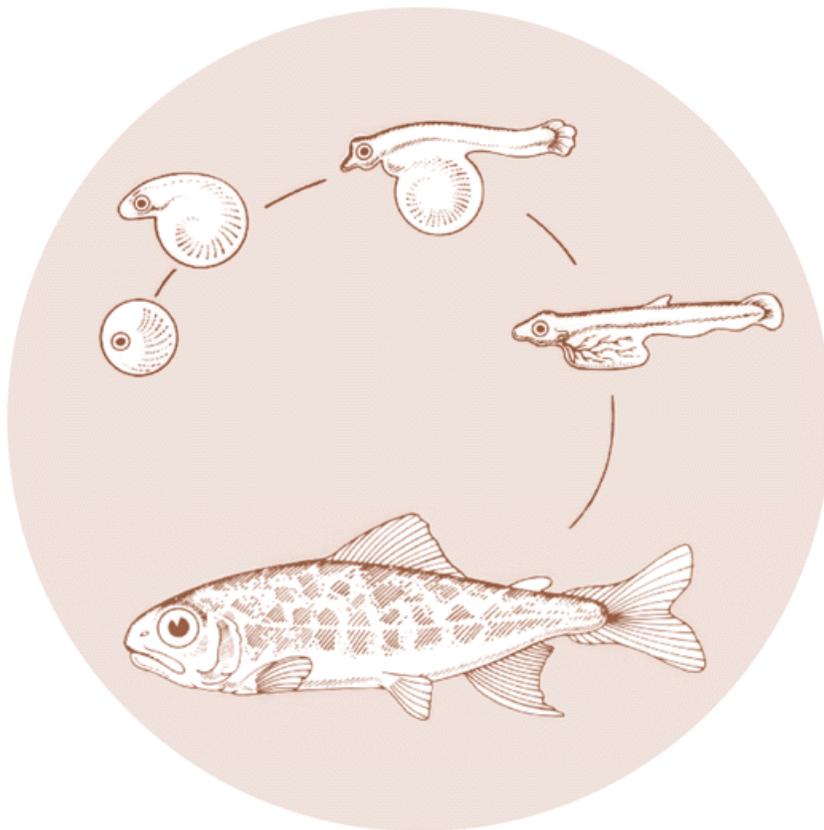


July 1990

**ASSESSMENT OF PRESENT ANADROMOUS FISH
PRODUCTION FACILITIES IN THE
COLUMBIA RIVER BASIN**

Oregon Department of Fish and Wildlife Hatcheries

Final Report



DOE/BP-98379-3



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ASSESSMENT OF PRESENT ANADROMOUS FISH PRODUCTION
FACILITIES IN THE COLUMBIA RIVER BASIN

Oregon Department of Fish and Wildlife Hatcheries

Final Report

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ABSTRACT

The goal of this report is to document current production practices for hatcheries which rear anadromous fish in the Columbia River Basin and to identify those facilities where production can be increased.

A total of 85 hatchery and satellite facilities operated by the IDFG, ODFW, USFWS, WDF, and WDW were evaluated. The years 1985 to 1987 were used in this evaluation. During those years, releases averaged **143,306,596** smolts weighing **7,693,589** pounds.

A total of 48 hatchery or satellite facilities were identified as having expansion capability. They were estimated to have the potential for increasing production by an **84,448,000** smolts weighing **4,853,306** pounds.

ACKNOWLEDGMENTS

This project has been a time consuming endeavor that has taken over two years from the initial discussions to complete. It could not have been completed without the cooperation of the various fisheries agencies, tribes, Bonneville Power Administration, and others interested in improving the runs of anadromous fish in the Columbia Basin. We wish to thank all who contributed by providing data and/or comments concerning the many drafts. We also wish to recognize the agency personnel who provided the raw data and helpful suggestions that went into this report. They were:

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Tom Sheldrake, U.S. Fish and Wildlife Service
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John Kerwin, Washington Department of Wildlife
Mark Kimbel, Washington Department of Fisheries

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INTRODUCTION

The Pacific Northwest Electric Power Planning and Conservation Act, 1980 (16 U.S.C. 839, PL 96-501) passed by Congress, designated for the first time that fish and wildlife resources in the Columbia Basin should receive equitable consideration with power and other water users in resource allocation. The Act called for appointment of a council to guide the regions resource decisions and the resultant Northwest Power Planning Council (NPPC) was formed. The subsequent Fish and Wildlife Program (FWP) was designed to restore anadromous fish resources to previously abundant numbers. The Bonneville Power Administration (BPA), as the federal entity responsible for marketing much of the electrical power produced in the Northwest, is the principle source for funding of the FWP.

The interim goal of the NPPC is a doubling of the anadromous fish run produced in the Columbia Basin. To achieve this goal will require a mix of natural and artificial production. This report is designed to be used in conjunction with sub-basin plans currently being developed by the fishery agencies. In this report, policy and management personnel are being provided with sufficient information to allow informed decisions with regard to artificial production.

To aid in the implementation of the FWP, the NPPC set up Technical Work Groups (TWG) for coordinating and recommending fisheries research. The Hatchery Effectiveness TWG included a hatchery capacity evaluation as a high priority in their five year research plan. This resulted in BPA funding this hatchery capacity evaluation entitled "Assess Present Anadromous Fish Production Facilities in the Columbia River Basin."

In addition to documenting current production practices, the goal of this evaluation is to identify hatcheries where production can be increased by one of the following methods: increase funding only, provision of additional water to existing facilities, or provision of additional pond space and/or water. Implementation of the last two also assume there is room for expansion, the potential for developing additional water supplies is good, and adequate operation and maintenance funding are available. This information is required to effectively evaluate options for expansion of existing hatcheries or construction of new ones which can easily cost 20 to 30 million dollars each.

This anadromous hatchery capacity evaluation was designed to summarize information and data which the fishery agencies were already collecting and had readily available. The evaluation was not designed to fill gaps in existing information or to create a multiple year study. Information gathered in a previous report to BPA titled "Survey of Artificial Production of Anadromous Salmonids in the Columbia River Basin" was utilized where applicable (Washington 1985).

The 1985 to 1987 juvenile release years were chosen for evaluation

in this report. These years were chosen because 1987 was the last year data had been finalized by each agency when this process began and three complete years of information were required. Only data on public facilities have been summarized. No information is included for private facilities such as Sea Resources in Washington or Clatsop Economic Development Commission in Oregon.

The National Marine Fisheries Service (NMFS), Environmental and Technical Services Division, in Portland, Oregon, volunteered to coordinate this evaluation and provide the final report. State and federal fishery agencies responsible for operating anadromous fish hatcheries in the basin supplied the data and reviewed this report for accuracy.

The operating agencies should be contacted to obtain additional information on hatchery operations not provided in this report. Appendix "A" provides addresses and phone numbers for each agency. The following agencies operate anadromous hatcheries in the Columbia Basin and supplied data:

1. Idaho Department of Fish and Game (IDFG)
2. Oregon Department of Fish and Wildlife (ODFW)
3. United States Fish and Wildlife Service (USFWS)
4. Washington Department of Fisheries (WDF)
5. Washington Department of Wildlife (WDW)

The 5 agencies operated a total of 85 hatcheries and satellite facilities devoted to rearing anadromous fish (Table 1). Hatcheries are described as facilities operated year round while satellites are only operated part of the year and are managed by personnel from a parent hatchery. These facilities are located in the states of Oregon, Washington, and Idaho (Tables 2 to 6). Releases from these hatcheries averaged 143,306,596 smolts weighing 7,693,589 pounds during the three years evaluated (Table 7).

Table 1. Number Of Hatcheries And Satellite Facilities Rearing Anadromous Fish In The Columbia Basin And Included In This Evaluation, By Agency.

Agency	Number	Location
IDFG	9	Idaho, Oregon
ODFW	29	Oregon
USFWS	14	Oregon, Washington, Idaho
WDF	16	Washington
WDW	17	Washington
Total	85	

Table 2. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The Idaho Department Of Fish And Game In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Magic Valley	Snake River Basin	Filer, Id
McCall	Snake River Basin	McCall, Id
Niagara Springs	Snake River Basin	Wendell, Id
Oxbow	Snake River Basin	Oxbow Dam, Or.
Pahsimeroi	Snake River Basin	Ellis, Id
Powell Satellite *	Snake River Basin	
Red River Pond *	Snake River Basin	Elk City, Id
Rapid River	Snake River Basin	Riggins, Id
Sawtooth	Snake River Basin	Stanley, Id

* Will **be** operated as satellite facilities to the Clearwater Hatchery when it is completed in 1992.

Table 3. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The Oregon Department Of Fish And Wildlife In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Big Creek	Below Bonneville Dam	Astoria, Or.
Bonneville	Below Bonneville Dam	Cascade Locks, Or.
Gnat Creek	Below Bonneville Dam	Clatskanie, Or.
Trojan Ponds *	Below Bonneville Dam	Clatskanie, Or.
Klaskanine	Below Bonneville Dam	Astoria, Or.
Sandy	Below Bonneville Dam	Sandy, Or.
Clackamas	Willamette Basin	Estacada, Or.
Leaburg	Willamette Basin	Leaburg, Or.
Marion Forks	Willamette Basin	Idanha, Or.
McKenzie River	Willamette Basin	Springfield, Or.
Roaring River	Willamette Basin	Albany, Or.
South Santiam	Willamette Basin	Sweet Home, Or.
Aumsville Ponds *	Willamette Basin	Aumsville, Or.
Stayton Pond	Willamette Basin	Stayton, Or.
Willamette	Willamette Basin	Oakridge, Or.
Dexter Pond *	Willamette Basin	Lowell, Or.
Cascade	Bon. Dam to Snake River	Cascade Locks, Or.
Irrigon	Bon. Dam to Snake River	Irrigon, Or.
Oak Springs	Bon. Dam to Snake River	Maupin, Or.
Oxbow	Bon. Dam to Snake River	Cascade Locks, Or.
Herman Cr. Ponds *	Bon. Dam to Snake River	Cascade Locks, Or.
Wahkenna Pond *	Below Bonneville Dam	Cascade Locks, Or.
Round Butte	Bon. Dam to Snake River	Madras, Or.
Pelton Ladder	Bon. Dam to Snake River	Madras, Or.
Lookingglass	Snake River Basin	Palmer Junction, Or.
Imnaha Pond	Snake River Basin	Imnaha, Or.

Table 3. Continued

Hatchery	Location In Columbia Basin	Closest Town
Wallowa	Snake River Basin	Enterprise, Or
Big Canyon Ponds *	Snake River Basin	Minam, Or.
Little Sheep Cr Pd*	Snake River Basin	Imnaha, Or.

