptable levels.

Management Objectives

The following management objectives for maintaining trout populations and angling quality are based primarily on the 1991 creel survey, 1992 population survey, and early returns from an angler box survey program. Based on historical data, these objectives are higher than can be expected for a series of normal or high flow years.

In order to maintain acceptable angling opportunities during below normal flow periods, fall brown trout densities should be no less than two-thirds as abundant as the populations present in October 1992. Specifically, the three reaches should contain at least:

	Trout density (no./mi.) by fishing area		
Length class	Campground/ spawning area	Catch-and-release area	Chalk Bluff area
Trout ≥8 inches	3,000	2,600	1,300
Trout ≥12 inches	750	650	300

Specific objectives for trout densities and catch rates under the current angling regulation during a series of normal or high flow years are yet to be defined.

Acceptable angling opportunities in the three management reaches may be characterized by the following minimum catch rates:

	Fishing area		
Catch statistic	Campground/ spawning area	Catch-and-release area	Chalk Bluff area
Trout/hour	0.5	0.75	0.35
Brown trout ≥12"	25%	35%	20%

To protect and maintain aquatic and streambank habitat in the lower Owens River, the following standards should be met:

- Flows as stable as possible with minimums of 100 to 200 cfs except in an emergency or periods of drought[2],
- Temperate water (35-64°F immediately below Pleasant Valley Dam),
- High transparency and low suspended sediments,
- DO ≥5.0 at all times through the WTA.
- An absence of harmful pollutants,
- Sufficient, clean, noncompacted gravel in both the spawning channel and the river to maintain trout production not limited by the number of emergent fry, and
- Vigorous stands of native riparian vegetation for cover and bank stabilization.

To provide a more natural and attractive streamside environment and enhance the angling experience, the following standards should be established and maintained:

- Vehicles providing access to the catch-and-release area and downstream as far as Chalk Bluffs should be parked in designated areas along the Chalk Bluffs Road.
- Campsites, vehicles, and permanent structures in the Pleasant Valley Campground should be set back a minimum of 50 feet from the streambank.

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[2] Minimum flows based on recent studies and possible State Water Rights Board hearing dates are yet to be determined. It is assumed the minimum winter flow will be about 150 cfs during normal runoff years and 100 cfs during drought years.

Past Instream Habitat Management

DWP Policies

Stream flows and other factors which strongly influence brown trout production in the lower Owens River are set by DWP operating policies.

DWP has endeavored to keep releases to the WTA above 200 cfs to benefit trout spawning, especially during the fall/winter period. During drought or emergency conditions, DWP has consulted with the Department and mutually acceptable operation plans have been made. Flow reductions during winter have generally been avoided to prevent stranding of brown trout redds. When flows are decreased at any other time of the year, DWP attempts to limit the rate of change to 25 cfs or less every two hours. This avoidance of sudden flow reduction allows many aquatic organisms to avoid stranding, and is believed to reduce the failure rate of suddenly unsupported, saturated stream banks.

To control oxygen depletion in the WTA, DWP maintains a small aerator near the Pleasant Valley Reservoir outlet tower. In 1992, additional steps were taken at the Department's request to mitigate low dissolved oxygen levels. Bypass of sufficient flow through the Johnson valve below Pleasant Valley Dam elevated the combined valve/turbine discharge DO concentration to above 5 parts per million. Compressed air injected into the turbine draft tubes slightly elevated DO concentrations in the discharge. A temporary change from peaking to continuous power generation improved aeration efficiency and eliminated sudden surges of anoxic water. Twice-a-day DO and temperature monitoring in the gorge penstock, reservoir, and river within the campground assured that corrective measures were effective.

The cattle grazing leasee's use of herbicides and fire to remove willow cover below the campground was halted by DWP in the 1970's. Physical removal of willow in the campground continues, but in 1988 a verbal agreement between the Department, DWP, Inyo County, and the California Department of Forestry discontinued this practice on the steep-sided stream banks. These changes resulted in partial recovery of bank stability and riparian vegetation in many areas.

