

# Shasta Watershed Restoration Plan



# Shasta Watershed Plan

## Table of Contents:

Section 1	Shasta CRMP Riparian Zone and Anadromous Fish Action Plan
Section 2	Calif. Department of Fish and Game Anadromous Fish Biological Needs Assessment
Section 3	Shasta CRMP Uplands Plan/RMAC Plan
Section 4	Yreka Creek Greenway Plan
Section 5	CRMP mid-term goals, workplan, original CRMP Plan, etc.
Section 6	Shasta River Remote Monitoring Station--Telephone Access Information; also historical flow and temperature information
Section 7	Sport, Tribal and Commercial Salmon Harvest Information, Shasta and Klamath Rivers spawning numbers
Section 8	The unique Shasta Valley Geology

1  
2  
3  
4  
5 SHASTA RIVER CRMP ACTION PLAN  
6

7 In order to write an action plan like this, there seems to be no way to avoid taking an unbalanced  
8 approach-- everything written here focuses entirely on problems. Yet the truth is that every industry  
9 has its impacts. Our purpose is to identify what negative impacts there are on water quality in the  
10 Shasta River, and find ways to minimize them. To the extent that we are successful in doing that, we  
11 will make agriculture in Siskiyou County stronger in the long run.  
12

13  
14 We have made an effort to keep this document brief and readable. One of the unfortunate  
15 consequences of this is that we make no mention of the beneficial uses that the river and its water  
16 have been put to--farming, ranching, etc., with its resulting set of jobs created, bills paid, spin-off  
17 jobs, and ultimately food for many people. In the end, there is no discussion at all of the various  
18 cultural, social, or economic values that absolutely depend on access to water to make otherwise dry  
19 land productive, and economic survival in the Shasta Valley possible for many of the people now  
20 living there.  
21

22 Yet at the same time, we must also fail to explain and describe the benefits of improving salmon  
23 production, and assume that everyone understands the key role the Shasta plays in a  
24 \$50,000,000/year fishing industry. An industry financially benefiting both residents of Siskiyou  
25 County through sportfishing camping and tourism, and also people downriver and on the coast. The  
26 fishing industry also directly translates into jobs for families, bill payments, and food for people.  
27

28 Finally, by focusing only on problems, this plan creates an image of a river in which nothing is right  
29 from a fishery standpoint, when in fact the whole point of the overall effort is that there is so much  
30 that is "right" with the river that returning it to economic production appears to be quite possible by  
31 reasonable means.  
32

33 We recognize all these shortcomings, but have chosen to accept them as the necessary cost of  
34 developing an action plan that is brief and concise enough to be easily read, understood and  
35 discussed by people living and working in the Shasta Valley.  
36

37  
38 We trust that each person reading this will recognize, as we do, that this document presents only part  
39 of the whole picture. And that to succeed, any changes that we might suggest will somehow have to  
40 meet the needs and desires of all the people who are going to be affected.

1 Introduction:

2  
3 The Shasta River Coordinated Resources Management and Planning Committee is a group made up  
4 of all landowners from the Shasta Valley, along with representatives of the Calif. Dept. of Fish and  
5 Game, Natural Resources Conservation Service, Bureau of Land Management and the Klamath  
6 River Basin Fishery Task Force. All meetings are open to the public, and business will be conducted  
7 only with a minimum of five members present.

8  
9 As a group, active members of the CRMP are committed to both identifying and assisting with  
10 actions that landowners in the Shasta Valley can voluntarily take that will result in an improvement  
11 in the survival of anadromous fish in the Shasta River. Each of the active members of, the CRMP  
12 urges other landowners throughout the Shasta Valley to work cooperatively with those agencies  
13 involved in the protection of fish, wildlife, and other public trust resources. It is their belief that all  
14 of us working together on these resource issues will do the most to preserve and strengthen  
15 agriculture as an integral part of life in Siskiyou county.

16  
17 While the Shasta River CRMP includes the entire watershed, the primary focus at present is the  
18 portion that is either accessible to or directly affects anadromous fish (the Shasta below Dwinnell  
19 Dam, Parks Creek, Little Shasta River and Yreka Creek). As needs for planning become apparent in  
20 other areas of the watershed, other sub-basin groups can be formed to develop sections to be added  
21 to this plan. Eventually this is expected to result in sub-basin groups each with its own sphere of  
22 influence and expertise, collectively planning for the needs of the watershed.

23  
24  
25  
26 Action Plan Format:

27  
28 This document is divided into sections. On the following pages is the C R P Action Plan,  
29 presented with as little explanatory text as possible. Following that is the Calif. Department of  
30 Fish and Game's Biological Needs Assessment that is attached as a separate document. The  
31 Biological Needs Assessment consists of a description of the conditions desirable for salmon and  
32 steelhead, along with a summary of current conditions in the Shasta River. The Biological  
33 Needs Assessment should provide enough information to understand the need for the actions  
34 called for in the CRMP Action Plan.

35  
36 Other background and supporting information is provided for those topics not completely  
37 covered by the Biological Needs Assessment.

38  
39  
40  
41  
42 Plans for revisions:

43  
44 As additional information becomes available, or as conditions change, this plan will be changed  
45 or expanded. When the need arises, discussion of changes will take place as agenda items at  
46 ordinary CRMP meetings. Changes to the plan will be made by majority vote only after  
47 discussion of any change at three consecutive meetings. Those persons voting must have  
48 attended at least two of those meetings.