* Operated as Satellite Facilities

Table 4. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The U.S. Fish And Wildlife Service In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Abernathy SCTC	Below Bonneville Dam	Longview, Wa.
Eagle Creek NFH	Willamette Basin	Estacada, Or.
Carson NFH	Bon. Dam to Snake River	Carson, Wa.
Little White Sal.	Bon. Dam to Snake River	Cook, Wa.
Willard NFH	Bon. Dam to Snake River	Cook, Wa.
Spring Creek	Bon. Dam to Snake River	Underwood, Wa.
Big White Pond *	Bon. Dam to Snake River	Underwood, Wa.
Warm Springs NFH	Bon. Dam to Snake River	Warm Springs, Or.
Entiat NFH	Cal. Basin above Snake R.	Entiat, Wa.
Leavenworth NFH	Cal. Basin above Snake R.	Leavenworth, Wa.
Winthrop NFH	Cal. Basin above Snake R.	Winthrop, Wa.
Dworshak NFH	Snake River Basin	Ahsahka, Id.
Xooskia NFH	Snake River Basin	Kooskia, Id.
Hagerman NFH	Snake River Basin	Hagerman, Id.

* Operated as a Satellite Facility

Table 5. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The Washington Department of Fisheries In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Cowlitz Salmon	Below Bonneville Dam	Salkum, Wa.
Elokomin	Below Bonneville Dam	Cathlamet, Wa.
Grays River	Below Bonneville Dam	Grays River, Wa.
Weyco Pond *	Below Bonneville Dam	Grays River, Wa.
Kalama Falls	Below Bonneville Dam	Kalama, Wa.
Lower Kalama	Below Bonneville Dam	Kalama, Wa.
Lewis River	Below Bonneville Dam	Woodland, Wa.
Speelyai	Below Bonneville Dam	Ariel, Wa.
Toutle	Below Bonneville Dam	Toutle, Wa.
Washougal	Below Bonneville Dam	Washougal, Wa.
Klickitat	Bon. Dam to Snake River	Glenwood, Wa.
Priest Rapids	Cal. Basin above Snake R.	Mattawa, Wa.
Ringold Salmon Pond	Cal. Basin above Snake R.	Mesa, Wa.
Rocky Reach	Cal. Basin above Snake R.	E. Wenatchee, Wa.
Wells Salmon	Cal. Basin above Snake R.	Pateros, Wa.
Lyons Ferry Salmon	Snake River Basin	Lyons Ferry, Wa.

* Operated as a Satellite Facility

Table 6. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The Washington Department Of Wildlife In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Beaver Creek	Below Bonneville Dam	Cathlamet, Wa.
Cowlitz Trout	Below Bonneville Dam	Winlock, Wa.
Gobar Pond	Below Bonneville Dam	Kalama, Wa.
Skamania	Below Bonneville Dam	Washougal, Wa.
Vancouver	Below Bonneville Dam	Vancouver, Wa.
Chelan PUD	Cal. Basin above Snake R.	Chelan Falls, Wa.
Naches	Cal. Basin above Snake R.	Naches, Wa.
Nelson Springs *	Cal. Basin above Snake R.	Naches, Wa.
Ringold Trout Pond	Cal. Basin above Snake R.	Mesa, Wa.
Turtle Rock	Cal. Basin above Snake R.	E. Wenatchee, Wa.
Wells Trout	Cal. Basin above Snake R.	Pateros, Wa.
Yakima Trout	Cal. Basin above Snake R.	Yakima, Wa.
Lyons Ferry Trout	Snake River Basin	Lyons Ferry, Wa.
Cottonwood Pond *	Snake River Basin	Asotin, Wa.
Tucannon Hatchery *	Snake River Basin	Pomeroy, Wa.
Curl Lake *	Snake River Basin	Pomeroy, Wa.
Dayton Pond *	Snake River Basin	Dayton, Wa.

* Operated as Satellite Facilities

Table 7. Summary Of Smolt Releases Made From Hatcheries Rearing Anadromous Fish In The Columbia River Basin.

Agency	1985		1986		1987		3 Year Average	
	Numbers	Pounds	Numbers	Pounds	Numbers	Pounds	Number	Pounds
IDFG	6,068,894	462,324	5,863,152	507,768	8,562,600	728,210	6,831,549	566,101
ODFW	36,566,439	2,211,795	42,703,334	2,202,552	46,593,424	2,350,680	41,954,399	2,255,009
USFWS	21,153,938	1,409,515	35,422,782	1,974,484	30,632,436	1,960,689	29,069,719	1,781,563
WDF	53,938,979	2,197,389	66,098,677	2,464,092	63,171,986	2,283,541	61,069,881	2,315,007
VDW	4,167,312	707,050	4,286,585	723,524	4,689,249	897,153	4,381,049	775,909
TOTAL	121,895,562	6,988,073	154,374,530	7,872,420	153,649,695	8,220,273	143,306,596	7,693,589

The objectives of this report are to identify production constraints and expansion capabilities at existing hatcheries. It is expected that management and policy personnel for the fishery agencies, tribes, BPA, and NPPC will utilize this document in their planning process to meet the goal of doubling the run of anadromous fish into the Columbia River Basin.

Data Collection Forms

Information used in this report was compiled in data collection forms completed by the operating agencies. The summary tables in the individual agency sections summarize data submitted on the collection forms. Blank copies of the data collection forms are presented in the appendix.

The data collection forms were divided into 3 parts as follows:

Part I. Existing Capacity: Includes basic information for all public hatcheries rearing anadromous fish within the Columbia Basin. It includes location, water supply, physical layout, staffing, operation costs, production numbers, adult returns, and production constraints. It also includes the agency production goal for each facility. Data collection forms 1.1 to 1.9 are included in this section.

Form 1.1, Hatchery Summary: This form identifies the hatchery or satellite facility, funding agency, initial year of operation, facility and operational synopsis, etc.

Form 1.2, Site Data: This form identifies hatchery location, legal covenants and conditions, and water rights held.

Form 1.3, Water Supply Summary: This form identifies water sources used in the hatchery for fish culture. It identifies the high, low, and average flow and temperature of water available for use that the delivery system is capable of supplying. If hatchery has water re-use system it is described.

Form 1.4, Facility Inventory: Lists rearing units at the hatchery by incubation, starter tanks, raceways, and ponds. It includes pond dimensions, volume, age, condition, etc. A schematic drawing of the hatchery is also attached.

Form 1.5, Staffing Summary: Lists staffing needed to operate hatchery.

Form 1.6, Adult Capturing/Handling: Completed if adults are captured and spawned. This form relates to form 1.7. One copy of this form should be provided for each form 1.7 that identifies releases from eggs taken. Brood year information provided in this form corresponds to egg take and release year data in form 1.7. As an example, yearling spring chinook released in spring 1985 (form 1.7) would have a corresponding

form 1.6 for brood year 1983 since this brood year led to the release. Egg take information on form 1.7 would also be for brood year 1983.

Form 1.7, Hatchery Production: Identifies releases for years 1985 to 1987. A separate form is required for each year. Egg take information corresponds to brood year for fish released. This form relates to form 1.6.

Form 1.8a, Hatchery Production Summary for Fiscal Years 1985 to 1987: Summarizes release information from form 1.7 and also identifies interim production. Interim production is identified as fish reared for a period of time and transferred to other stations. The other stations receive credit for these fish when released. No attempt has been made to track transferred fish. A separate form for each year is provided.

Form 1.8b, Hatchery Production Summary For Fiscal Years 1985 to 1987. Summarizes releases and transfers to obtain total hatchery production. Also identifies operating cost by fiscal year. A separate form is provided for each of the three production years.

Form 1.9, Production Constraints: Identifies factors which may be limiting production or affecting smolt quality. Also identifies problems and areas needing upgrading, rehabilitation, or replacement.

Part II. Theoretical Capacity: Theoretical capacity for each facility included in Part I is calculated using flow and density methodologies described in Piper et al (1982) and is identified in form 2.1. The following formulas were used:

Flow Method: $W = F \times I \times L$ **Density Method:** $W = D \times V \times L$

w = Weight of fish in pounds
F = Flow Index
L = Length of fish in inches
I = Water inflow in gallons per minute
D = Density Index
V = Volume of rearing unit in cubic feet

The flow index was taken from the table on page 69 of Piper (1982) and varies depending on water temperature and elevation. The density index was assigned by agreement of all agencies prior to compiling the information. The remaining variables are easily obtained from hatchery records. Different density indices were used for raceway type rearing units and large ponds. The definition of a large pond was left up to the individual agencies but is basically large ponds having poor flow patterns and long turnover rates. It should be kept in mind that no one or two

density indices can be expected to fit all the various rearing facilities currently in use. The density indices assigned to each species are shown in Table 8.

Table 8. Density Indices Assigned To Each Species Used To Calculate Theoretical Production Based On Density.

Species	Raceways/Small ponds	Large Ponds
Fall Chinook	.3	.03
Coho	.3	.03
Spring Chinook	.25	.03
Steelhead	.25	.03

Part III. Expansion Capability: Includes an estimate of expansion capability at existing facilities. The basis for expansion and the relevant information are detailed in form 3.1. Costs are not included in this report because in most cases they are little more than guesses. In most cases additional engineering studies are required before accurate costs can be determined.

INDIVIDUAL HATCHERY REPORTS

The main body of this report consists of detailed information for each hatchery and is divided into individual agency sections. Each hatchery discussion is divided into 4 parts: Introduction, Current Production Constraints, Theoretical Production, and Hatchery Expansion Capability. Each part is described briefly below.

Introduction

Includes a brief description of hatchery location, rearing facilities, operations, and water rights.

Current Production Constraints

Contains information identifying areas constraining production in the existing facilities. It also identifies general problem areas which are affecting smolt quality, adult survival, egg take, etc.

Theoretical Production

This section calculates 2 theoretical capacity levels, one based on flow and one based on density. A brief comparison is made between these two calculations, average production for the 3 years evaluated, and the agency production goal. Throughout the report theoretical capacity and theoretical production are used interchangeably.

Determining the theoretical capacity of a facility is a difficult and elusive concept. There is no single theoretical capacity figure as it will vary each time the species or size at release goal changes. Since size of fish in inches is a variable in the theoretical formulas, by simply changing the species reared or size at release will change the hatcheries theoretical capacity by 50% to 100%. As an example, changing production from fall chinook (3.5 to 4 inch smolts) to coho, steelhead, or spring chinook (5.5 to 8 inch smolts) can double the theoretical capacity in pounds of a facility.