Impact of the Second Aqueduct

In response to concerns over the impact of higher flows resulting from operation of the second aqueduct on instream habitat, DWP, California Trout, and the Department sponsored a USGS study (Williams, 1975). Study objectives were to determine:

1. The probable effect of increased flows on the movement of natural streambed gravel.

2. The probable effect of increased flows and removal of riparian vegetation on the rate of bank erosion.

3. The probable effect of a proposed bypass channel on channel geometry, bank erosion, and sediment transport in the main river.

A bypass channel, adjacent to the river, carrying the additional flow from the second aqueduct was viewed as a possible means of maintaining existing habitat conditions in the main channel. Properly designed, the proposed bypass channel could create a new year-round fishery.

The USGS study concluded that:

1. Any proposed flow into the main channel below Pleasant Valley Reservoir within the range studied (138 to 690 cfs) would not reduce the amount of spawning-size gravel being moved downstream.

2. Reduced flows would not return the river to its natural state but should decrease bank erosion. Frequent fluctuations and low winter flows accelerate bank sloughing.

3. Improved bank stabilization by increasing riparian vegetation should consider the amount of gravel available from eroding banks. Downstream gravel movement may be greater if river widths are reduced and the excess energy from high flows scours the stream bottom. The present vegetation is vital in maintaining existing conditions, and improper land-use practices could alter the existing ecosystem.

4. Changes caused by diverting part of the flow down the proposed bypass channel are expected to be too small to significantly affect sediment movement or bank erosion rates.

Based on the study results and potential operational problems, a decision was made not to proceed with the bypass channel. Operational problems included inadequate winter flows and sedimentation. If the available 200 cfs minimum winter flow was split between two channels, trout production in the main river would probably decrease. If the bypass channel had limited or no flow in the winter, its value as a fishery would be largely compromised. A freshly cut or excavated channel may contribute substantial amounts of fine sediment into the main river.

The Department's most recent angling and trout population studies, however, indicate that reducing flow in the main channel may have appreciably improved the fishery. If the bypass channel could have been designed to sustain a brown trout population with a flow of 25 to 50 cfs in the winter and carry up to 300 cfs thereafter, trout production in the main channel may have been substantially increased. Lower main channel flows would also have allowed anglers to wade much more of the stream and, in general, improved fishing conditions. However, the long-term effects on channel stability and habitat quality are unknown.

Proposed Instream Habitat Management

Releases of Water from Pleasant Valley Dam

The Department shall request and encourage the DWP to:

1. Release a minimum of 150 cfs during normal operations (Figure 12).

2. Anticipate seasonal changes in water needs to minimize flow fluctuation.

3. Continue consultation and coordination with the Department when special conditions, such as drought, require alteration of release schedules.

4. Decrease flow rate by not more than 10% per day.

Pleasant Valley Spawning Channel

The Department should continue to operate the Channel to maximize production of young-of-the-year brown trout. Annual programs should be performed to de-silt the gravel substrate and control beaver populations and cattail growth. Ultimately, the Department should evaluate the need for juvenile brown trout production in the Channel to maintain the river population during high runoff years. If it is determined that the Channel has value, an engineering evaluation should be made to determine ways to maximize output of juvenile trout and minimize maintenance requirements.

Ramping Rate

DWP has endeavored to limit the rate of change of Pleasant Valley Dam releases to 25 cfs every two hours. Avoidance of sudden flow reduction should reduce stranding of aquatic animal life and failure rates of suddenly unsupported saturated stream banks. Unfortunately, extensive streambank collapse has persistently occurred. A more conservative ramping rate to reduce streambank damage and provide conditions for vegetative recovery is desired. Site-specific information on the effect of receding flows on bank erosion is lacking. Hill, Platts, and Beschta (1991) recommend staging flow reductions in 24-hour increments of less than 10% of the previous day's flow. Until better information is locally developed, the Department recommends this more conservative ramping rate for routine operations.