1  
2  
3  
  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
7  
48  
49

Draft Shasta CRMP Action Plan:

I Water

A. Observed Problems

1. Surface Water

- a. low flows during some of the summer irrigation season (April I-Oct. 1)
- b. rapid reduction in flow at start of irrigation season in some years
- c. difficulties in regulating flow consistently throughout the irrigation season
- d. inadequate flows in winter to maintain gravel in suitable condition for successful incubation of salmon eggs
- e. high water temperatures in summer
- f. low levels of dissolved oxygen in summer
- g. nutrient loading
- h. urban contamination-street runoff, sewage, toxic spills
- i. difficulties in closely controlling irrigation water distributed via open ditches and flood irrigation
- j. lack of regulation under the Shasta River Adjudication of riparian and groundwater rights
- k. data gaps relating to above problems

2. Ground Water

- a. uncontrolled groundwater withdrawal has impacted surface flows, and can be expected to do so increasingly in the future

B. Recommended Actions

- 1. Continue program of riparian fencing and native tree planting. Benefits:
  - a. shade water to minimize temperature gain.
  - b. stabilize banks to minimize erosion
  - c. filter nutrients
  - d. avoid future problems by re-creating diverse, natural conditions
- 2. Continue pulsed flow program. Benefits:
  - a. provides short term solution to lethal water conditions for salmon residing in Shasta River in early summer
  - b. boosts salmon production in the short term while waiting for long-term habitat improvements to take effect.
- 3. Assist with screening of diversions. Benefits:
  - a. protect salmon
  - b. protect water users from Endangered Species Act problems

- 1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49
4. Provide real-time access to river flow information. Benefits:
    - a. help water-master avoid drawdowns below normal levels.
    - b. help to develop staggered start-up at the start of the irrigation season
    - c. better position people to manage water locally should water-master service be discontinued.
  
  5. Support creation of dedicated instream flows **for** fish and wildlife (if done on a voluntary basis) through purchase or conservation measures. (with provision that all or most of conserved water be dedicated to instream flows). Benefits:
    - a. reduce temperature and nutrient levels
    - b. increase habitat and cover, reducing salmon losses to predators.
    - c. protect water rights of other water users **by** developing dedicated insream flows through voluntary measures
  
  6. Continue efforts to substitute pumps for existing diversion dams. Benefits:
    - a. reduce temperature gains
    - b. reduce erosion
    - c. increase levels of dissolved oxygen
  
  7. Seek ways to reduce irrigation tailwater, or capture it for re-use. Benefits:
    - a. reduce contribution to daytime water temperature build-up
    - b. Reduce nutrient loading
    - c. Reduce input of fine sediment.
  
  8. Comment where appropriate on CEQA, NEPA, and local planning actions. Also applications for water rights, and other regional planning efforts. Benefits:
    - a. to be certain that new development doesn't transfer costs to existing water users
    - b. to increase awareness of our goals and efforts.
  
  9. Should re-adjudication occur, insist that it include both surface and ground water wherever they are in communication with each other.
    - a. to insure that it is truly comprehensive, and won't have to be redone again
    - b. to protect the rights of both surface and ground water users
    - c. to protect gains in instream flows.
  
  10. Seek funding for studies to fill data gaps
    - a. hydrologic study of the river, defining importance of existing meander pattern, gravel budget, flows for channel and gravel maintenance.
    - b. continue gathering data to create water model capable of predicting effects of various restoration efforts.
    - c. create good photographic/map base on which to document progress to date, key areas, plans and baseline conditions.
    - d. further study early life history of salmon use of the Shasta to better understand and meet their habitat needs

- e. evaluate existing irrigation diversion impoundments to determine to what extent they are functioning as sediment traps, areas of surrogate rearing habitat, or barriers to fish migration.

## II Erosion

### A. Observed Problems

1. Bank erosion leads to loss of good agricultural land.
2. Sediment in river settles out in spawning gravel, reducing survival of salmon eggs.
3. River tends to get shallower and wider, leading to increased water temperatures.

### B. Recommended actions

1. Continue program of riparian livestock control fencing and re-planting.
  - a. stabilize banks with roots of woody plants.
  - b. minimize hoof impacts by creating graveled stockwater access areas.
2. Focus erosion controls on methods that will be both effective and will result soonest in ongoing vegetative bank protection.
  - a. vegetation will be not require ongoing maintenance
  - b. vegetation will produce other benefits--shading, improved rearing habitat, other wildlife habitat.
  - c. cost will be lower and permitting will be substantially easier.
  - d. vegetation will allow the river to adjust to changing conditions.
3. Seek information to fill data gaps:
  - a. gather descriptions and photographs to try to develop a historical perspective of bank vegetation
  - b. develop baseline information of current spawning gravel condition.
  - c. investigate possibilities of mechanically cleaning existing gravels in place.
  - d. secure a hydrological review of the river to determine what is a stable meander pattern for various reaches, and how can that be maintained.
  - e. investigate role of impoundments as sediment traps.

