

HABITAT IMPROVEMENT PROJECT

Fishery Division



OREGON STATE GAME COMMISSION
1634 S. W. Alder Portland 5, Oregon

NUMBER 6

STATE OF OREGON
OREGON STATE GAME COMMISSION
FISHERY DIVISION

C. J. Campbell, Chief of Operations

FEDERAL AID TO FISH RESTORATION
PROGRESS REPORT

State-wide Fishery Rehabilitation
Upper Cow Lake and Tributaries Segment
F-20-D-21

By
Lawrence E. Bisbee
Aquatic Biologist

Monty L. Montgomery
Staff Biologist

State Oregon
Project No. F-20-D-21
Date April 15, 1964

PROGRESS REPORT

State-wide Fishery Rehabilitation Upper Cow Lake and Tributaries Segment

Period covered - July 1, 1963 through January 1, 1964

ABSTRACT

Upper Cow Lake located in Malheur County, Oregon, Township 28 South, Range 44 East, Section 29, was chemically treated with 2,325 gallons of liquid synergized rotenone (Pro-noxfish) on September 11, 1963 to remove an abundant population of rough fish. The lake has a maximum surface area of 975 acres and a volume of 7,150 acre-feet. Samples of fish killed after chemical treatment included coarsescale suckers 69.2 per cent, squawfish 24.5 per cent, redbottom shiners 3.0 per cent, black bullhead 2.0 per cent and bridgelip suckers 1.3 per cent.

Chemical treatment of approximately 55 miles of tributary streams above Upper Cow Lake was completed in August and September, 1963. Twelve miles of tributary streams located in Idaho were treated by the Idaho Game Department personnel.

Restocking of the lake with rainbow trout will begin in 1964. Very little of the tributary system is suitable for restocking of game fish.

Location and past history

Upper Cow Lake is located in Malheur County, Oregon, Township 28 South, Range 44 East, Section 29, approximately 25 miles northwest of the community of Jordan Valley and 10 miles south of Mahogany Mountain.

Upper Cow Lake was formed when lava flows blocked the former stream channel and created a lake of 975 surface acres with a maximum depth of 15 feet at capacity. As far as it is known Upper Cow Lake or its tributaries in Oregon have never supported a fishery. Only undesirable fish have existed in the lake. A minor trout fishery is found in the headwater tributaries located in Idaho. Public use of the lake has been very light to date, although access has been permitted across private lands. It is planned to create a permanent public access route to the lake. No prior treatment and very little management work have been attempted in the past on the lake. A water gauge has been painted on a verticle rock formation located near the new access site at the southwest end of the lake.

Preparation

The Cow Lake drainage lies generally in the open rolling sagebrush type country. Cow Creek which is the main stream originates in Idaho while the majority of the tributaries head in the open slopes of Mahogany Mountain in Oregon.

Preliminary survey work on the Idaho section of the stream was completed in July 1, 1963 by Idaho personnel and revealed dace, suckers and rainbow trout to be present in all creeks of the drainage. Only trout, however, were found above the upper forks of Upper Cow Creek. Redside shiners were present in the lower portions of Cow Creek. In Jackson Creek, suckers and dace did not extend beyond the Omer Stanford ranch three miles above the mouth. The upper limit of suckers and dace in Chimney Creek was approximately one-half mile above the beaver dams located two miles above the mouth of the creek. All waters of Soda Creek contained rough fish.

Preliminary survey work on the Oregon tributaries was completed in 1962. Since all the streams are intermittent and are of little value for game fish production, the majority of the survey work consisted of locating the upstream limits of the rough fish.

Initial physical survey data on the lake was completed May 28, 1963. Water volumes were calculated from soundings taken with a Bendix electrical sounding device, applied to the surface acreage as determined from an aerial photograph. At the time the soundings were completed, the lake level had dropped five and one-half inches below the high water level. The maximum surface area was calculated to be 975 surface-acres with a volume of 5,320 acre-feet.

All fish collected in the tributary streams were undesirable species. Fish collections taken by gill nets and trap nets in the lake on September 22, 1962 were composed of coarcescale suckers 68.9 per cent, squawfish 24.5 per cent, redbottom shiners 6.0 per cent, bridgelip suckers 0.3 per cent and black bullheads 0.3 per cent.