Bank Cover

Loss of undercut banks and overhanging willows has seriously reduced trout cover and bank stability. Natural willow recolonization is occurring in many reaches of the channel. The extent to which undercut banks might form again is unknown. Riprap and structural means of bank

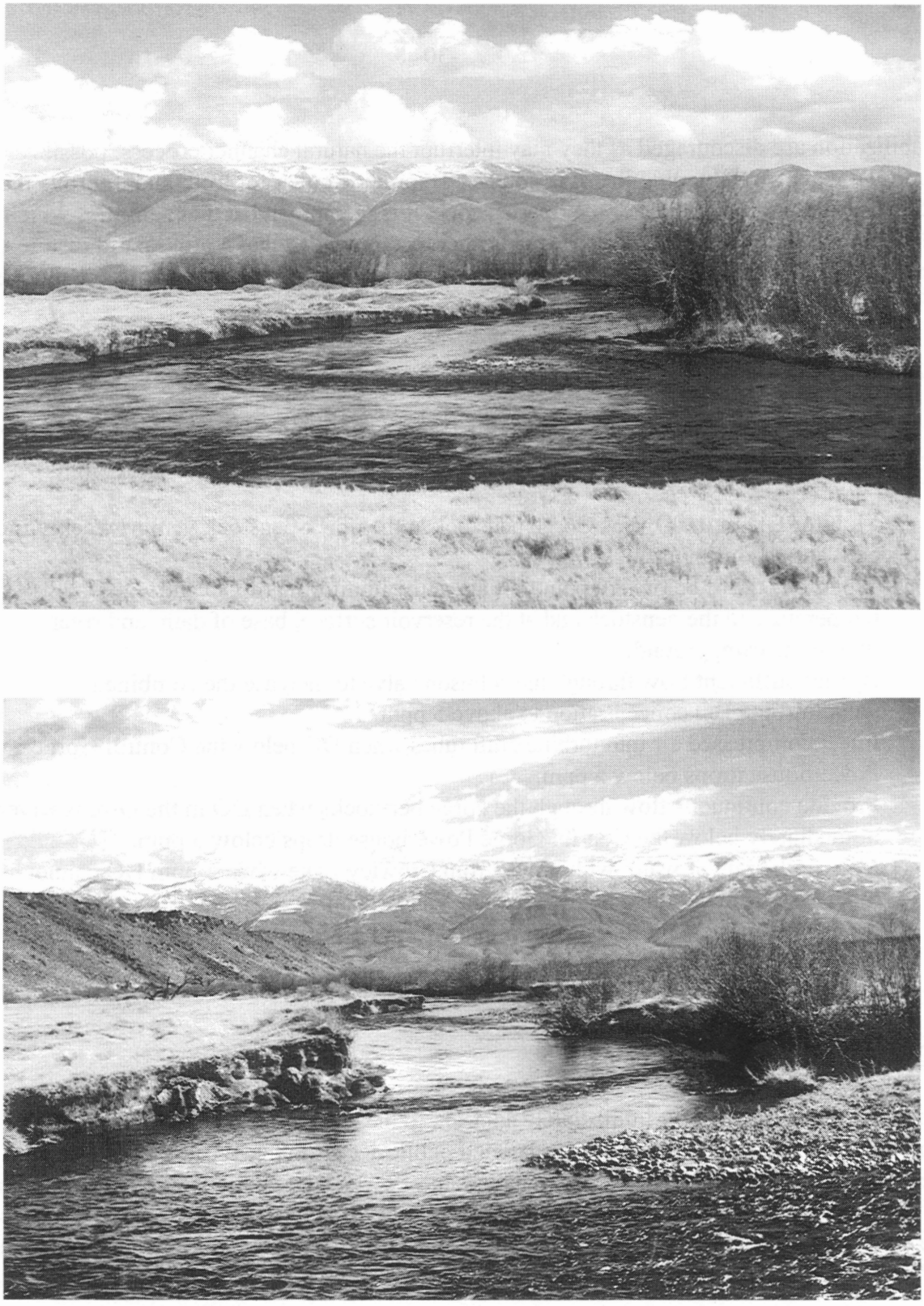

Figure 12. Lower Owens River flowing at a moderately high flow (about 475 cfs) and a flow of about 150 cfs.