No single set of criteria can be applicable to all hatcheries when attempting to determine theoretical calculations. The formulas used cannot account for the large number of physical and chemical variables which differ from hatchery to hatchery. In addition, recent research has shown that reduced densities may in fact produce as many or more adults over higher densities at least with some species and stocks. While theoretical calculations may provide you with a number which can be physically held and reared, it may or may not have any bearing on increasing adult survival or producing more adults, which is the ultimate goal. As such, production based on theoretical calculations is probably more

applicable to commercial trout producers or catchable trout programs where survival of juveniles in the wild to adults is not a factor.

Theoretical calculations can provide a production starting point with a new hatchery, but actual capacity must be adjusted as the agency gains experience with the facility and adult returns are analyzed.

The theoretical calculations in this report have only been used as a gross comparison to determine if rearing space is in balance with water supply. In cases where the result of the 2 theoretical calculations differ by a large amount, the assumption is made that one or the other (water supply or rearing space) is the limiting factor in production potential. As an example, if the flow method identifies 100,000 pounds can be produced and the density method shows 300,000 pounds it would indicate that additional production may be possible if additional water could be provided. It does not mean that 200,000 pounds more could be produced given additional water. The numbers generated by these 2 formulas are not meant to be absolute and are not to be used as identifying or quantifying what an anadromous hatchery can successfully produce.

Hatchery Expansion Capability

This section identifies the land area, potential water supplies, and provides estimates of possible production increases. Each hatchery operated by the individual agencies is discussed in it's respective section. Tables are provided in each agency section -which identifies the facilities with the most potential for production increases. The operating agencies were responsible for determining which hatcheries have expansion capability.

The ODFW is currently conducting research into the potential applications of providing an oxygen supplementation system in a hatchery. It will be several years before results from this research provides needed information. If oxygen supplementation is proven effective there may be additional expansion capability which has not been identified in this report.

At several hatcheries, WDF is proposing small scale experimental net pen rearing near the mouths of tributary streams. This experimental net pen rearing has been identified as potential expansion capability in this report. If net pen rearing is proven successful there may be additional expansion capability which has not been identified in this report.

The four constraints identified in this report are defined as follows:

Budget: Identifies those facilities where production is set by budget level. If additional funding could be provided, then production could be increased with existing rearing

space and flows.

Flow: Identifies those facilities where production could be increased by providing additional water to existing rearing ponds. The likelihood that additional water can be found is good.

Rearing Space: Identifies those facilities where production could be increased by providing additional rearing ponds. Space for expansion is available and existing water supply will support additional rearing ponds.

Flow and Rearing Space: Identifies those facilities where production could be increased by providing additional water and rearing ponds. These facilities have space for expansion and a high probability of adequate water supplies to operate them. It also includes those facilities needing major renovation or complete rebuild to more efficiently utilize available water supplies.

The increased production identified in this report should be used as only a general indication of expansion capability. In many cases numbers provided are very preliminary and are based on various assumptions. In most cases, additional detailed evaluation is required for those facilities identified as having expansion potential. Only those facilities deemed by policy and management personnel as capable of meeting future production goals based on hatchery location and species which can be reared should receive additional evaluation. This phase 2 study should include engineering, feasibility study, and estimated cost. An updated estimate of the potential production increase should also be provided based on this phase 2 study.

Hatchery expansion capability has been identified as **84,448,000** smolts weighing **4,853,306** pounds from existing hatcheries or satellite facilities (Table 9). These facilities are located throughout the Columbia Basin and as described above require a wide range of actions to accomplish. It is left up to policy and management personnel to determine which facilities can best meet future goals.

Table 9. Hatchery Expansion Capability For Each Agency Operating Anadromous Fish Hatcheries In The Columbia River Basin.

Agency	Number of Facilities	Production Numbers *	Increases Pounds *
IDFG	4	7,000,000	359,500
ODFW	9	9,492,000	662,583
USFWS	10	12,930,000	546,755
WDF	14	46,865,000	1,923,135
WDW	11	8,161,000	1,361,333
Total	48	84,448,000	4,853,306

* Numbers and pounds of fish used are those recommended by operating agencies. Numbers and pounds will change if species and/or size of smolts is changed.

Oregon Department of Fish and Wildlife

A total of 29 hatcheries and satellite facilities have been evaluated. These facilities range from full service hatcheries to short term acclimation sites. Summary Tables 1 through 13 detail information provided in data sheets. Table 10 and Figure 1 show the approximate location in the Columbia Basin for each facility. The hatcheries are scattered throughout the basin from the Columbia River mouth to the Snake River Basin.

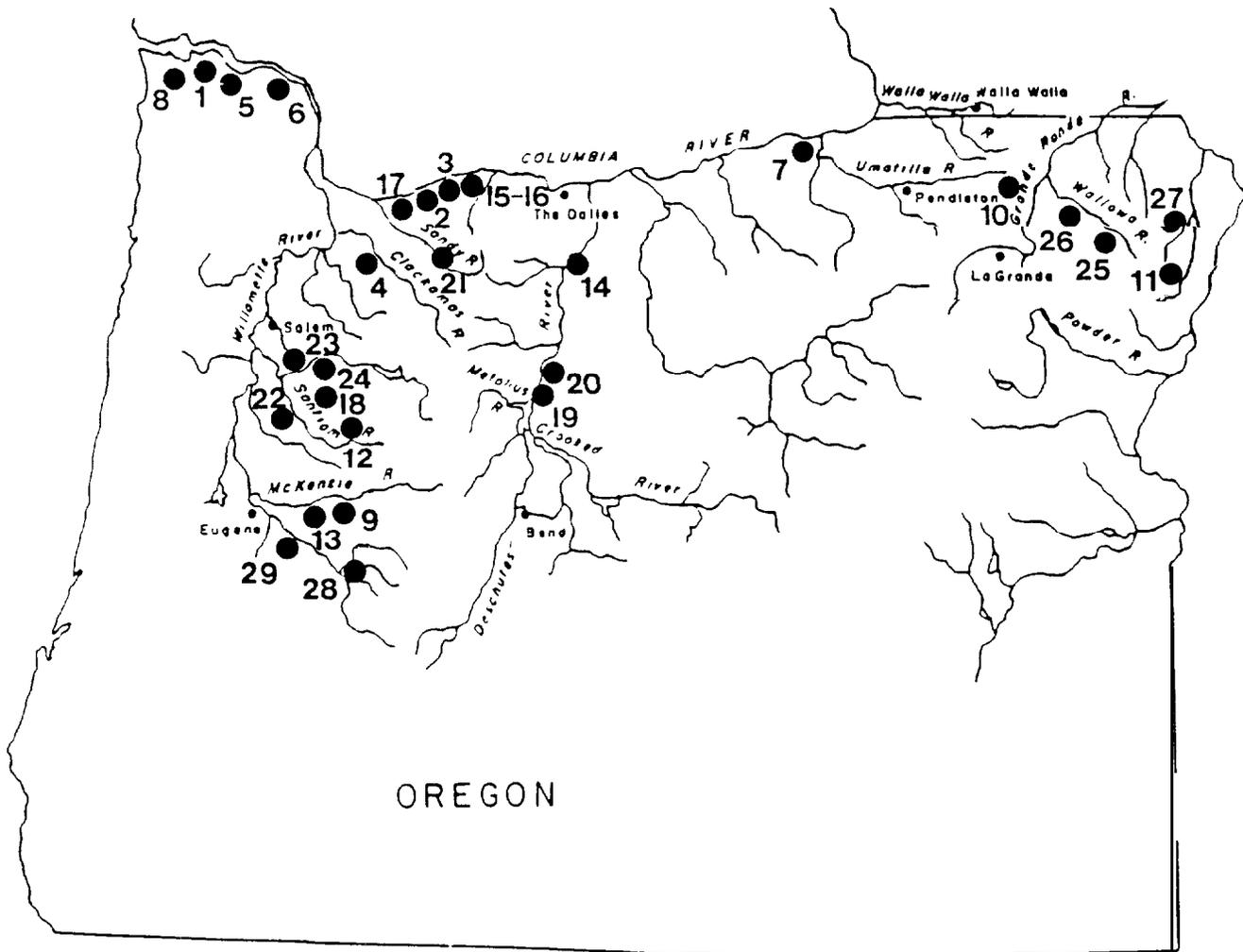
Several hatcheries produce both resident trout and anadromous fish. Only the anadromous fish production from these hatcheries have been summarized in this report. An average of 41,954,399 anadromous smolts weighing 2,255,009 pounds were released from these facilities during this evaluation period.

Table 10. Location Of Hatcheries And Satellite Facilities Operated By the Oregon Department Of Fish And Wildlife In The Columbia Basin.

Below Bon. Dam	Bon. Dam to Snake River	Willamette Basin.	SNAKE RIVER Basin
1. Big Creek	1. Cascade	1. Clackamas	1. Lookingglass
2. Bonneville	2. Irrigon	2. Leaburg	2. Imnaha Pond
3. Gnat Creek	3. Oak Springs	3. Marion Forks	3. Wallowa
4. Trojan Ponds	4. Oxbow	4. McKenzie R.	4. Big Canyon
5. Klaskanine	5. Herman Cr Pds	5. Roaring River	5. Little Sheep
6. Wahkeena Pd	6. Round Butte	6. South Santiam	
7. Sandy	7. Pelton Ladder	7. Aumsville Ponds	
		8. Stayton Pond	
		9. Willamette	
		10. Dexter Pond	

Production at several hatcheries appears to be limited by available water supplies. At several facilities it appears that no additional water supplies are available. To obtain more detailed information, refer to individual hatchery discussions. Nine hatcheries operated by ODFW have been identified as having expansion capability (Tables 11 and 12). The estimated expansion potential is approximately 9,492,000 smolts weighing 662,583 pounds.

Figure 1. Approximate Location Of Hatcheries Operated By The Oregon Department Of Fish And Wildlife Which Rear Anadromous Fish In The Columbia River Basin.