## III Fish needs

### A. Observed problems:

1. Summertime water temperature and dissolved oxygen often at stressful, and sometimes at lethal, levels.
2. Apparent loss of rearing habitat through loss of woody vegetation on banks.
3. Loss of spawning habitat due to reduced instream flows near the end of the irrigation season (September)



- 1 4. Loss of rearing habitat due to reduced flows during the irrigation season (April  
2 through October 1).
- 3 5. Fish passage problems:
  - 4 a. for adults going upstream, including low flows, obstructions and high  
5 velocity water
  - 6 b. for juveniles going upstream and downstream, including low flows,  
7 obstructions, high velocity water, lack of suitable fish ladders,
  - 8 6 Delays in spawning due to low water and high temperatures prior to end of the  
9 irrigation season (September and early October).
  - 10 7. Reduced egg survival due to fine sediment in spawning gravel.
  - 11 8. Reduced spawning gravel availability due to lack of gravel recruitment.
  - 12 9. Inability to estimate production of salmon or steelhead smolts.

13  
14  
15 B. Recommended actions:

- 16 1. Fish screens:
  - 17 a screen unscreened diversions and pumps.
  - 18 b. improve or replace inadequate screens.
- 19 2. Impoundments:
  - 20 a. Investigate and recommend improvements to fish passage.
- 21 3. Continue pulsed flows until water quality is adequately improved
- 22 4. Continue riparian fencing and native tree replanting
  - 23 a increase shade
  - 24 b. improve rearing habitat
  - 25 c. reduce sediment in spawning gravels.
- 26 5. Continue efforts to modify DFG counting weir.
  - 27 a. continue to press for modifications to weir that will make it more fish  
28 friendly as long as it is there.
  - 29 b. continue to try to develop alternate method of getting accurate spawner  
30 counts and other biological information so weir can be eliminated  
31 completely.
- 32 6. Seek funding for purchase of water for instream flows from willing sellers.
- 33 7. Where other means of adequate protection is unlikely, support the purchase  
34 of key areas from voluntary sellers whose sale would protect  
35 remaining land uses in the Shasta Valley.
- 36 8. Seek funding to fill data gaps:
  - 37 a. develop water model to use in evaluating effectiveness of various  
38 restoration measures
  - 39 b. support early life history study of salmonids in the Shasta to determine  
40 current and future needs for spawning and rearing habitat, and  
41 amounts now present.
  - 4 2 c. investigate flows required to clean spawning gravels. Evaluate impact  
43 of those flows on juvenile salmon rearing in river, on the river  
44 itself, and on water users.
  - 45 d. develop gravel budget for the river. Seek funding and methods to meet  
46 it
- 47 9. Develop mechanism to produce count or index of production.



1  
2 The following occur outside of the Shasta Valley, but directly affect Shasta River fish. There is  
3 much that residents of the Shasta Valley can and must do to improve salmon survival in the  
4 following areas. Solutions to these problems must be found for us to be successful, and we  
5 should press for improvement whenever possible.  
6  
7  
8  
9  
10

#### 11 IV Harvest

##### 12 A. Observed problems

- 13 1. Human overharvest
- 14 2. Non-human predation
- 15 3. Timing of in-river harvest
- 16
- 17
- 18

##### 19 B Recommended actions

- 20 1. Continue to submit comments on all fishery harvest plans requesting  
21 appropriate restraint. Press for greater recognition of spawner needs  
22 during the allocation process.
- 23 2. Maintain fishing closure at the mouth of the Shasta River. Take steps  
24 necessary to be certain that it isn't dropped from regulations again.
- 25 3. Avoid drastic reductions in Klamath River flow, since predation increases as  
26 flows decrease.
- 27 4. Request continued efforts to evaluate impacts of various predators. Support  
28 steps necessary to limit predation to reasonable levels
- 29 5. Support efforts calling for marking of all hatchery fish to allow selective  
30 harvest and better run size estimation.
- 31 6. Request that hatchery production be reduced until natural production catches  
32 up in order to reduce demands to overharvest natural stocks, and to make  
33 food and habitat more available to natural stocks.
- 34 7. Maintain contacts with tribes to encourage them to spread their harvest impact  
35 over the full duration of the run in order to eliminate excessive  
36 impacts on any single stock of salmon.
- 37

#### 38 V. Klamath River

##### 39 A. Observed problems for Shasta River fish:

- 40 1. Water Quality problems
- 41 a. High water temperatures
- 42 b. Low levels of dissolved oxygen
- 43 c. Low flows during outmigration and spawning
- 44 2. Habitat problems
- 45 a. Degraded rearing habitat
- 46 b. Reduced or dewatered spawning habitat
- 47 c. Loss of habitat in estuary
- 48

1 d. Loss of nutrient inputs normally associated with decay of spawned  
2 fish..

3 3. Iron Gate Hatchery impacts

4 a. Predation by residualized “steelhead”

5 b. Competition for available food and rearing habitat

6 c. Impacts on the fitness to survive of Shasta River fish from influx of  
7 domesticated hatchery fish straying into the Shasta.

8 d. difficult to resist demands from fishing interests to harvest all available  
9 hatchery fish, leading to overharvest of naturally spawning  
10 fish.

11  
12 B. Recommended actions:

13 1. Maintain communications with Klamath River Basin Fishery Task Force.

14 2. Continue pressing for better management of the Klamath fishery, including but  
15 not limited to:

16 a. marking of all hatchery fish

17 b. define impact of Iron Gate Hatchery “steelhead” predation

18 c. re-examine hatchery production targets and releases in light of existing  
19 habitat and food availability

20 d. keep hatchery fish ladders open 24 hrs. per day through the entire  
21 spawning season, and do not return any live hatchery fish to the  
22 river.