stabilization are discouraged as they may interrupt the natural channel process, possibly shortening and straightening the river course. To provide cover for trout and improve the aesthetic and wildlife values of the riparian zone, it is recommended that activities which might hinder willow recovery be avoided. It is further recommended that a program to restore tree species (Fremont cottonwood and Gooding's willow) to their former abundance be pursued (Figure 13).

Dissolved Oxygen

It is likely that severe oxygen depletions will again occur in the Crowley Lake-Owens River system. The following corrective measures are recommended to limit DO depletion:

- Monitor DO in the Owens Gorge penstock at the upper penstock venturi weekly in July and August during drought years.
- When DO drops below 3.0 ppm, initiate daily monitoring of DO and temperature in the penstock and at the reservoir surface, base of dam, and river within the campground.
- Bypass sufficient flow through the Johnson valve to increase the combined valve/turbine DO concentration to above 5 ppm.
- Inject compressed air into turbine draft tubes when DO below the Control Gorge Powerhouse drops below 5 ppm.
- Provide continuous flow through the gorge penstocks when DO in the Owens River immediately below the Control Gorge Powerhouse drops below 5 ppm.
- Reduce the rate of water withdrawal from Crowley Lake when 5 ppm DO cannot otherwise be maintained below Pleasant Valley Dam.
- Support efforts to control nutrient imputs from the watershed.

Management of Adjacent Lands

DWP Policies

Land use and development immediately adjacent to the river are controlled under DWP policies. DWP has long provided unrestricted public access to the WTA for day use and designated camping facilities. These practices have served the public well by allowing access to one of California's finest wild brown trout fisheries. It is recommended that these practices be continued. To maintain ecological, fishery and aesthetic values, it is also recommended that DWP continue to restrict incompatible development from the WTA.

Controlled Vehicle Access

River access below the campground is largely by private vehicles. Most recreationists use the evolving network of spur roads to drive directly to the river's edge. These unplanned access routes have expanded into a web of tracks which cut through the alkali/saltgrass meadow north of the river.