General physical and biological data indicated that the lake could support a population of game fish. Since good angling waters are limited in the Jordan Valley area, Upper Cow Lake was scheduled for chemical treatment in September after maximum drawdown for irrigation purposes.

It was important to explain the project to many of the local ranchers since most of the drainage flows through private lands. Coordination with the Idaho Game Department was necessary since the chemical treatment of Cow Creek extended a number of miles beyond the Idaho boundary.

Tributaries were to be treated with the portable 200-gallon John Bean sprayer mounted on a 3/4-ton four-wheel drive pickup truck. Drip stations were of little use on the Cow Creek drainage in Oregon but were employed in Idaho where the streams contained flowing water.

The lake was divided with markers into four sections containing nearly equal volumes of water. Four boats equipped with venturi devices were to be used in distributing the rotenone with one boat operating in each section. One flat bottom scow equipped with a motor lift and the 200-gallon spray tank with 200 feet of high pressure hose attached was used to treat the extreme shallow areas at the upper end of the lake. Live boxes containing bullheads, suckers and squawfish were anchored at various locations to check the rotenone distribution.

A chemical analysis of the lake water was obtained prior to treatment. Results of the water analysis are presented in Table 1. The samples were taken in the center of the lake opposite the outlet.

Table 1: A chemical analysis of water samples from Upper Cow Lake - April 29, 1963

	Sample 1	Sample 2
Depth in feet	1	12
Dissolved solids, ppm	263	284
Alkalinity as CaCO ₃		
Carbonate, ppm	0	0
Bicarbonate, ppm	55	54
Conductivity, micromhos/cm	105	105
P _h value	7.61	7.42

A series of water temperatures taken in Upper Cow Lake is presented in Table 2.

Table 2: Water temperature and dissolved oxygen data for Upper Cow Lake, 1963

Date	4/29/63	7/8/63	8/13/63	8/13/63				
Station No.	1	1	1	2				
	Temp.	Oxygen	Temp.	Oxygen	Temp.	Oxygen	Temp.	Oxygen
Air Temp.	67		61		70		79	
Surface Temp.	52		64		68.5		79.5	
1'	51	9.2	64	7.2	69	6.6	79	
2'	51		64		69		79	
3'	51		64		69		79	
4'	51		64		69		74	
5'	50		64		69			
6'	49		63.5		67			
7'	49		63		66			
8'	48		62		66	6.6		
9'	46		61.5	7.2				
10'	45							
11'	44							
12'	44	9.1						
13'	44							
Time	5:30 PM		3:00 PM		3:00 PM		4:00 PM	
Turbidity	Very murky		Muddy 3.5"		Muddy 4"		Muddy 4"	
Maximum Depth	13'		11'		8'		4'	
Weather	Clouds 40% Breeze 5-10		Clear Breeze 5-10		Clear Breeze 0-5		Clear Breeze 0-5	

Chemical Treatment - Tributaries

The most important unit of equipment used in chemical treatment of the tributaries was a John Bean sprayer mounted on a 3/4-ton four-wheel drive pickup. The equipment, personnel and the amount of chemical required to rehabilitate the Cow Lake tributaries are listed in Table 3.

Table 3: Equipment, personnel and chemicals used on Cow Lake tributaries, 1963

Equipment used

- a. One pickup 3/4-ton four-wheel drive
- b. One pickup 1/2-ton
- c. One 200-gallon John Bean sprayer with 200 feet of high pressure hose and gun
- d. Five back-pack pump cans
- e. Five one-gallon rotenone cans
- f. Two five-gallon rotenone cans
- g. One funnel

Personnel needed - 4 men

Man days required* - 106 man days

Chemical used - 200 gallons pro-noxfish synergized rotenone

* Based on eight-hour work day.

The individual streams and mileages requiring chemical treatment are delineated in Table 4.