23 e. Join the Scott CRMP to press for reductions in harvest of wild fish

24 3. Support investigations of ways to improve water quality in the Klamath,  
25 including cold water releases from Iron Gate Dam.

26 4. Support development of gravel budget for the Klamath River.

27 5. Participate in the development of flow targets for Klamath River.

28 6. Support efforts to reduce sediment throughout Klamath Basin

**Section 2**

**CDFG**

**A Biological Needs Assessment  
for  
Anadromous Fish  
in the  
Shasta River  
Siskiyou County, California**

**Section 3**

**State Water Resources Control Board  
Division of Water Quality  
Nonpoint Source Program**

**CALIFORNIA RANGELAND WATER QUALITY  
MANAGEMENT PLAN**

**July 1995**

## Section 4

### Yreka Creek Greenway Master Plan Report

Although included in Shasta CRMP plan, not included in KRIS bibliography.  
Originally prepared for City of Yreka, 701 Fourth Street, Yreka, CA 96097

May 26, 1989

## Shasta CRMP Mid-term Goals

1. Construct a minimum of 3 miles of livestock control fence annually along the Shasta River or its tributaries accessible to anadromous fish.
2. Plant a minimum of 1.5 miles of native trees annually, or use other vegetative bank stabilization methods as site conditions dictate.
3. Reduce the maximum water temperature (as measured at the Montague-Grenada Road Bridge) by 5 degrees F. in 10 years. (The baseline maximum shall be from 1996--80.6 degrees F.
4. Dedicate enough water to instream flows to assure a minimum of 20 cfs within 10 years.
5. Raise the levels of dissolved oxygen to above 6 mg/l at all times, as measured anywhere along the main Shasta.
6. Within 3 years develop a mechanism to produce an index of outmigration numbers.

Activities and Projects	GENERAL WORK PLAN											
	1997				1998				1999			
	1	2	3	4	1	2	3	4	1	2	3	4
Coordinate Sub-basin Restoration Activities	X											X
Construct Three Miles of Riparian Livestock Control Fences per Year	X											X
Plant One and One-half Miles of Fenced Area to Native Riparian Trees per Year	X			X	X			X	X			X
Install One Irrigation Tailwater System		X	X							X	X	
Assist USFWS in KRIS Development	X			X								
Install 750 Feet of Biotechnical Bank Protection per Year		X	X			X	X			X	X	
Contact landowners along the River	X											X
Secure Funding for Future Work	X											X
Maintain Real-time Temperature and Flow Monitoring Station	X											X
Attend Two Klamath River Basin Fishery Task Force Meetings/Year	X		X		X		X		X		X	
Attend Two KRBFTF Tech Work Group Meetings/Year		X		X		X		X		X		X
Make Presentation at Klamath River Basin Symposium	X								X			
Attend Salmonid Restoration Federation Symposium		X				X				X		
Attend Continuing Education Events	X		X		X				X			





Activities and Projects	DETAILED WORK PLAN--SCHEDULE											
	1997				1998				1999			
	1	2	3	4	1	2	3	4	1	2	3	4
<b>Re-photograph Completed Restoration Project Photopoints:</b>												
Ordway Fence 1			X				X				X	
Ordway Fence 2			X				X				X	
Il. Terry Fence		X				X			X			
Peters Fence				X				X				X
Meamber Fence 1	X				X				X			
Meamber Fence 2				X				X				X
Ekstrom Fence				X				X				X
Parker Fence				X				X				X
Wah Lee Fence				X				X				X
Kuck Fence			X				X				X	
Karlsson Fence				X				X				X
B&B Fiock Fence 1			X				X				X	
Lemos Fence 1	X				X				X			
Easton Fence		X				X			X			
Marion Fence				X				X				X
Linguist Fence			X				X				X	
Eagan Fence		X				X			X			
Peters Bank Sloping			X				X				X	
Easton Bioengineered Bank Protect.			X				X				X	
Meamber Bioengineered Bank Prot.			X				X				X	
Peters Bioengineered Bank Protect.			X				X				X	
Ekstrom Tailwater Project	X											
Meamber Tailwater Projects			X				X				X	
Webb Planting		X				X			X			
BLM Planting		X				X			X			

## SHASTA RIVER COORDINATED RESOURCE MANAGEMENT PLAN

**AREA OF COVERAGE:** The Shasta River from below **Dwinell Reservoir** downstream to **the confluence** with the **Klamath River** and all tributaries in this section.

**OBJECTIVE:** To improve riparian habitat while maintaining Agricultural uses.

**GOALS :**

1. **Identify and prioritize the problems**
  - A. **Develop "riparian rating system"**
  - B. **Survey Shasta River and tributary riparian condition/land owner cooperation.**
  - C. **Define "workable" segments**
2. **To develop improved riparian conditions while having the lowest possible impact (least intrusive) to landowners.**
  - A. **Provide "immediate" assistance to cooperators wishing to do restoration work.**
  - B. **Implement existing grant projects**
  - C. **Continue to seek funds**
  - D. **Gather "library" of technology/alternatives for fisheries restoration projects.-**
3. **Improve landowner awareness of the problems along and in the Shasta River and the benefit potential for improvements.**
  - A. **Publish Shasta River CRMP newsletter**
    1. **Minimum of two times per year**
    2. **Distribute to land owners, agencies, legislators**
  - B. **Provide news articles/fact sheets for publication**
  - C. **Hold an annual field tour of area projects/concerns.**

# SHASTA VALLEY RESOURCE CONSERVATION DISTRICT

215 EXECUTIVE COURT. YREKA, CALIF. 96097

4. Coordinate agency activities and funding for projects and actions on the Shasta River.

A.