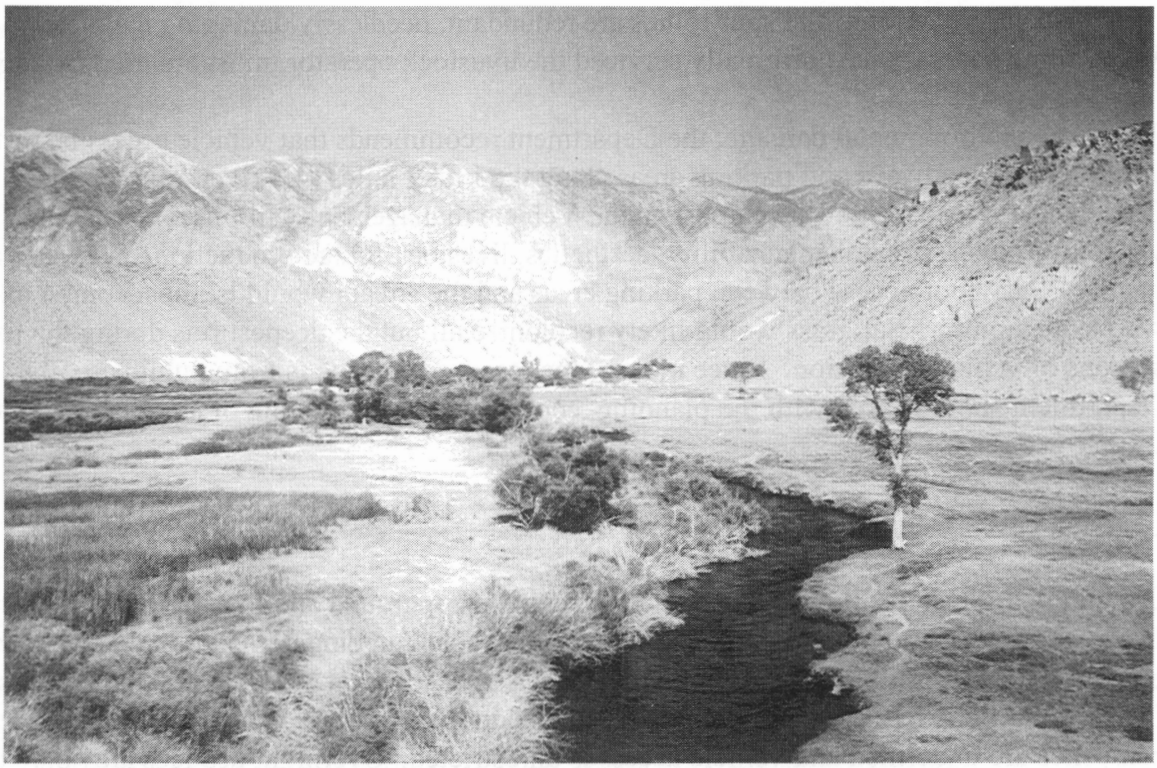

Figure 13. Largely denuded north bank of the Owens River.

The ruts lack vegetative cover and produce blowing alkali dust during dry windy conditions and muddy runoff after heavy rains (Figure 14). Where tracks are near the river, they contribute to bank instability. Most of the spur routes are redundant, needlessly damaging the meadow. While some access routes originally serviced the livestock operator, most are used by anglers.

To reduce environmental damage, the Department recommends that vehicle access be restricted to designated roadways and parking areas along the first 2 miles (4.4 river miles) of the Chalk Bluffs Road east of the campground. Vehicle management will improve riparian vegetative cover, streambank stability, aesthetics, livestock forage production, and water and air quality. Easy foot-access between parking areas and the stream would be most compatible with wild trout angling. Saltgrass would likely recolonize all but the deepest ruts during the first few seasons of vehicle exclusion. Since most of the resource damage is from public use, the Department should assist with the planning, coordination, and funding of a project to control vehicle access.

Pleasant Valley Campground

Camping has been disallowed between the existing campground and Five Bridges Road since the 1970's to protect water quality and aesthetics. To satisfy camping demand, Inyo County has operated a semiprimitive campground in the WTA near Pleasant Valley Dam under a lease from DWP. Pit toilets, free-standing barbecues, and a hand-pump water well are provided. Actual campsites are undefined and vehicle access is unrestricted. Overnight use fees are $6.00 per vehicle.

Most camping is concentrated in riparian areas under limited shade. Over the years, the size and number of trees along the bank have declined due to vandalism, firewood cutting, and lack of replacement as they die. Much potential campsite space exists on a flood terrace, but little shade exists there. Because of annual burning and mechanical removal of invading sand bar willow, the vegetation is restricted to a saltgrass dominated community.

Campground use patterns conflict with wild trout angling and habitat management. Many of the campsites are on the river bank (Figure 15), and many anglers are reluctant to fish through occupied campsites. Intense foot and vehicle traffic has compacted soils, damaging native plants and contributing to streambank instability. Moving the entire campground out of the WTA would be difficult and may be counter-productive. Good alternative campsites close to the river are hard to find, and people would likely camp illegally along the river if there is no campground in the area. However, if a suitable nearby site is found, the campground should be relocated.

Inyo County and DWP recognize the problems and have agreed to address them. The campground lease requires a 50-foot setback for improvements. The concept of a 50-foot naturally vegetated stream buffer zone was incorporated in the master planning document for Inyo County Parks and Recreation Department in 1990 (Anonymous). While fishery, wildlife,

Figure 14. Vehicles driven to the riverbank via one of several roads worn into the meadow below Pleasant Valley Campground.