Table 4: Streams treated in the Cow Lake rehabilitation project, 1963

<u>Stream</u>	<u>Water volume</u>	<u>Miles Treated</u>
Cow Creek (Oregon)	Potholes to minute flow	18.0
Cow Creek & tributaries (Idaho)	Potholes to 0.75 cfs	12.0
Channel A (Cow Creek)	Potholes	4.0
Channel B (Cow Creek)	Potholes	2.0
Cove Creek	Potholes to minute flow	1.50
Mahogany Creek	Potholes to small flow	7.50
Goodyear slough	Potholes to minute flow	2.75
Ditches and diversions	Potholes to 0.5 cfs	7.0
Oliver Ditch	Potholes	3.0

Chemical treatment of Cow Creek began on August 5, 1963 at the Idaho-Oregon border by a four-man crew. Simultaneously a crew of four men from the Idaho Game Department began the treatment of that section of Cow Creek and tributaries located in Idaho. All streams treated in Oregon contained only minute flows or were potholed since all live water was diverted for irrigation purposes in Idaho. The portable 200-gallon John Bean sprayer with 200 feet of high pressure hose attached was used to systematically work out all areas containing water. Flowing water in the streams entering the lake received the chemical at a later date, in conjunction with the lake treatment.

No estimates on the total numbers of fish killed were obtained. The majority of the fish killed was less than eight inches in length. A representative sample of the fish inhabiting Cow Creek was secured in the vicinity of the Glover ranch. Fish killed in a section 125 feet in length were counted by species. The result is presented in Table 5.

Table 5: Numbers and species of fish by percentage collected from a section of Cow Creek near the Glover ranch - August 14, 1963.

Species	Number	Size range	Per cent of total
Speckled dace	300	1" to 2"	36.4
Redside shiners	230	1" to 3"	27.9
Squawfish	170	2" to 9"	20.7
Coarsescale suckers	73	2" to 13"	8.9
Bridgelip suckers	50	2" to 7"	6.1

Success of the chemical treatment was checked on August 22 and 23 when one-hundred yard test sections were re-treated every one-half mile with back-pack cans. Six shiners were found in an isolated pothole near the Idaho border. All other areas appeared to be free of fish.

Some difficulty in obtaining a complete kill was encountered at the lower end of Cow Creek canyon where large pools up to three feet in depth existed. This area was treated with back-pack cans because of lack of vehicle access. The pools contained thick beds of vegetation which made rotenone penetration difficult. Live fish were observed in this area several days after the initial treatment. All pools in the area were re-treated a second time. Rotenone was pumped beneath the floating weed masses and a successful kill was then obtained.

No restocking of the tributaries is anticipated since suitable habitat is lacking for game fish.

Chemical Treatment - Upper Cow Lake

Table 6: Equipment, personnel and chemical used during the chemical treatment of Upper Cow Lake and related impoundments.

Equipment used

- a. Fifty gallons regular gas
- b. One hand gas pump
- c. Two 14-foot aluminum flat bottom scows
- d. One 16-foot aluminum boat with 18-hp outboard motor
- e. One 14-foot aluminum boat with 18-hp outboard motor
- f. One 12-foot aluminum boat with 18-hp outboard motor
- g. Four 25-hp outboard motors with gas cans
- h. One case outboard motor oil
- i. One portable 200-gallon John Bean sprayer with 200 feet of high pressure hose and gun
- j. Three 16-foot poles for "A" frame construction
- k. One-quarter ton chain hoise
- l. One small crawler caterpillar Int. T-340
- m. One set of barrel hooks
- n. Two outboard motor lifts
- o. One barrel bung opener
- p. Six venturi attachments with hose and barrel fittings
- q. Eight live boxes with lines and anchors
- r. One funnel
- s. Eight plywood shore markers 4' x 4'
- t. Nine to twelve plastic buoys
- u. Lumber for dock construction
- v. Oxygen gear and plastic bags

Personnel used - 9 men

Man days required based on an 8-hour day

- a. Preliminary - 24 man days (hauling equipment, rotenone, travel time, survey, etc.)
- b. Treatment - 22 man days (including original and follow-up)
- c. Post treatment - 11 man days (hauling equipment, gill-netting, cleanup, etc.)

Chemical used - Pro-noxfish synergized liquid rotenone - 2,325 gallons.

Table 7 lists the surface area of lakes and reservoirs treated in conjunction with the Upper Cow Lake project.

Table 7: Volume and surface area of the lake and reservoirs treated at Cow Lake, 1963.

<u>Lake</u>	<u>Volume</u> Acre-feet	<u>Area</u> Surface-acres
Upper Cow Lake	2,500	825 A.
Odom Reservoir	100	15 A.
Oliver Reservoir	30	8 A.
	<u>2,630</u>	<u>848 A.</u>

Odom Reservoir, a small private reservoir, tributary to Cow Creek was chemically treated August 2, 1963. Liquid synergized rotenone was introduced into the reservoir by a boat equipped with a venturi device. Shallow shoreline areas were treated by the 200-gallon portable sprayer mounted on the 3/4-ton four-wheel drive pickup.