- | | |
|-----------------------------|---------------------------------|
| 1. Big Creek Hatchery | 16. Herman Creek Ponds |
| 2. Bonneville Hatchery | 17. Wahkeena Pond |
| 3. Cascade Hatchery | 18. Roaring River Hatchery |
| 4. Clackamas Hatchery | 19. Round Butte Hatchery |
| 5. Gnat Creek Hatchery | 20. Pelton Ladder |
| 6. Trojan Rearing Ponds | 21. Sandy Hatchery |
| 7. Irrigon Hatchery | 22. South Santiam Hatchery |
| 8. Klaskanine Hatchery | 23. Aumsville Ponds |
| 9. Leaburg Hatchery | 24. Stayton Pond |
| 10. Lookingglass Hatchery | 25. Wallowa Hatchery |
| 11. Imnaha Acclimation Pond | 26. Big Canyon Acclimation Pond |
| 12. Marion Forks Hatchery | 27. Little Sheep Acclimation Pd |
| 13. McKenzie River Hatchery | 28. Willamette Hatchery |
| 14. Oak Springs Hatchery | 29. Dexter Rearing Pond |
| 15. Oxbow Hatchery | |

Table 11. List Of Hatcheries And Satellite Facilities Operated By The Oregon Department Of Fish And Wildlife Where Production Could Be Increased By Providing Additional Flow, Rearing Space, Or Flow And Rearing Space.

Flow	Rearing Space	Flow and Rearing Space
	1. Lookingglass	1. Clackamas
	2. McKenzie	2. Leaburg
	3. Dexter	3. Oak Springs
		4. Round Butte
		5. Pelton Ladder
		6. Stayton Pond

Table 12. Expansion Capabilities For Hatcheries Operated By The Oregon Department Of Fish And Wildlife Which Rear Anadromous Fish In The Columbia Basin.

Hatchery	Additional Water Available at Site			Delivery Method	Land Available	Potential Numbers	Production	
	Volume	Temp. Range	Source				Pounds	Species
Clackamas	6,000 gpm		Clackamas River	Pump	Yes	350,000	40,000	Spr. Chinook
Dexter Pond	unlimited	38-67	Dexter Reservoir	Gravity	Yes/8 acres	1,050,000	131,250	Spr. Chinook
Leaburg	5,388 gpm		McKenzie	Gravity	21.5 Acre	300,000	60,000	Steelhead
Lookingglass	4,000 gpm		Wells/Creek	Pump/Gravity	Yes	1,400,000	70,000	Spr. Chinook
McKenzie River			Leaburg Canal	Gravity	Yes	1,800,000	120,000	Coho/Spr Chin
Oak Springs	1,792 gpm	54	Springs	Pump/Gravity	20 acres	180,000	30,000	Steelhead
Pelton Fish Ladder	14,360 gpm	35-60	Lake Sintustis	Gravity	Existing	700,000	93,333	Spr. Chinook
Round Butte		50-52	Springs	Pump/Gravity	Some	112,000	28,000	Steelhead
Stayton Pond	Large Volume		NF Santiam Riv	Gravity	Yes	3,600,000	90,000	Fall Chinook
					TOTAL	9,492,000	662,583	

The ODFW is currently evaluating the potential benefits of utilization of an oxygen supplementation system in a hatchery. It will require several years of research before numbers can be quantified and conclusions determined. Research will need to determine the oxygen transfer efficiency, long term effect of operation and maintenance of oxygen generators, and effect on adult survival. If oxygen supplementation works, the potential benefits include increased production, improved smolt quality, and ultimately increased adult production.

There are several hatcheries not listed above where production could potentially be increased in the existing facilities by re-using water if oxygen supplementation is proven effective. Production at these hatcheries is currently limited by water supply. While it is too early to quantify potential production increases if any, the following hatcheries have potential for expanding production if oxygen supplementation is proven effective:

1. Big Creek Hatchery
2. Cascade Hatchery
3. Irrigon Hatchery
4. Marion Forks Hatchery
5. Sandy Hatchery

Big Creek Hatchery
Route 4
Box 594
Astoria, Or 97103

Manager: Dave Rieben
Phone #: (503)458-6512

Funding Agency: NMFS
Species Reared: Fall Chinook
Coho
Winter Steelhead
Sea Run Cutthroat

Introduction

Big Creek Hatchery is located 16 miles from Astoria and approximately 3 miles upstream from Big Creek's confluence with the Columbia River. Facility elevation is approximately 75 feet above sea level. The hatchery began operation in 1941 as a state funded facility but was refurbished in 1957 under the Columbia River Fisheries Development Program (CRFDP) (authorized by Congress under the Mitchell Act). The facility currently is operated by the ODFW with funding administered by NMFS (the Bureau of Reclamation also contributes a small share of funding). It is staffed with 7.3 FTE's.

The facility is in good to fair condition and consist of 2 adult holding ponds, 30 raceways, 1 rearing pond and 64 troughs.

Adult returns to Big Creek include all species reared. The facility takes large numbers of eggs annually and routinely supplies other rearing facilities with eggs. Most of the production is reared to smolt size and released at the station.

There are three water supplies for the hatchery: Big Creek, Mill Creek, and springs. Current water rights total 31,656 gpm. All water supplies are delivered by gravity but can be pumped for re-use if required. The re-use system is not normally used but has a capacity of 3,200 gpm. High water usage is 21,000 gpm from all sources.

Current Production Constraints

Low head pressure and the size of the water delivery pipe currently limit the volume of water that can be supplied to rearing ponds from Big Creek. Logging in the watershed has lead to siltation and water turbidity. The existing sediment settling pond is too small and does not keep sediment out of rearing ponds at all flows. During high flows, rearing pond siltation is a major problem and potential cause for major fish mortality.

The spring water supply is insufficient for total incubation needs so creek water must be used which slows egg development and limits fall chinook size at release.

The adult holding and spawning area is inefficient and not set up

to handle the several species and large numbers of adult fish that annually return to this facility. Adult fish must be handled several times resulting in some stress related mortality. An improved adult handling and sorting facility could provide additional eggs during years of basin wide shortages.

Theoretical Production

Theoretical production based on flow is 145,218 pounds and based on density is 170,044 pounds. Average production was 206,636 pounds and the 1987 agency goal was 155,146 pounds. The current agency goal is 152,513 pounds. Theoretical calculations were computed as follows:

Flow Method

Fall Chinook:	1.22 X 10,500 gpm X 3.47" =	44,450 lbs
Coho:	1.18 X 12,300 gpm X 5.75" =	83,455 lbs
Winter Steelhead:	1.22 X 1,716 gpm X 8.27" =	<u>17,313 lbs</u>
		145,218 lbs

Density Method

Fall Chinook:	.3 X 88,710 cu ft X 3.47" =	92,347 lbs
Coho:	3 X 30,881 cu ft X 5.75" =	53,270 lbs
Winter Steelhead:	:25X 11,815 cu ft X 8.27" =	<u>24,427 lbs</u>
		170,044 lbs

The calculations used above were based on the following:

Species	Time Period	Pond Numbers
Fall Chinook	May	12-22, 23-30
Coho	June	7-10, 31
Winter Steelhead	May	1-3

Note: Not all ponds were used in calculations. Two brood years of coho salmon are held on station and fingerlings take up pond space which is not used in theoretical calculations.

Comparison of the 2 theoretical calculations indicates that flow may be the limiting factor in production. Production has exceeded theoretical calculations in the past, but has been achieved by serial releases. The rearing facilities are not capable of holding 200,000 pounds of production at any one time.

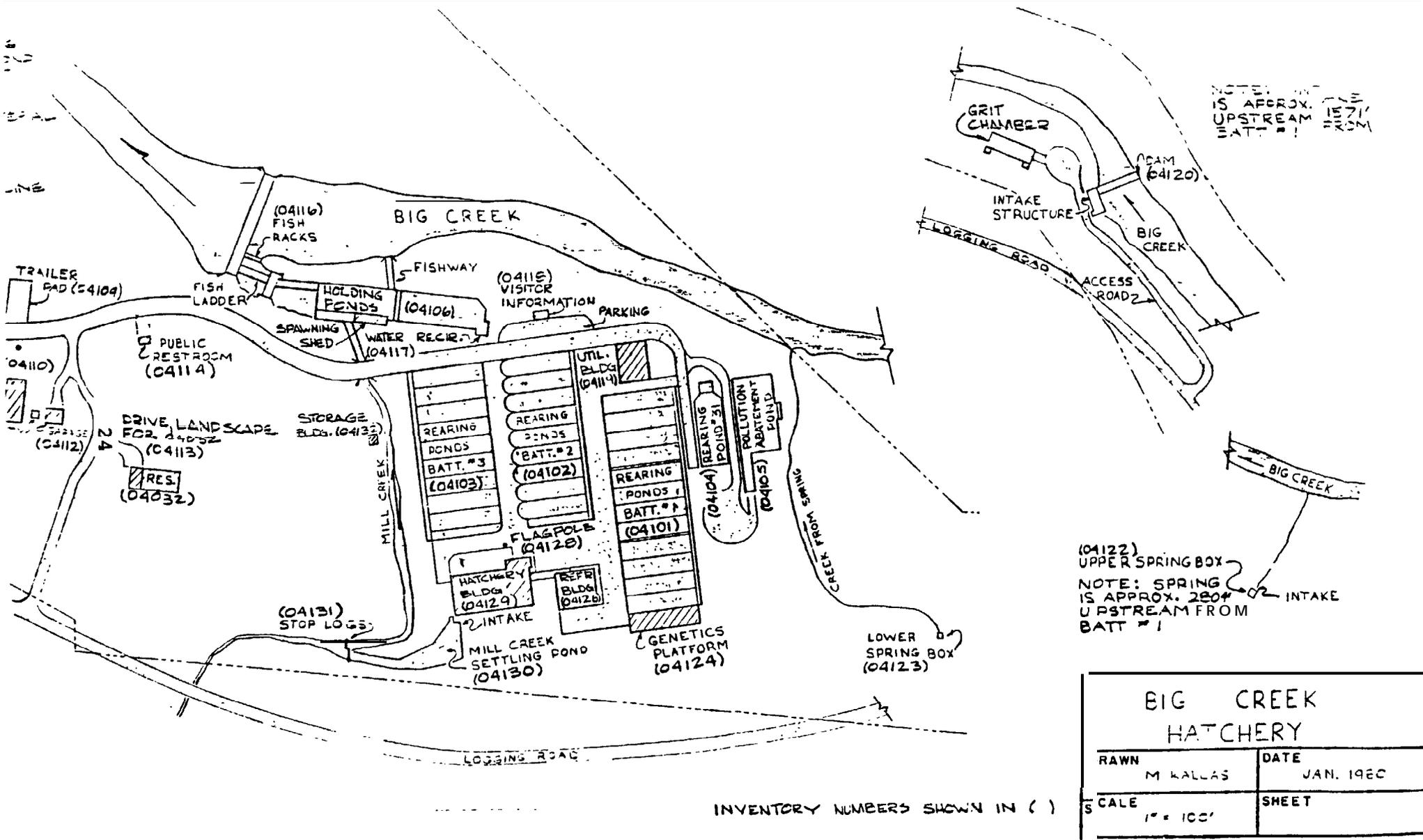
Hatchery Expansion Capability

The hatchery is situated on 48 acres owned by ODFW. Approximately 40 percent of the area is currently being utilized. The topography limits use of the entire area but it is estimated that an additional 30 percent (about 14 acres) of land could be used for additional rearing facilities. Additional water from Big Creek is not available. The potential for well water is not known.