CRMP coordinator will "gather" proposals to see that duplication of **effort** does not occur.

- B. Invite interested Tribes to participate in CRMP

1. Contact the following persons

a. Hoopa -- Mike Orcut

b. Karuk -- Leaf Hillman

c. Yurok -- Walt Lara

d. Other -- . ???? ????  
*anath Trib Shasta Trib.*

- C. Keep other interested "Fish Groups" informed via Newsletters and minutes

- D. Continue to seek funding for \_\_\_\_\_ position which is only funded for FY 92.

5. Improve public awareness of the work being done.

A. Coordinate public information with KRBFTF

B. Determine target audiences  
ie., Kids, decision makers, etc.

C. Seek out Volunteers to do public information program

6. Evaluate all restoration efforts (in CRMP area)

A. CRMP supported oject-; will contain formal monitoring and evaluation criteria.

1 Add to Memorandum of Understanding between agencies, groups and the CRMP

≡ Proposals will need to define expected results/goals and the method of proposed ovaluation.

B. Encourage Non-CRMP sponsored projects contractors to include evaluation and monitori in projects and encourage sharing of results with CRMP group.

## Shasta River Telephone Access Monitoring Station

Careful management of the Shasta River is becoming increasingly necessary to protect all water uses. Probably the single most important factor that will make this possible is the ability of any water user to quickly and easily access information about the river's flow and water temperature.

In order to make this possible, the Shasta CRMP now operates a river monitoring station that will provide temperature and flow information 24 hours per day, via voice telephone line.

The monitoring station can be reached at: 916-459-0416.

In addition to the voice accessible information, stored data can be downloaded via a computer and modem, if you have proper software. Minimum system requirements are an IBM compatible 286 (or higher) computer, and a 1200 baud modem. Contact Dave Webb (916-926-2460) for further information and free software.

It is our hope that by making this information accessible to everyone, we will create the environment where water management decisions will come be made at least in part on the flow and temperature conditions in the river.

On the following page is the conversion table used by the watermaster to convert the staff gauge height to flow. Use this to convert the staff gauge height reported by the monitor to flow.

The Department of Fish and Game Biological Needs Assessment contains information on critical temperatures for salmon and steelhead. Temperatures above 70 degrees Fahrenheit are increasingly stressful to these fish. Temperatures above 78 degrees are lethal.

Whenever possible, minimize irrigation activities that will result in the return of tailwater to the river during daylight hours when the water temperatures are above 70 degrees.

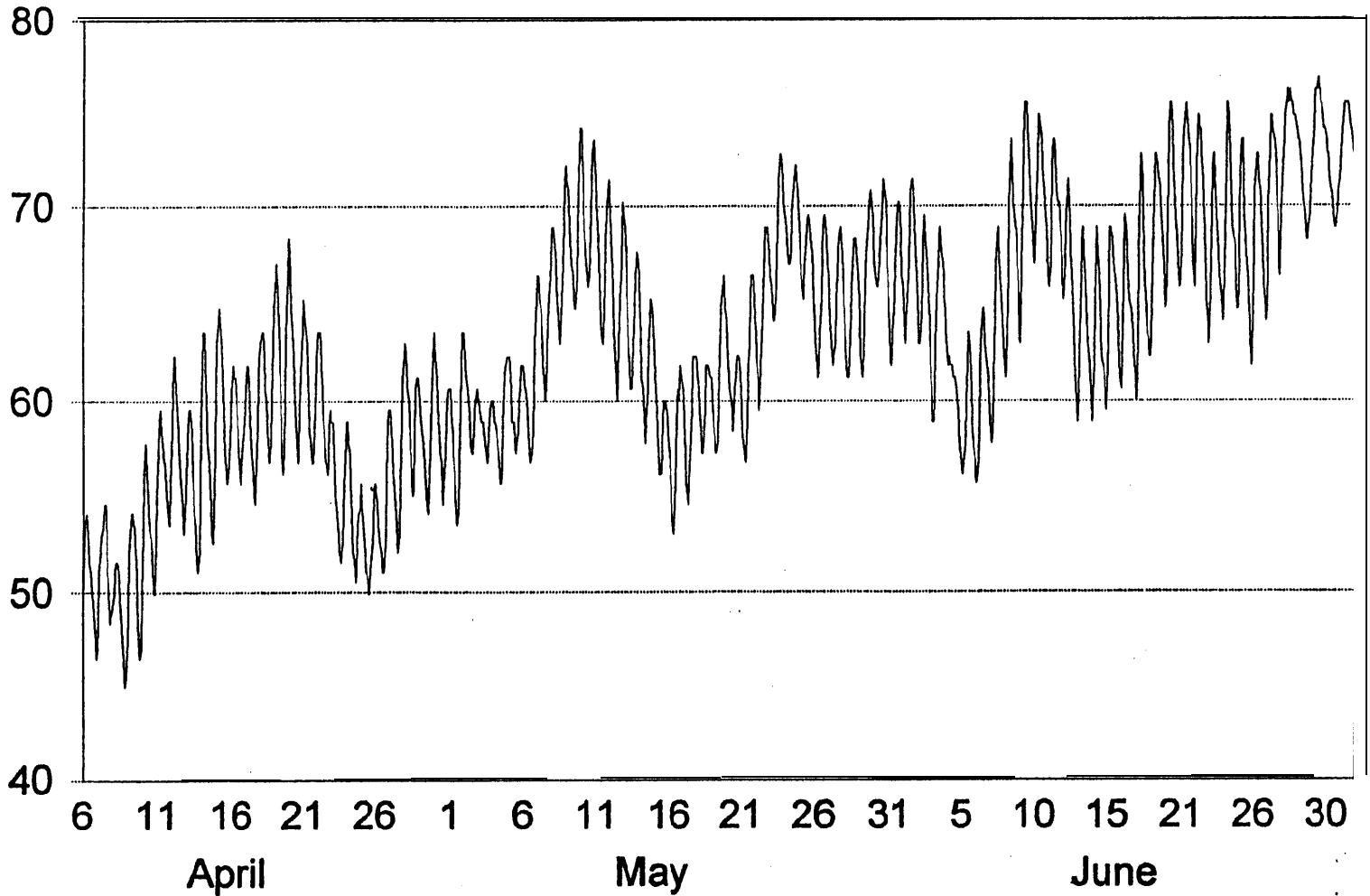
Flow in the Shasta River at the Montague-Grenada Road Bridge