An estimated 10,000 fish were killed as determined by sample counts along the shoreline. The kill by species was redbreast shiners 57.6 per cent, speckled dace 28.2 per cent, bullheads 9.5 per cent and bridgeline suckers 4.7 per cent.

Tests for toxicity and success of treatment were not made. Restocking with warm water game fish is scheduled for 1964.

The chemical treatment of Upper Cow Lake was started September 11, 1963. The lake covered 825 surface acres containing 2,500 acre-feet of water. Approximately 9½ hours were required to distribute 2,325 gallons of pro-noxfish, establishing a concentration of approximately 2.0 ppm in the lake. The majority of the rotenone was distributed by four boats equipped with venturi devices, with a boat assigned to each of four sections.

Difficulty was encountered in establishing an even distribution of rotenone in the large upper section of the lake. It is believed that an adequate distribution of rotenone over the entire shallow area resulted after strong wind action churned the lake for some time shortly after completion of the treatment project.

The day following the treatment, live fish showing the effects of rotenone were found in an area near the center of the upper lake section. Large numbers of seagulls in the area revealed the location of fish still dying.

Bullheads in a live box anchored in the same area were still alive but were showing the effects of rotenone. An additional 110 gallons of rotenone were distributed in the upper area of the lake to insure better coverage. Two days later all fish in the lake appeared to be dead.

No estimates on the total number of fish killed in the lake were made because of water turbidity and insufficient time. Composition of the fish eliminated was estimated to be coarsescale suckers 69.2 per cent, squawfish 24.5 per cent, redbottom shiners 3.0 per cent, black bullheads 2.0 per cent and bridgelip suckers 1.3 per cent.

No tests for toxicity were made in the lake because restocking was not anticipated until the spring of 1964.

The lake was checked by gill nets on October 1, 1963. Four gill nets were set for a period of four days at various locations in the lake. No live fish were caught.

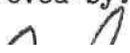
At the time of the Upper Cow Lake treatment the ditch flowing from the lake to the Oliver Reservoir also received rotenone. The small reservoir was treated by a boat equipped with a venturi device on September 10, 1963. The shallow shoreline area was sprayed with the 200-gallon pumper mounted in the 3/4-ton four-wheel drive pickup.

The reservoir contained small numbers of rough fish. No estimates were made of the kill.

The lower sections of Cow Creek, Cove Creek and Schnable Creek were connected to Cow Lake by open water and were treated last with the portable sprayer completing the treatment of Upper Cow Lake and its tributaries.

Restocking of Upper Cow Lake with rainbow trout will begin in the spring of 1964. Odom Reservoir and Oliver Reservoir will be restocked with warm water game fish at the same time.

Approved by:

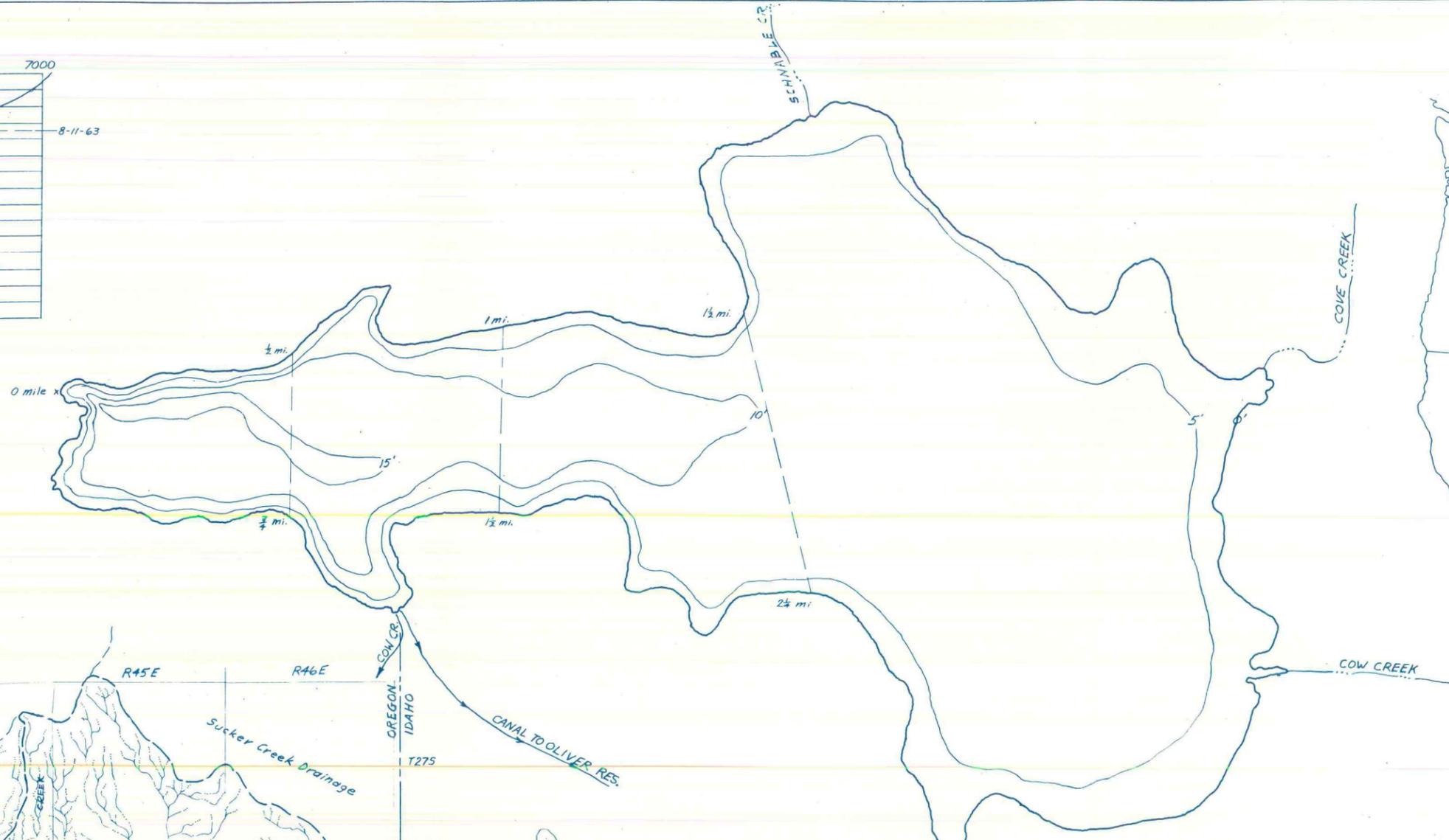
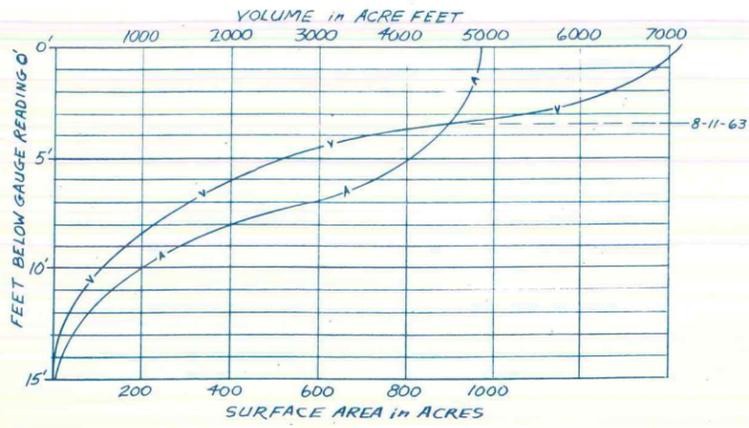