Figure 15. One of many campsites next to the river in the Pleasant Valley Campground.

and aesthetic values would be maximized by campground removal and site restoration, the Department acknowledges that competing recreational demands exist. We believe that all existing uses of the campground area, including wild trout angling, could be enhanced through campground redevelopment based on the following concepts:

- Campsites should be designated in defined areas.
- Vehicles should be confined to planned access roads and parking areas only.
- A minimum 50-foot stream buffer zone should be established where vehicles, campsites, and permanent structures are not present, and native vegetation is restored.
- Native tree species should be planted throughout the camping area to provide shade and an attractive visual setting for campers.

The Department supports an incremental plan toward an attractive camping facility on the lower Owens River. Support should take the form of official concurrence with cooperating agency efforts, assistance in applying for State grants for environmental restoration, and sharing of our in-house expertise with vegetation management, natural resource interpretation, and engineering.

Livestock Management

Lands surrounding the WTA are leased to two livestock operators for winter cattle grazing. In the first 3.5 miles below the campground, cattle arrive around December 1 and remain there through early spring. Cattle are taken out of the area, depending on how quickly feed is established on alternate pastures after the April 1 irrigation season commences on other DWP property. In the lower 1.5 miles ending at Five Bridges Road, cattle arrive in late fall after spending the summer in higher country. Cattle remain in this stretch into the spring period. Grazing during the spring depends upon the timing of snowmelt and feed production on irrigated pastures elsewhere. Cattle do not normally graze the campground area. The WTA is normally not grazed during the summer and much of the fall. This rest period occurs at the optimal time for plants to recover from early spring grazing.

Current livestock management practices in the WTA appear to be compatible with wild trout angling and habitat objectives.

Water Quality

In the late 1960's, fine sediments from mine tailings entered Pine Creek, tributary to the Owens River at Pleasant Valley Reservoir. The resulting turbidity was carried through the reservoir and into the WTA, continuing for several days. In 1987, a closure plan was prepared for U.S. Tungsten, Pine Creek Operations, under the requirements of the California Regional Water Quality Control Board, Lahontan Region (LRWQCB), but the turbidity problem still persists.

Land-use practices in the upper Owens River basin undoubtedly contribute nutrient enrichment to the aquatic system, increasing the risk of oxygen depletion in and downstream from Crowley Lake and Pleasant Valley Reservoir. For this reason, the Department should continue to fully cooperate with the LRWQCB to attain compliance with current Basin Plan Standards (Kaiser Engineers, 1991), and with improved grazing strategies being implemented by DWP on their lands adjacent to Crowley Lake.

Past Fisheries Management

Wild Trout Designation

Prior to 1970, the lower Owens River was, in part, managed as a stocked, roadside, catchable trout stream. An average of 42,000 hatchery-reared catchable and large subcatchable rainbow trout were stocked annually from 1967 through 1969. In 1967-68, stocked rainbow trout comprised 49% of the fish observed in the creel.

After the 1967-68 baseline studies, it was concluded that the lower Owens River, unlike many of its less fertile, east slope Sierra tributaries, could provide satisfactory fishing without stocking. Furthermore, managing a portion of the river for wild trout would provide more diversified fishing in an area where virtually every suitable roadside water was stocked with catchables. It was recognized that many anglers derived little satisfaction from catching stocked trout and desired an opportunity to fish roadside waters supporting abundant populations of wild trout.

In 1970, catchable trout stocking was halted in the first 7 miles of stream below Pleasant Valley Dam. The next 9 miles of stream, extending the no-stocking section of river down to Five Bridges, was added at the start of the 1972 season. Later in 1972, the Commission formally designated this 16-mile section as a wild trout management area.