Gauge Height	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.5	7	7.6	8.2	8.8	9.4	10	10.6	11.2	11.8	12.4
1.6	13	14.43	15.86	17.29	18.72	20.15	21.58	23.01	24.44	25.87
1.7	27.3	29.7	30.84	32.61	34.38	36.15	37.92	39.69	41.46	43.23
1.8	45	48.2	51.4	54.6	57.8	61	64.2	67.4	70.6	73.8
1.9	77	80.3	83.6	86.9	90.2	93.5	96.8	100.1	103.4	106.7
2	110	113.4	116.8	120.2	123.6	127	130.4	133.8	137.2	140.6
2.1	144	147.5	151	154.5	158	161.5	165	168.5	172	175.5
2.2	179	182	186.2	189.8	193.4	197	200.6	204.2	207.8	211.4
2.3	2.15	218.7	222.4	226.1	229.8	233.5	237.2	240.9	244.6	248.3
2.4	252	255.8	259.6	263.4	267.2	271	274.8	278.6	282.4	286.2
2.5	290	294	298	302	306	310	314	318	322	326
2.6	330	334.2	338.4	342.6	346.8	351	355	359.4	363.6	367.8
2.7	372									
2.8	416									
2.9	462									
3	510									

Example: if the monitor reports a gauge height of 1.84 feet, the flow in the river is 57.8 cubic feet per second.