James W. Goin, Jr.
Federal Aid Funds Coordinator

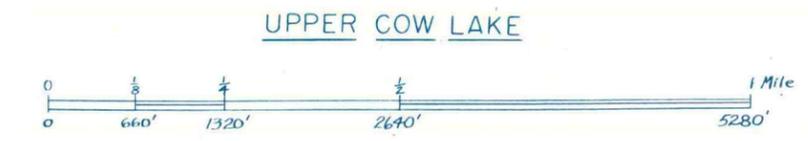
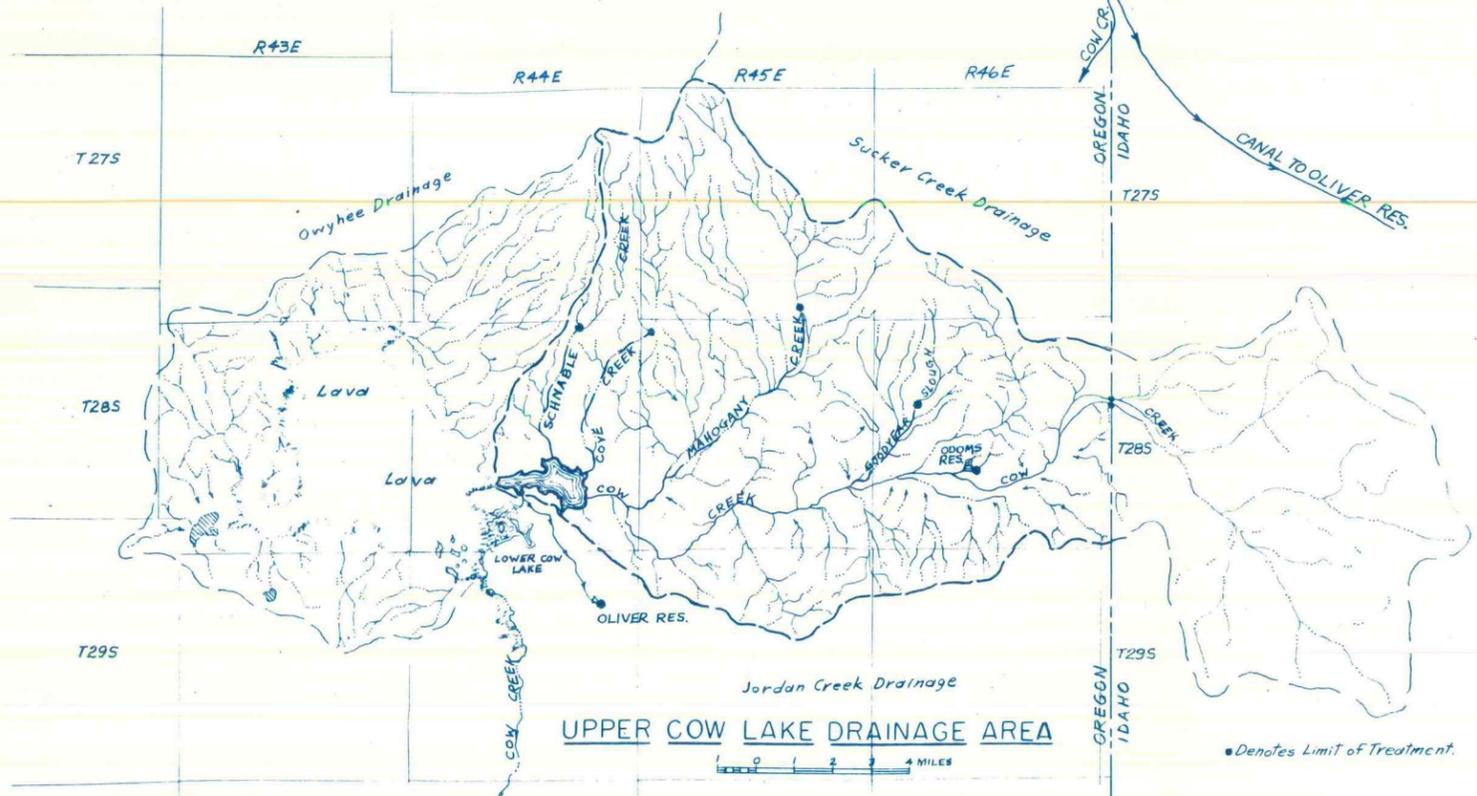
Submitted by:

Lawrence E. Bisbee
Aquatic Biologist

Monty L. Montgomery
Staff Biologist



LOCATION



OREGON STATE GAME COMMISSION PORTLAND, OREGON			
UPPER COW LAKE PROJECT 1963			
DESIGNED BY	APPROVED BY CHIEF ENGINEER	DATE	REVISION BY
DRAWN BY K.S.L.	APPROVED BY DIRECTOR	6-63	Original KSL
CHECKED	SHEET 1 OF	DRAWING NO.	
SCALE	1 SHEETS	1228	