There is space for construction of an additional 20 ponds each 20' X 80' X 3', but additional water is not available to supply them. There are presently 30 raceways and 1 larger rearing pond at this station, but available water during low flow periods is sufficient to supply only 12 of them. The water supply is insufficient for present demands so at present there is no expansion capability.

If oxygen supplementation is proven effective and was provided, then the remaining ponds and the 20 additional ponds could be utilized to increase production. Using the density factor only, it is estimated that the 20 new ponds could produce about 7,987,200 fall chinook weighing 99,840 pounds or 2,491,200 coho weighing 166,080 pounds.

No expansion capability is currently identified. If oxygen supplementation is proven effective in water short hatcheries such as this one, then this facility could have expansion potential.



NOTE: SPRING IS APPROX. 200' UPSTREAM FROM BATT. #1

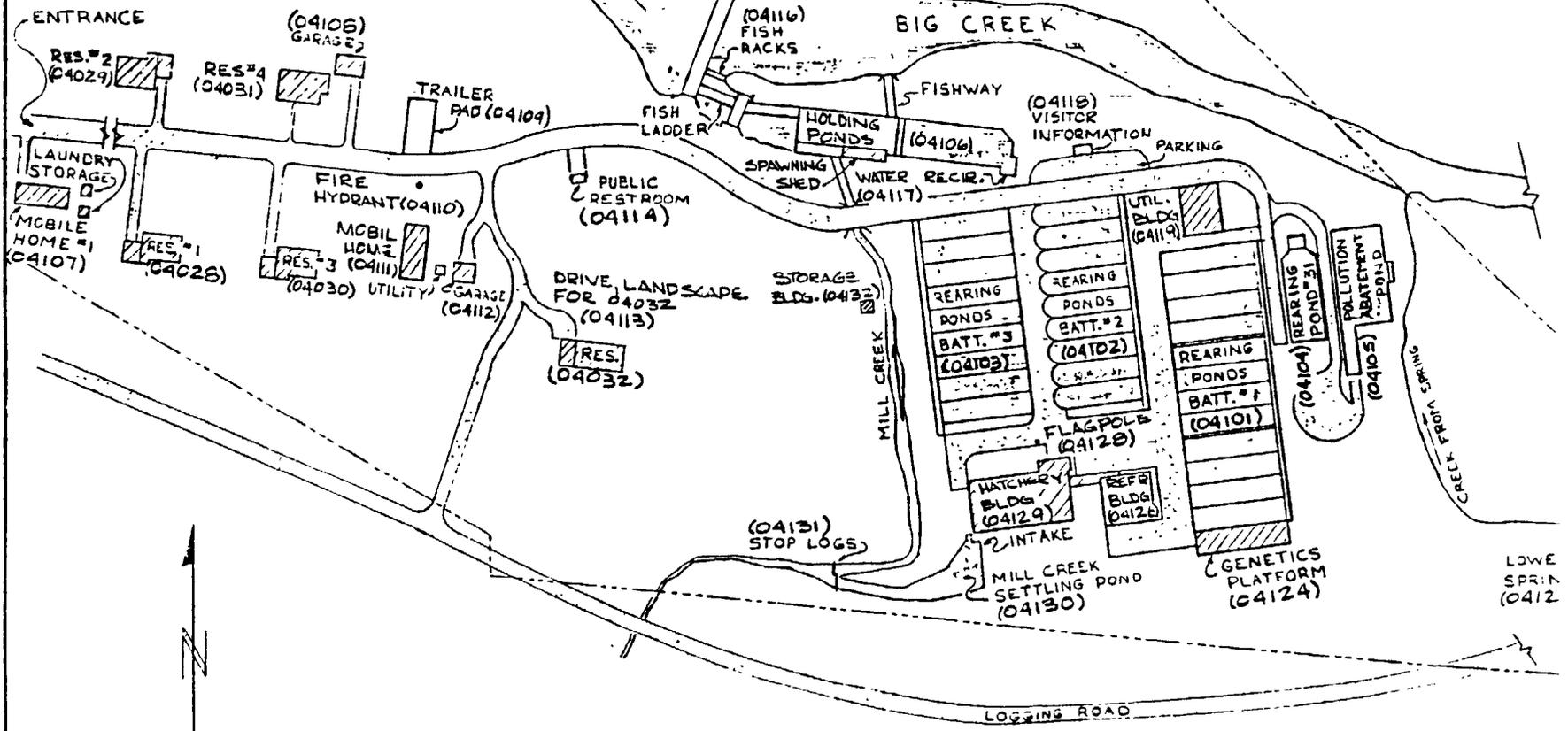
(04122) UPPER SPRING BOX
 NOTE: SPRING IS APPROX. 200' UPSTREAM FROM BATT. #1

BIG CREEK HATCHERY	
RAWN M KALLAS	DATE JAN. 1960
SCALE 1" = 100'	SHEET

INVENTORY NUMBERS SHOWN IN ()

NOTE:

- 04100 LAND
- 04115 ROADS, DRIVEWAYS & PAVING
- 04121 PIPELINE, FROM DAM TO POND
- 04125 RUNWAYS FOR LEAK CART
- 04127 PIPE BRIDGE
- 04133 POND SCREENS
- 04134 SAFETY REQUIREMENT MATERIAL
- 04135 GRADINGS, WALKWAYS
- 04136 PIPELINES, POND AREA
- 04137 POND LIGHTING
- 04138 ALARM SYSTEM
- 04139 DOMESTIC WATER PIPELINE



25

INVENTORY NUMBER:

Bonneville Hatchery
Star Rt. B, Box 12
Cascade Locks, Or 97014

Funding Agency: NMFS 55%, COE 45%
Species Reared: Fall Chinook
Spring Chinook
Coho

Manager: Dan Barrett
Phone #: (503) 374-8393

Introduction

Bonneville Hatchery is located just west of Cascade Locks at Bonneville Dam on the Columbia River. It is approximately 46 feet above sea level. The hatchery was first operated in 1894 by the state. In 1957 the facility was remodeled and enlarged under the CRFDP (Mitchell Act). In 1974 the hatchery underwent another renovation as part of the U.S. Army Corp of Engineers' (COE) mitigation of fish loss from construction of John Day Dam on the Columbia River. Currently, the hatchery obtains funding from the NMFS (55%) and COE (45%). A total of 13 FTE's are used to operate the facility.

The current rearing facilities include 30 raceways, 28 Burrows or converted Burrows ponds, and 3 adult holding ponds (also used for coho rearing) The condition of the rearing facilities ranges from fair to good.

Two stocks of fall chinook return to the hatchery as adults and are spawned, lower river Tules and up river brights (URB). Adult coho salmon needed to fulfill egg take goals are collected and transferred to Cascade Hatchery for spawning. Coho are not normally spawned at this facility. Coho juveniles are later transferred back for rearing.

Major disease problems include infectious hematopoietic necrosis (IHN) which has resulted in destruction of large numbers of eggs in the past. Cold Water Disease (CWD) is a chronic problem. Erythrocytic Inclusion Body Syndrome (EIBS) has caused significant loss in yearling coho. There are also periodic bacterial problems.

The hatchery water supply is obtained from two sources, Tanner Creek and wells. Current ODFW water rights include 996 gpm from wells and 44,440 gpm from Tanner Creek. The COE holds additional rights for five wells which supply water for rearing and domestic uses also. Hatchery use of well water averages 17,370 gpm and for Tanner Creek averages 12,791 gpm. Construction of the navigation lock at Bonneville Dam will destroy the existing wells and require new wells to insure hatchery production. The COE is supplying the new wells, but water temperature, quantity, and quality is uncertain and may differ from the old wells. Water from Tanner Creek is supplied by gravity but sometimes freezes in December and January so is not a reliable supply during that time period.

Water is re-used through the adult capture and holding system.

Water is both pumped and flow through. Twenty-eight raceways have the capability to re-use water with a pumping system, but is not used because of disease concerns.

Current Production Constraints

Navigation lock construction at Bonneville Dam is disrupting water supply. Water quality and quantity from the new wells has not been determined. Tanner Creek freezes during the winter and can not be used and summer flows are well below the water right.

In the past, power outages have been annual events during the winter when service was supplied commercially by Cascade Locks City Power. These power outages should no longer be a problem since the COE has recently begun supplying power to the hatchery directly from Bonneville Dam station service.

Fungal infections and bacterial gill disease (BGD) on adults has been a recurring problem.

Cold Water Disease is a chronic problem and bacterial epizootics also cause concern.

Two additional adult holding ponds are needed as the present number and variety of returning adults overloads the present facilities.

The COE owns the facility and any changes would need to be negotiated.