# Shasta River 1994

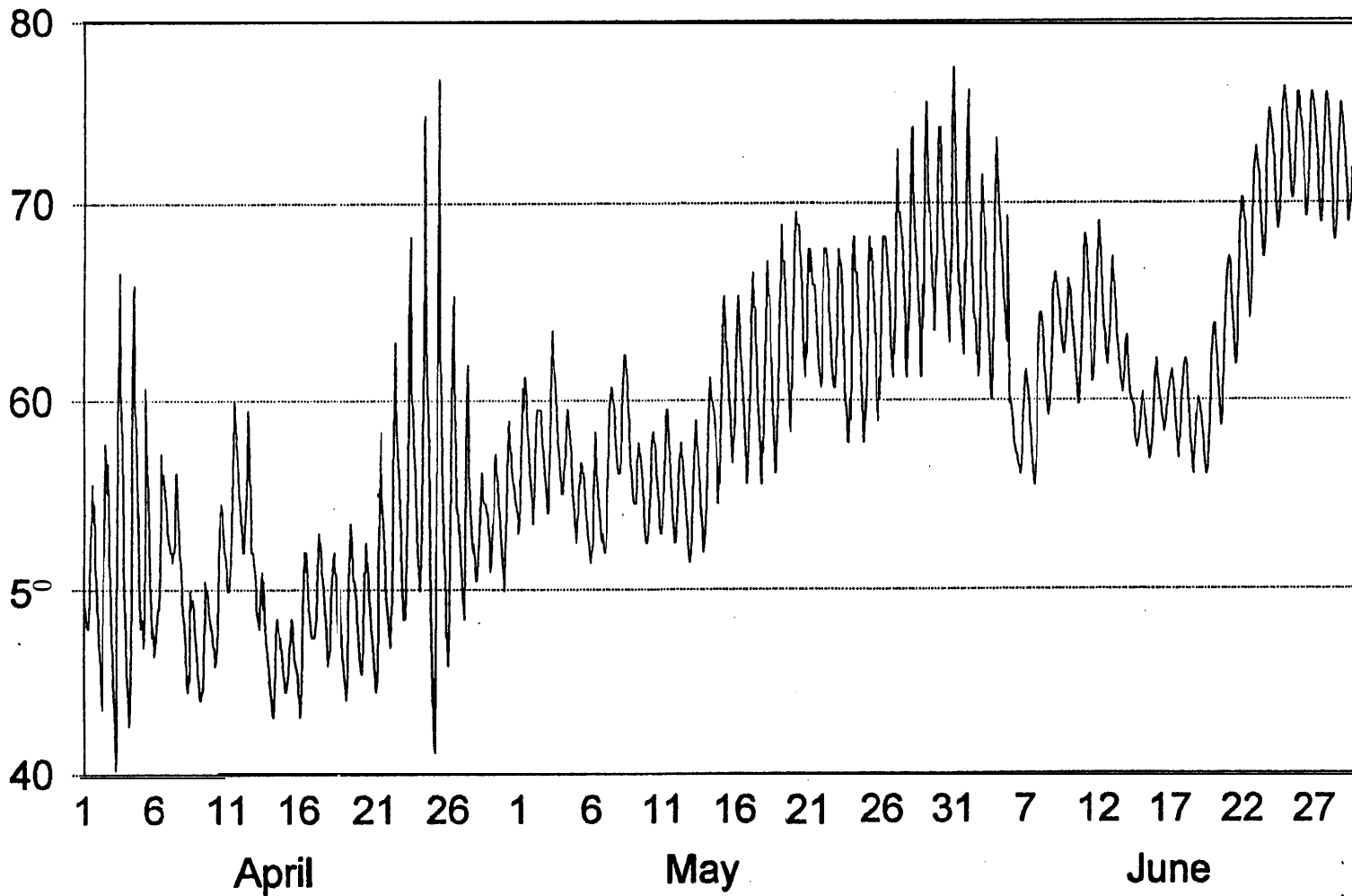
## Highway 263





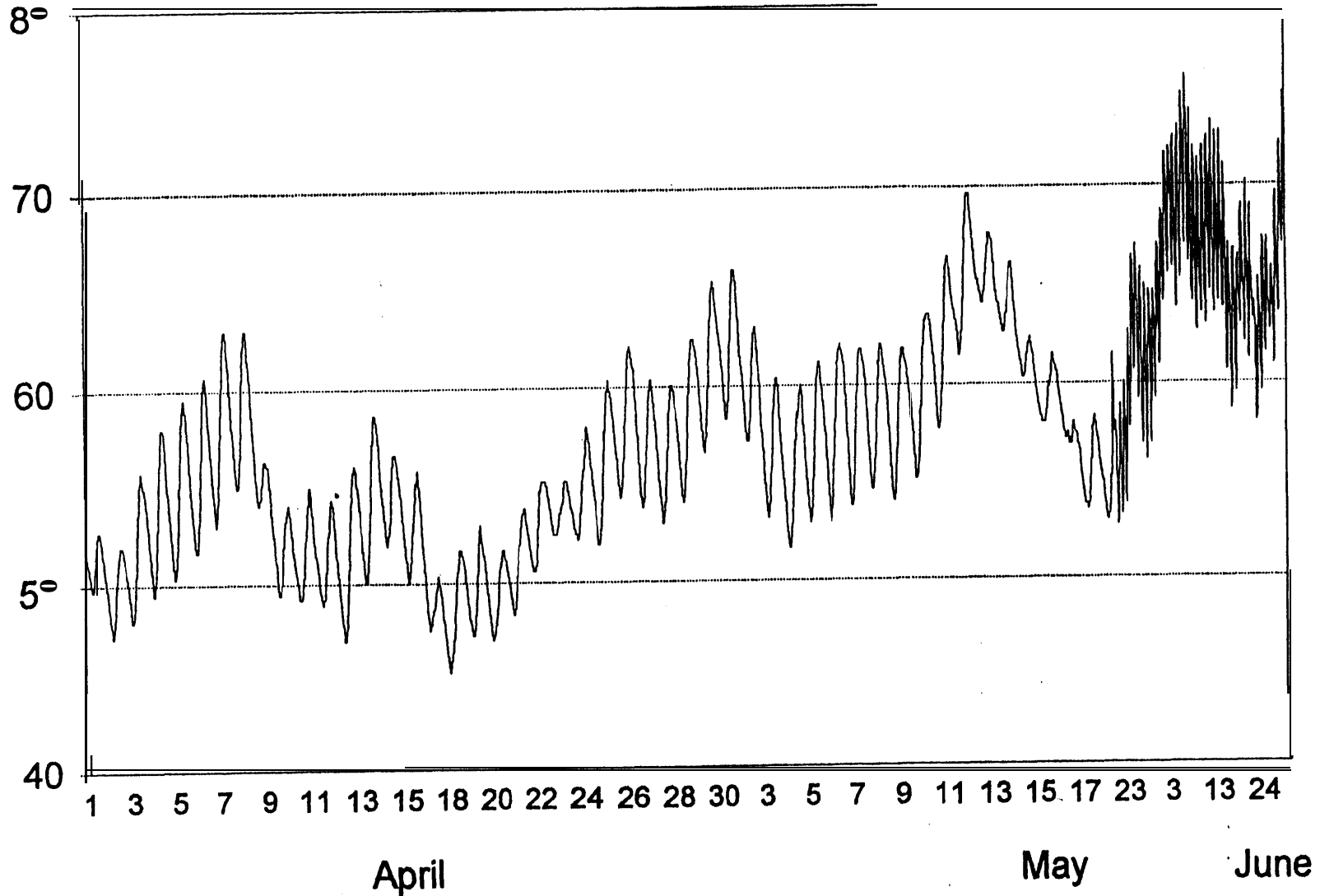
# Shasta River 1995

## Highway 263



# Shasta River 1996

## Highway 263







## Shasta River Flow Data

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	
<b>Maximum</b>											<b>Maximum</b>
Oct	164	145	174	249	187	153	239	230	237	231	Oct
Nov	208	226	228	629	199	812	281	420	669	239	Nov
Dec	174	1090	225	595	395	3620	1310	1490	363	215	Dec
Jan	174	1570	364	2410	263	613	1200	995	252	862	Jan
Feb	178	479	280	688	332	2440	1290	441	498	2440	Feb
Mar	156	591	358	393	234	1570	2600	426	257	821	Mar
Apr	133	688	177	301	252	750	1110	376	199	304	Apr
May	148	203	282	137	175	188	614	205	125	244	May
Jun	115	144	60	223	61	354	617	140	198	134	Jun
Jul	37	137	32	67	21	272	152	70	65	59	Jul
Aug	33	234	124	53	21	67	186	155	60	53	Aug
Sep	129	453	119	99	102	148	168	144	208	189	Sep
Year	208	1570	364	2410	395	3620	2600	1490	669	2440	Year