Angling Regulations

Unlike most roadside streams in the WTP, special angling regulations were not imposed on the lower Owens River for nearly a decade. Four factors influenced the decision to stay with the 10-trout general season and 5-trout winter season bag limits. The first factor was the type of angler using the resource. Though managed as a roadside wild trout fishery, the river failed to attract many anglers oriented toward catch-and-release fishing. Most anglers fished with bait and kept all of the trout caught. While few could creel their limit, most, according to a 1972 survey, desired the opportunity to do so. When asked if they would continue to fish the river if the general season limit were reduced from 10 to 5 trout, only 10% of the anglers said no. However, when asked if they would continue to fish the stream if the limit were dropped to two or zero, 69% and 80%, respectively, said no. While it is difficult to say if approximately 70% of the anglers fishing the stream during the survey would not have returned if a two-trout limit was imposed, the survey was accepted as indicative of the type of angling desired.

Second, catch rates remained fairly steady during the 1970's (Figure 9). Third, the proportion of larger trout in the creel was, overall, increasing (Figure 10). And fourth, the brown trout population, based on the 1977 survey, was considered abundant (Figure 8).

Establishing an experimental angling regulation area in a 2.5-mile section of the river downstream from the Pleasant Valley Campground was proposed by the WTP in 1978. However, the proposal lacked the Department support needed for it to be considered by the Commission.

The first change in angling regulations was based on the 1979 fish population survey which indicated there was a sharp decline in abundance of young-of-the-year brown trout (Figure 8). The Department requested and the Commission approved a two-trout limit. Again, consideration was given to the bait anglers and an artificial-lure-only restriction was not recommended by the Department. As previously discussed, the two-trout limit appeared to reverse the downward trends in the fishery. Angler use, the number of trout landed, and catch rates all improved.

The results of the 1991 creel census led the Department to recommend a major change in regulations for the WTA. For a few seasons, anglers had been complaining about the decrease in the numbers of larger brown trout in the river. Although the Department documented this decrease in size in 1988 (Figure 10), it was considered a short-term change accompanying the drought. When a comparison of the March and July 1991 creel census data showed how quickly the larger brown trout in the fishery could be depleted, the Department concluded that more restrictive regulations were necessary.

The first decision made was that a reach of the river should be managed as a catch-and-release only (zero-limit) section. Data from the mid-1980's through 1991 also showed that, contrary to the 1970's, many of the anglers on the river were now strongly catch-and-release oriented. The reach selected started at the footbridge at the lower end of Pleasant Valley Campground and extended downstream for 4.4 miles. Here, the impact of angling on the number and size of trout available would be minimized.

Second, to meet a strong concern that spawning stocks in the area of the Pleasant Valley Spawning Channel be protected, a 12-inch maximum size limit was recommended from the footbridge upstream to Pleasant Valley Dam. Data from the spawning channel indicated that this regulation would protect 70% of the spawning-size fish in the fall run. Beyond protecting the spawning run, a 12-inch maximum size limit would allow those staying in the campground to harvest smaller trout for a meal if they desired.

The third decision was that bait fishing should continue to be a part of the management program. When angler use and success data were studied, it was concluded that the lower 9 miles of the WTA were under-utilized. This reach was considered suitable for bait angling, especially where

heavy willow growth lined both banks of the river. To further encourage bait anglers to use this reach of stream, it was recommended that the two-trout limit be replaced with five-trout year-round. The Commission approved all three recommendations effective March 1, 1992.

Creel Surveys vs Fish Population Surveys

The scheduling of the angler and fish population surveys on the lower Owens River has been predicated largely on perceived management problems. Angler surveys were conducted in 1967-68 and then in even-numbered years from 1970 through 1976. As the downward trend in angler use and catch during this period became apparent, the angler surveys were replaced with trout population surveys which potentially provided a more direct way to identify any problems related to brown trout production.

Those conducting the 1977, 1979, and 1980 population surveys believed that the river could not be effectively sampled unless the flow was cut to about 50 cfs. However, a 50 cfs flow caused losses of small brown trout in backwater areas and stranded aquatic insects on dried-out cobble and gravel bars. After the 1980 survey, it was concluded that unless fish population data were critical to answering a management problem, the Department would rely on angler surveys to assess the fishery. Hence, no population surveys were conducted from 1981 through 1991.