Theoretical Production

The theoretical production based on the flow method is 218,121 pounds and based on the density method is 336,031 pounds. The 3 year average was 395,863 pounds and the 1987 agency production goal was 404,542 pounds. Theoretical calculations were computed as follows:

Flow Method

Fall Chinook:	1.55 X 19,482 gpm X 3.47"	=	104,783 lbs
Coho:	1.55 X 10,400 gpm X 5.89"	=	94,947 lbs
Spring/Summer:	1.55 x 1,806 gpm X 6.57"	=	<u>18,391 lbs</u>
Chinook			218,121 lbs

Density Method

Fall Chinook:	.3 x 150,000 cu ft x 3.47"	=	156,150 lbs
Coho:	.3 x 90,384 cu ft X 5.89"	=	159,708 lbs
Spring/Summer:	.25 X 12,282 cu ft X 6.57"	=	<u>20,173 lbs</u>
Chinook			336,031 lbs

The above numbers were generated by the following:

Species	Pond numbers
Fall Chinook Coho	Battery A, C, D Upper and Lower Adult Pond

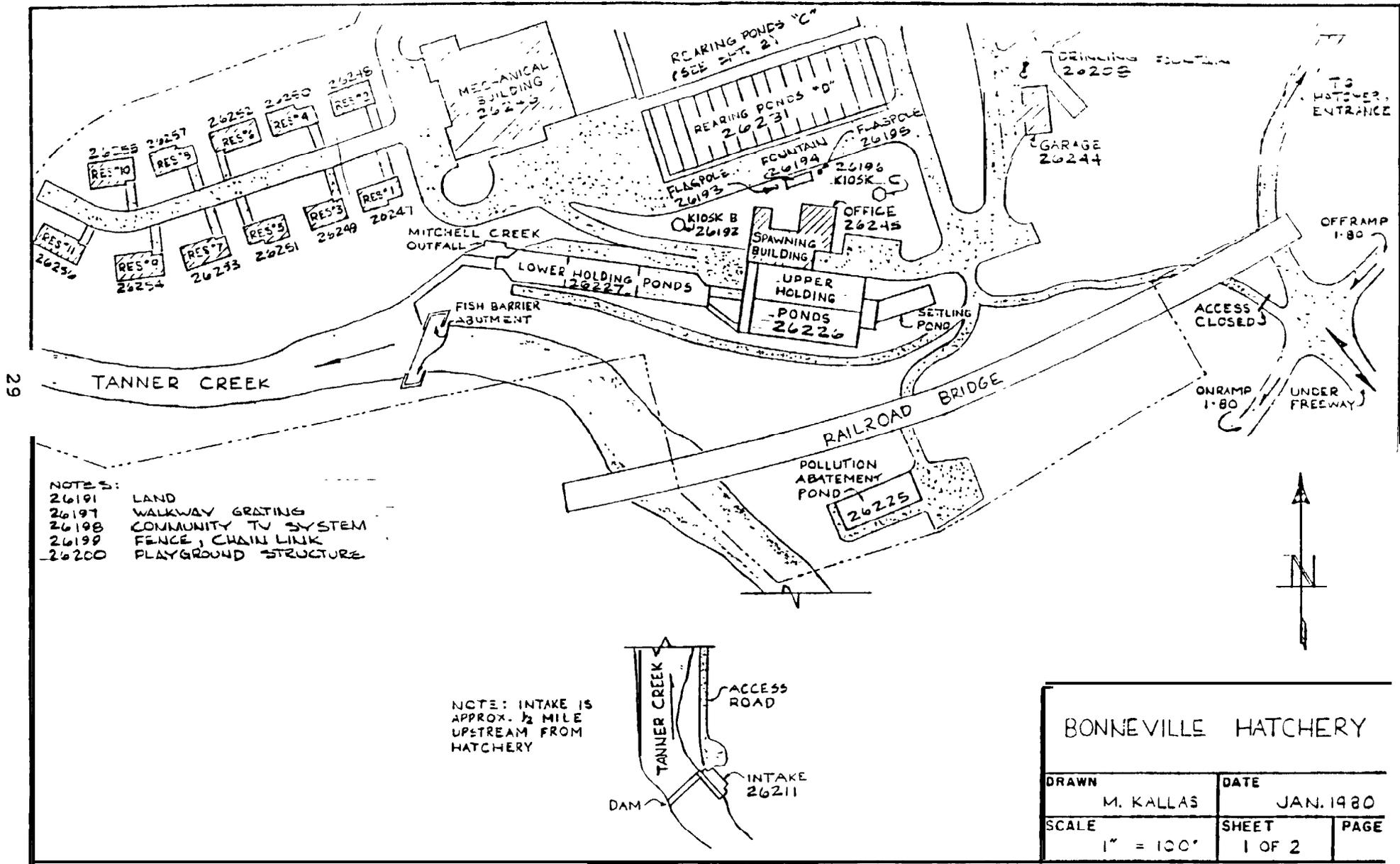
Comparison of the 2 theoretical calculations indicates that flow is the limiting factor in production. The agency goal and average production are both larger than either theoretical calculation. This production is accomplished with serial releases and by transferring in coho from Herman Creek Ponds after Bonneville coho have been released. The coho transferred in are reared and acclimated for 4 to 8 weeks prior to release. Bonneville is credited for these releases. The result is an illusion of production potential, because releases credited are more than double the number of coho which can be held on station at any one time. This facility is not capable of holding 400,000 pounds on station at any one time.

Expansion Capability

The hatchery covers 22.46 acres owned by the COE. Approximately 100 percent of the area is being utilized. Some additional land owned by the COE adjacent to the hatchery may be available but it is unknown if they would be willing to allow its use for fish production. Additional Tanner Creek water is not available. New wells are currently being drilled to replace existing ones which will be destroyed by navigation lock construction at Bonneville Dam. How much water they will be able to supply is unknown.

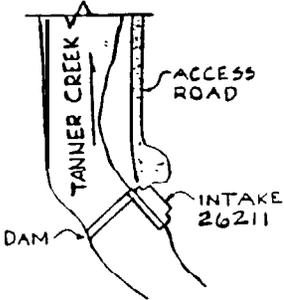
Replacement of the existing lower adult holding pond with two ponds similar to the two upper adult ponds is needed. These ponds will improve adult holding conditions, decrease mortality, and increase egg takes especially during years of shortages. Approximately 3,000 gpm re-use water from raceways would supply the ponds. Coho would be reared in these ponds but no increase in production is projected as the same number of smolts reared in the existing pond would be produced in the new ponds.

No expansion capability is identified.



- NOTES:
- 26191 LAND
 - 26197 WALKWAY GRATINGS
 - 26198 COMMUNITY TV SYSTEM
 - 26199 FENCE, CHAIN LINK
 - 26200 PLAYGROUND STRUCTURE

NOTE: INTAKE IS APPROX. 1/2 MILE UPSTREAM FROM HATCHERY



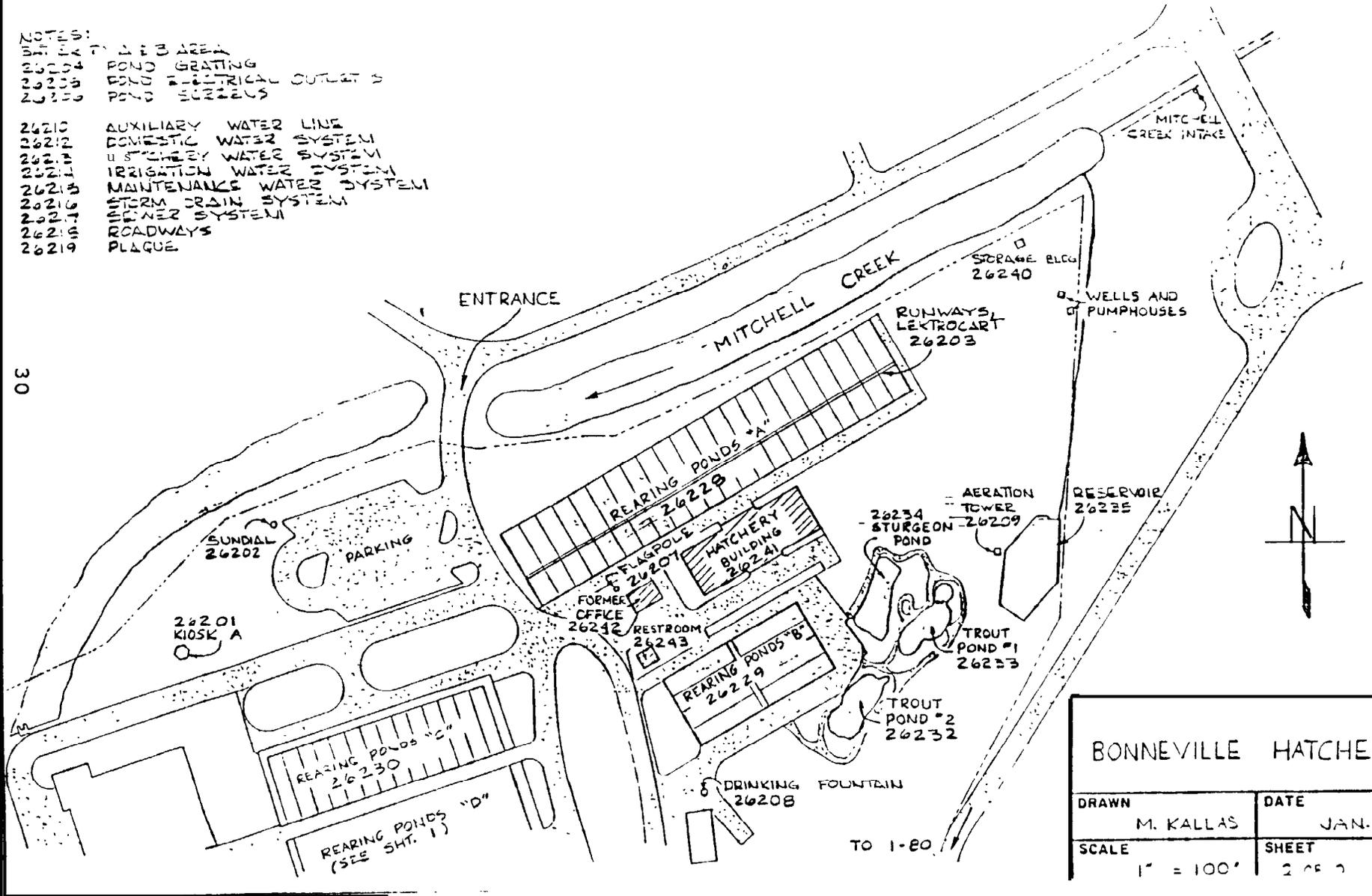
BONNEVILLE HATCHERY			
DRAWN	M. KALLAS	DATE	JAN. 1980
SCALE	1" = 100'	SHEET	1 OF 2
		PAGE	

29

- 26210 1" VENT
- 26211 1" VENT
- 26212 4" FLOOR AREA
- 26213 FLOOR GRATING
- 26214 FLOOR ELECTRICAL OUTLET
- 26215 FLOOR VENTILATORS

- 26216 AUXILIARY WATER LINE
- 26217 DOMESTIC WATER SYSTEM
- 26218 INDUSTRIAL WATER SYSTEM
- 26219 IRRIGATION WATER SYSTEM
- 26220 MAINTENANCE WATER SYSTEM
- 26221 INTERIOR DRAIN SYSTEM
- 26222 EXTERIOR DRAIN SYSTEM
- 26223 ROADWAYS
- 26224 PLACQUE

30



BONNEVILLE HATCHERY		
DRAWN	DATE	
M. KALLAS	JAN. 1950	
SCALE	SHEET	PAGE
1" = 100'	2 OF 2	

TO 1-20

Cascade Hatchery
Star Rt. B, Box 526
Cascade Locks, Or. 97014

Funding Agency: **NMFS**
Species Reared: Coho

Manager: Wayne Stedronsky
Phone #: (503) 374-8381

Introduction

Cascade Hatchery is located along Eagle Creek near the town of Cascade Locks. The hatchery is situated 100 feet above sea level and was constructed on U.S. Forest Service (USFS) land in 1959 with funds provided by the federal government (Mitchell Act). The hatchery is operated under the CRFDP. A USFS special use permit allows use of hatchery grounds by the state. The hatchery is staffed with 6.5 FTE's.