## Shasta River Flow Data

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Maximum
Maximum												
t	193	153	134	210	155	148	145	166	119	166	177	Oct
v	235	189	439	179	181	172	145	173	157	171	389	Nov
c	219	309	184	170	175	188	252	189	155	1750	2510	Dec
n	281	309	297	628	182	181	1080	184	847	969	8420	Jan
b	270	205	209	214	205	209	265	202	688	1250		Feb
r	228	190	756	302	249	152	637	174	1170	457		Mar
r	112	200	312	158	124	84	283	120	559	337		Apr
y	86	112	354	300	354	42	243	197	445	275		May
n	66	261	143	262	88	47	466	61	292	136		Jun
l	70	33	52	67	87	54	75	34	241	102		Jul
g	45	71	124	35	35	39	91	20	79	58		Aug
p	92	63	368	96	99	50	87	66	87	117		Sep
ar	281	309	756	628	354	209	1080	202	1170	1750		Year









	A	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
1	Klamath Basin All Harvest Summary										
2											
3											
4		tribal									
5		Calculated harvest		TOTAL	TOTAL	TOTAL	TOTAL	TOTAL--			NATURAL
6		(2,3,4,&5)		OCEAN	SPORT	TRIBAL	IN-RIVER	ALL HARVEST			SPAWNERS
7				IMPACT	IMPACT	IMPACT	IMPACTS	IMPACTS			2 Year-olds
8					(INRIVER)						
9											
10	1978				3,852	21,600	25,452		1978		16,414
11	1979				4,408	16,200	20,608		1979		6,761
12	1980				10,595	14,040	24,635		1980		26,982
13	1981				13,500	38,338	51,838		1981		16,507
14	1982				21,239	17,583	38,823		1982		18,646
15	1983				4,678	8,697	13,375		1983		2,526
16	1984				4,378	20,655	25,033		1984		5,285
17	1985				15,073	14,171	29,243		1985		35,951
18	1986	27,205		289,500	31,044	28,059	59,103	348,603	1986		28,942
19	1987	57,377		335,900	26,117	57,792	83,909	419,809	1987		8,772
20	1988	55,829		357,400	28,166	56,407	84,574	441,974	1988		12,544
21	1989	49,225		142,300	11,263	49,416	60,679	202,979	1989		5,509
22	1990	8,432		161,600	5,766	8,619	14,386	175,986	1990		1,350
23	1991	21,730		16,200	3,630	11,083	14,713	30,913	1991		1,017
24	1992	12,883		1,800	5,087	6,643	11,730	13,530	1992		4,855
25	1993	20,656		15,600	6,304	10,596	16,899	32,499	1993		3,204
26	1994	24,880		7,300	4,476	12,796	17,272	24,572	1994		6,842
27	1995	33,718		62,000	9,080	17,402	26,482	88,482	1995		21,548
28	1996	116,689		58,400	16,157	60,611	76,767	135,167	1996		8,083
29					-	-					
30					-	-					
31					-	-					
32					-	-					
33					-	-					
34					-	-					
35					-	-					
36					-	-					





	A	BG	BH	BI	BJ
1		sin Spawner Summary			
2					
3					
4					
5		TOTAL	TOTAL	Total In-River	
6		SPAWNERS	SPAWNERS	Run--Spawners	
7		Adults	Ages 2,3,4,5+	plus Harvest	
8				Inriver	
9					
10	1978	71,451	90,105	115,557	1978
11	1979	34,273	42,255	62,864	1979
12	1980	27,994	57,683	82,318	1980
13	1981	38,282	56,333	108,171	1981
14	1982	42,362	67,076	105,900	1982
15	1983	44,649	47,960	61,335	1983
16	1984	23,560	30,375	55,408	1984
17	1985	48,211	104,487	133,730	1985
18	1986	146,251	180,263	239,366	1986
19	1987	130,840	143,890	227,799	1987
20	1988	112,344	130,249	215,322	1988
21	1989	65,790	72,438	133,117	1989
22	1990	21,103	22,817	40,199	1990
23	1991	17,631	18,336	34,353	1991
24	1992	18,358	27,175	40,348	1992
25	1993	42,448	47,190	64,740	1993
26	1994	47,897	59,748	75,936	1994
27	1995	179,268	201,182	236,495	1995
28	1996	101,049	109,924	186,689	1996
29					
30					
31					
32					
33					
34					
35					
36					

## Section 8

### The Unique Shasta Geology

Gigantic Debris Avalanche of Pleistocene Age from Ancestral Mount Shasta Volcano, California, and Debris-Avalanche Hazard Zonation

US Geological Survey Bulletin 1861