The 1992 survey was conducted at a 100 cfs release, which required only a 10 cfs reduction in the existing flow. One of the keys to successfully conducting this survey was using a barge-mounted electric generator rather than the usual battery-operated backpack electrofishing units (Figure 16). The 1991 survey was undertaken to answer persistent complaints that brown trout recruitment had been exceptionally low for two to three years and to establish baseline data from which new angling regulations could be evaluated.

Proposed Fishery Management

Monitoring Programs in 1994 and 1997

To monitor the status of trout populations in each of the three management areas, the six sections sampled in 1992 will be sampled again in 1994. An angling survey covering established spring, summer, and fall periods will also be repeated in 1994. Since 1992, supplemental angling data from the zero-limit area have been collected using angler survey boxes. Data from the boxes and the 1994 surveys will be used to determine whether or not the objectives of the fisheries portion of the management program are being achieved.

If the objectives from the three management areas are being achieved, the surveys will be repeated again in 1997. If not, consideration may be given to modifying the angling regulations or implementing other remedial measures. The 1997 population survey should include a collection of brown trout scales for a study of growth rates within the catch-and-release area. If,

Figure 16. Crew using the barge-mounted generator to sample brown trout during the fall 1992 survey.

after these two- and six-year checks, the program is on track, it is probable that adequate monitoring of the fishery can be provided by a return to the periodic March, July, and October angler survey supplemented by angler survey boxes.

Expansion of the Catch-and-Release Area

If the catch-and-release area continues to provide excellent fishing under high flows, angler use in this reach will likely increase. The number of anglers present on some weekends has been so high in parts of the catch-and-release area that anglers have complained about overcrowding. If additional catch-and-release area is desired, the lower boundary should be moved progressively downstream. The first expansion should be to the fence line approximately one road-mile downstream of the current boundary. If needed, a second expansion of the catch-and-release area should be to the fence crossing the road immediately east of Chalk Bluffs. Expanding the catch-and-release area in this manner will preserve the section boundaries used during the collection of creel survey data since 1967, allowing for comparative data analysis.

If, after these two proposed expansions, additional portions of the lower Owens River need to be managed as quality wild trout fishing areas, it is recommended that the reach of river between Five Bridges and the Highway 6 bridge near Laws be evaluated for wild trout designation.

ACKNOWLEDGMENTS

We wish to thank Anne Gerolamy for typing and Chuck Knutson for editing this plan. We also wish to express our appreciation to the staff and administration of the Northern District Office of DWP for their long-term cooperation in managing the lower Owens River WTA.

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PROGRAM IMPLEMENTATION SCHEDULE

Task	Department section and other agencies responsible	Implementation date
A. Instream Habitat Management		
1. Pleasant Valley Spawning Channel Maintenance	Region 5	As needed
2. Channel width transect study	Region 5	1997
B. Land Use Management		
1. Pleasant Valley Campground		
a. Plant native shade trees	Region 5	1993 and as needed.
b. Pursue 50-foot campsite setbacks	Region 5, Inyo Co., DWP, and other interested parties	Ongoing until achieved.
2. Control vehicle access	Region 5-Southwest Council, Federation Fly Fishers	1997 and until completed.
3. Restore native riparian trees	Region 5	After planting techniques refined.
C. Fishery Management		
1. Fish population surveys		
a. Field survey	Region 5-IFD	Fall 1994/1997
b. Data compilation	IFD	Winter 1994/1997
c. File report	Region 5-IFD	1997
2. Angler creel census		
a. Field survey	Region 5	1994/1997
b. Data compilation	IFD	Winter 1994/1997
c. File report	IFD	1997
3. Angler box survey		
a. Maintenance	Region 5	Ongoing
b. Data compilation	IFD	Winter 1993-1997
c. File report	IFD	Winter 1993-1997
4. Evaluate angling regulations	Region 5-IFD	1995/1997
5. Expand catch-and-release area	Region 5-IFD	As needed
D. Coordination with DWP and Inyo County	Region 5	Continuing