Coho salmon was the only species reared during the study period. Fish production during the 3 years evaluated was not credited as smolt releases but as transfers to other stations. Fish were transferred from Cascade to other stations 4 to 6 weeks prior to release and were credited to the receiving stations as smolts released. Chronic CWD is a problem.

The facilities are in fair to poor condition and consist of 30 raceways, 1 adult pond, and 40 troughs. Adult coho and fall chinook salmon are collected. If adult fall chinook are required for spawning they are transferred to Bonneville Hatchery. Adult coho salmon are transferred in from Bonneville Hatchery and spawned along with the swim ins.

Water is supplied from Eagle Creek with a total water right of 20,197 gpm. It is supplied by gravity flow, but an emergency pump can supply around 4,500 gpm. The emergency pump is only used during slush ice periods in the winter. Water use averages about 7,117 gpm. It is believed that the water supply pipe is partially blocked with gravel and is at least a partial cause of reduced amount of water which can be supplied.

The adult holding pond can utilize flow through or re-use water from raceways. Water can be re-used in raceways by a recirculation pump with a capacity of 4,500 gpm but is used only in very dry years.

Current Production Constraints

Existing fish production is constrained by limited amount of water which can be supplied to raceways. The water supply pipe from creek intake to hatchery appears to be partially blocked, probably with rock/gravel. The pipeline can only deliver a maximum of 10,600 gpm but has a design capacity of 18,000 gpm. If additional water were supplied production may be able to be increased.

Eagle Creek gets very cold during the winter months and slows development of eggs and fish. The creek intake can ice up restricting the water supply. Slush ice can be delivered to raceways where it displaces water in the raceways and can cause severe fish losses. Nearly the entire fish production on station has been lost in the past due to slush ice. Fish losses should be expected in the future from slush ice unless a source of warm water is found that can be used to temper the current supply. The warm water would only be needed during the relatively short time periods that freeze up is occurring.

The adult holding pond is an unusual shape and there is no easy way to separate adult fish. This can stress adult fish causing mortality.

Water supply headbox in the incubation room is not high enough to switch from troughs to vertical incubators for egg incubation. Construction of a new head box and installation of a pump system could supply water to permit utilization of vertical incubators. This would allow expansion of egg incubation capacity.

Theoretical Production

Theoretical production based on the flow method is 72,172 pounds and based on density is 161,460 pounds. Average production was 115,160 pounds and the 1987 agency production goal was 113,333 pounds. Theoretical calculations are based on coho 15 fish per pound and are computed as follows:

Flow Method				
raceways	1.29 X	9,730 gpm X	5.75"	= 72,172 lbs
Density Method				
raceways	.3 X	93,600 cu ft X	5.75"	= 161,460 lbs

Comparison of the 2 theoretical calculations indicates that flow is the limiting factor in production. Average production is greater than the theoretical production based on flow, but agency has not experienced any problems.

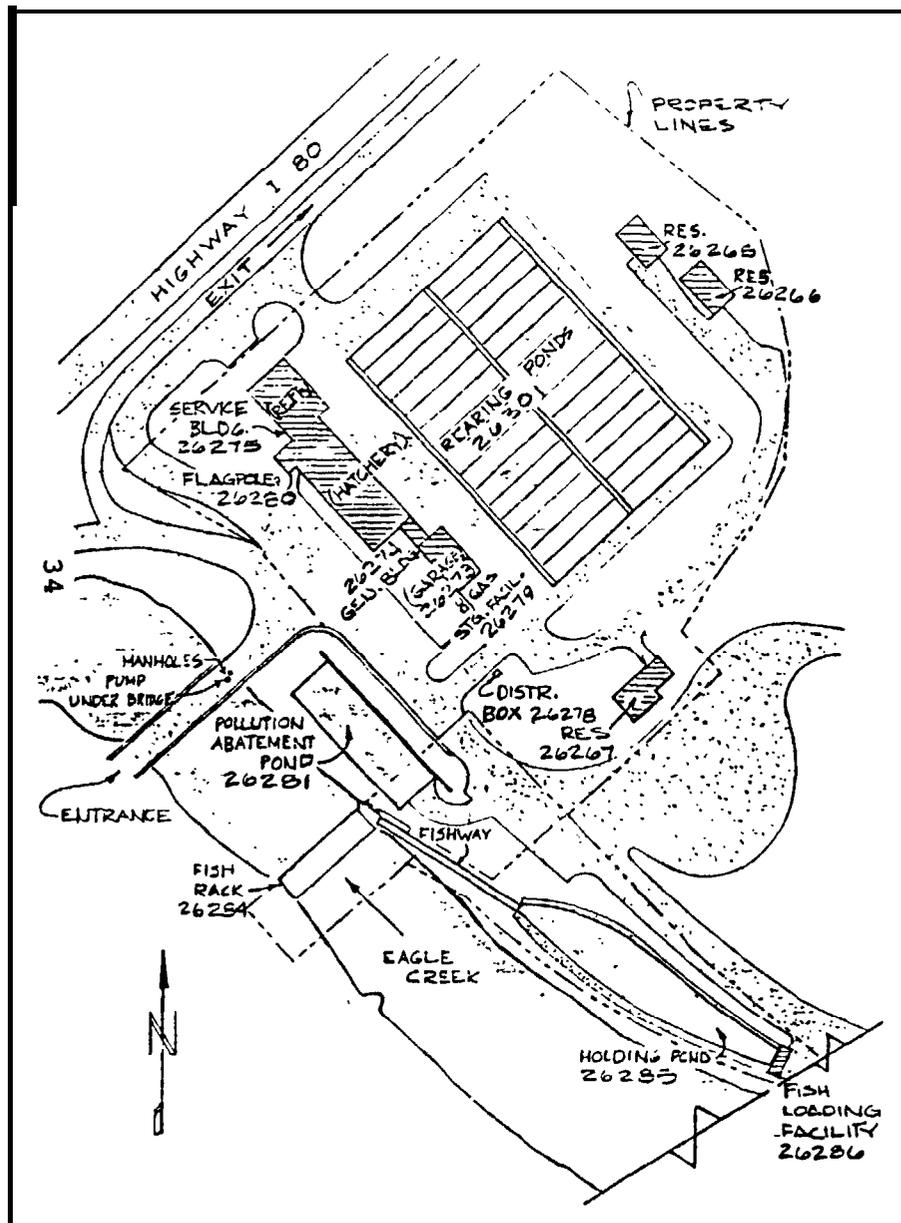
Hatchery Expansion Capability

The hatchery is situated on 3.5 acres owned by the USFS. Approximately all of the area is being utilized. The topography of adjoining land is not suitable for expansion. There is no space for construction of additional ponds. Additional water from Eagle Creek is available during spring months when fish loads are heaviest, but the current supply pipe can not deliver it. The

potential for well water is unknown.

Reconstruction of the water supply line could provide additional water during spring months when present loadings are greatest. Installation of an oxygen supplementation system for use during low summer flow periods would be needed to allow holding any increase in production over current levels. Oxygen supplementation has possibilities, but until research is completed the potential if any is not known. Any increase in production would be accomplished utilizing present facilities.

No expansion capability is currently identified. If oxygen supplementation is proven effective then there may be potential for expanding production in the future.

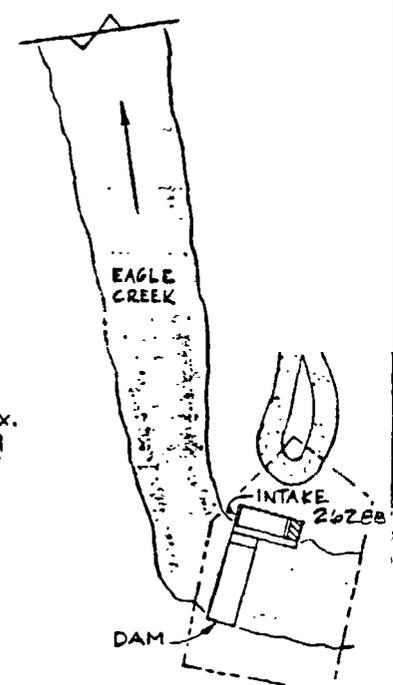


11,500 GAL. WATER STORAGE TANK 26289



SPRING

NOTE: INTAKE IS APPROX. 2900' UPSTREAM FROM HATCHERY



- NOTES:
- 26276 SEPTIC TANK / DRAINS
 - 26277 FENCE, WOOD
 - 26282 FENCE (POLL. ABATE)
 - 26283 CONTROL BOX B
 - 26287 PIPELINE
 - 26290 WATER SYSTEM (PUMP / HEATER)
 - 26291 PAVING / ROADWAY
 - 26292 CURBS, WALKS, RET. WALL
 - 26293 FENCE, LINK
 - 26294 POND SCREEN S
 - 26295 SAFETY REG'D. MAT.
 - 26300 LAND, USFS PERMIT

CASCADE		HATCHERY	
DRAWN	M. KALLAS	DATE	FEB. 1980
SCALE	1" = 100'	SHEET	PAGE

Clackamas Hatchery
24500 S. Entrance Rd.
Estacada, Or. 97023

Funding Agency: NMFS, ODFW, PGE,
City of Portland

Manager: George Nandor
Phone #: (503) 630-7210

Species Reared: Spring Chinook
Winter Steelhead

Introduction

Clackamas Hatchery is located 5 miles east of Estacada at Milo McIver State Park on the Clackamas River. The hatchery is situated 313 feet above sea level. The facility was constructed and began operation in 1979. It was enlarged in 1986 by the City of Portland as mitigation for dams on tributaries to the Sandy River. The hatchery is operated with 4.5 FTE's.

The rearing units are in good condition and consist of 3 rearing ponds, 10 raceways, and 2 adult holding ponds. The adult holding ponds are not used to rear juveniles.

Adult spring chinook and summer steelhead are captured although only spring chinook are spawned. Winter steelhead fingerlings are usually received from Eagle Creek NFH and reared in the raceways. Spring chinook eggs are transferred to Oxbow and Marion Forks Hatcheries for incubation and early rearing and then transferred back for rearing in the large ponds. Most of the smolt production is released on station.

Disease problems cover a wide spectrum including IHN, Ich, Columnaris, Enteric Redmouth Disease (ERM), CWD, Costia, Trichodina, and Furunculosis.

Water rights total 44,354 gpm from the Clackamas River and a well. Water is supplied from each source, both requiring pumping. The Clackamas River supplies the majority of water used. All ponds/raceways are supplied with single pass water. The Clackamas River pumps originally supplied about 20,000 gpm but had declined to about 15,000 gpm during this evaluation period. Pumps have been repaired/rebuilt since then to increase water supply.

Current Production Constraints

Water supplied from pumps on the Clackamas River has slowly dwindled from 20,000 gpm to 15,000 gpm. Pumps have been repaired/rebuilt recently and should increase flow to hatchery.

High water temperature and plankton blooms are periodic problems in the summer. The city of Estacada sewer, discharges into the Clackamas River above the hatchery intake and is a potential problem.

The large rearing ponds draw potential water from raceways. This

limits use of raceways during certain times of the year. Rebuilding pumps to deliver designed water flow (20,000 gpm) may help supply raceways, but probably will not eliminate the problem. Rearing ponds are located farther along the supply line and at a lower elevation so tend to draw water. To supply the raceways, water must be restricted at the rearing pond manifolds. A totally separate supply line to raceways is needed to insure an adequate supply and could potentially increase production by allowing full utilization of raceways.

Funding for operations is received from four sources: ODFW, NMFS, Portland General Electric Company, and City of Portland. Book keeping and management is complicated due to the number of funding sources and the different fiscal years used by the various federal, state, and local entities.

Theoretical Production

Theoretical production based on the flow method is 170,020 pounds and based on the density method is 248,668 pounds. Average production was 120,518 pounds and the 1987 agency goal was 98,890 pounds. Theoretical calculations were computed as follows:

Flow Method

Spring Chinook:	1.61 X 12,000 gpm X 7.18" =	138,718 lbs
Winter Steelhead:	1.67 X 2,400 gpm X 7.81" =	<u>31,302 lbs</u>
		170,020 lbs

Density Method

Spring Chinook:	.25 X 122,000 cu ft X 7.18" =	218,990 lbs
Winter Steelhead:	.25 X 15,200 cu ft X 7.81" =	<u>29,678 lbs</u>
		248,668 lbs

Note: Not all ponds were used in above calculations. There are 3 rearing ponds totaling 202,000 cubic feet and 10 raceways totaling 40,800 cubic feet. Only 2 rearing ponds (for spring chinook) and 3 raceways (for steelhead) were used by the agency in density calculations. There is not enough water to operate all rearing ponds and raceways at one time plus some raceways must be used to hold marked fish. If all facilities are used in density calculations then we obtain a theoretical figure of 442,252 pounds.

Comparison of the 2 theoretical calculations indicates that flow is the limiting factor in production. This is even more apparent if all rearing facilities are used in density calculations. The density index for raceways (.25) was used for calculations involving the large rearing ponds. In reality, a density index laying somewhere between the two (.03 or .25) used in this

evaluation is probably more appropriate for these ponds. If the smaller density index (.03) is used in calculations, then the theoretical production for the rearing ponds is 43,510 pounds and with the 10 raceways added gives a total of 123,173 pounds.

Production probably can not be increased to the theoretical flow poundage because of the water distribution problem described above. If this problem was solved production could be increased.

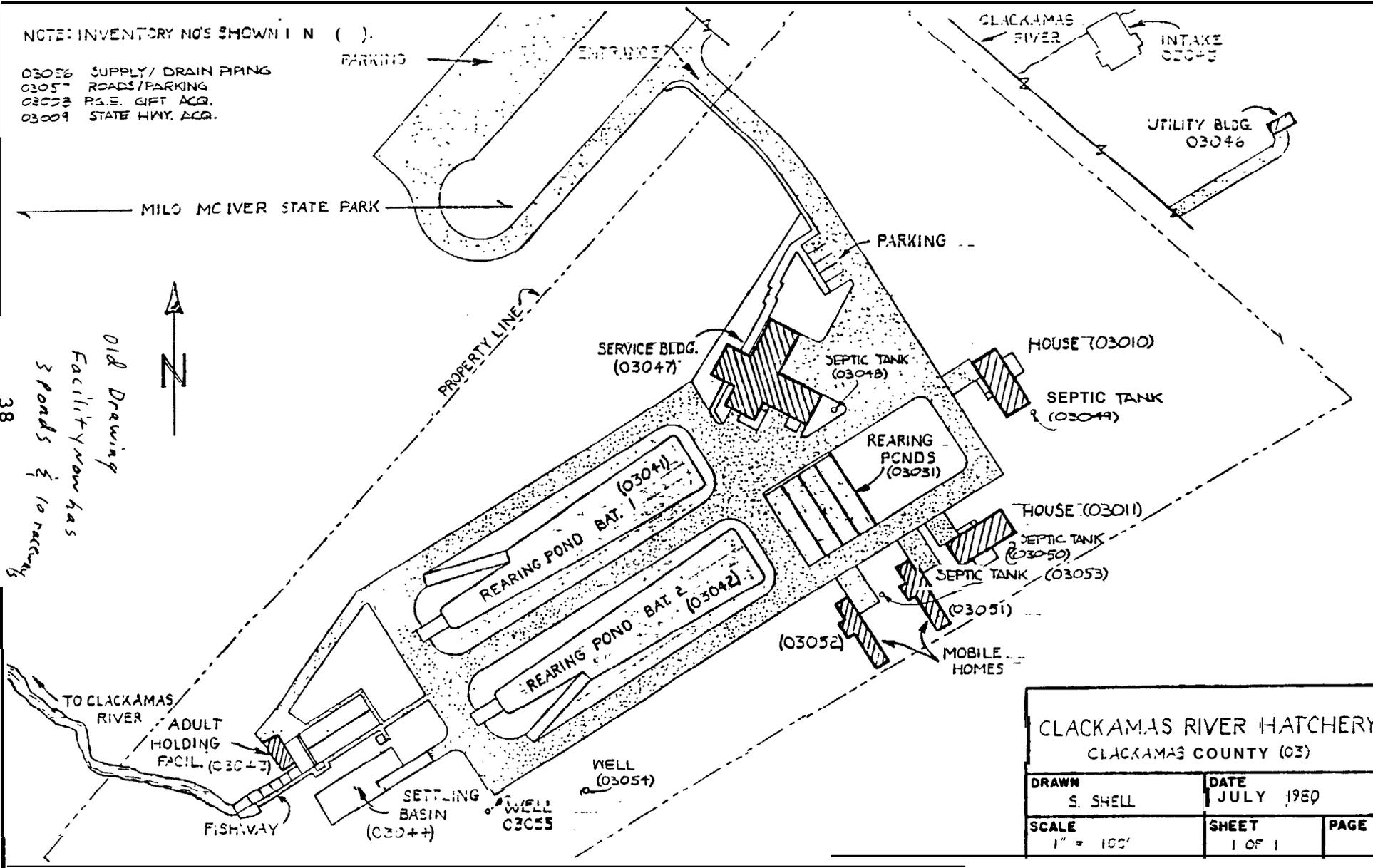
Hatchery Expansion Capability

The hatchery grounds cover 17 acres owned by ODFW. Approximately 60 percent of the area is currently being utilized. There is room for expansion and water should be available from the Clackamas River. The potential for water from wells is unknown but the existing well supplies only about 200 gpm.

Space is available to add one additional asphalt rearing pond of 80' X 200'. An additional water right would be required, but water is available from the Clackamas River. A new pump and delivery system capable of supplying 6,000 gpm would be required. Also, additional incubation and starter ponds would be required. Production from this pond is estimated to be 350,000 spring chinook weighing 40,000 pounds.

NOTE: INVENTORY NO'S SHOWN IN ().

- 03036 SUPPLY/ DRAIN PIPING
- 03057 ROADS/PARKING
- 03028 P.S.E. GIFT ACQ.
- 03009 STATE HWY. ACQ.



MILG MCIVER STATE PARK



Old Drawing
 Facility year has
 3 ponds & 10 rearing
 38

CLACKAMAS RIVER HATCHERY CLACKAMAS COUNTY (03)		
DRAWN S. SHELL	DATE JULY 1980	
SCALE 1" = 100'	SHEET 1 OF 1	PAGE

Gnat Creek
Rt. 2, Box 2198
Clatskanie, OR. 97016

Funding Agency: NMFS
Species Reared: Summer Steelhead
Winter Steelhead

Manager: Mel Kelly
Phone #: (503) 455-2234

Introduction

Gnat Creek is located in the lower Columbia River Basin below Bonneville Dam along Gnat Creek approximately 17 miles east of Astoria. Facility elevation is about 90 feet above sea level. The hatchery was constructed and began operation in 1960 under the CRFDP. It is operated with 4.5 FTE's per year. Trojan Rearing Pond is operated as a satellite facility with the same personnel.

There are 15 raceways each with 6,400 cubic feet of rearing space which are in in fair to-poor condition.

Adults are not collected nor are eggs taken at this facility. Eggs and/or fingerlings are transferred in from South Santiam Hatchery (summer steelhead) and Big Creek Hatchery (winter steelhead). When required, staff from Gnat Creek assist Big Creek Hatchery personnel in spawning operations. Winter steelhead production was approximately 67 percent of total for the study period. Smolts are all released off-station.

Water rights total 21,643 gpm from Gnat Creek, Unnamed Stream, and a well. Water is delivered by gravity flow to the hatchery from Gnat Creek and ranges from a high of 15,700 gpm to a low of 1,200 gpm. Well water is used for domestic purposes and the unnamed stream is not currently being used for fish culture. Installation of a separate pump and supply system would allow approximately 50 gpm to be delivered from the unnamed stream during the summer low flow period when additional water is needed.

During the summer/fall low flow period, raceway water is recirculated. The pumps have a capacity to recirculate 1,200 gpm which allows water to be used twice before discharge. Fish production during this period is restricted due to the low flows.

Current Production Constraints

Existing smolt production is in balance with the available rearing space.

The most critical constraint is the lack of summer/fall flows. Production on station at this time is forced into 6 raceways (4 for winters and 2 for summer steelhead) even when water is being recirculated. Fish are being overcrowded and it would be preferable to spread them out over additional raceways to reduce stress.

Some raceways need patching although water is not being lost.

Theoretical Production

Theoretical production based on flow is 32,455 pounds and based on density is 145,012 pounds. Average production was 129,713 pounds and agency goal 129,000 pounds. Theoretical calculations were computed as follows:

Flow Method *

Summer Steelhead:	1.45 X 200 gpm	5.58" X 2 ponds	=	3,236 lbs
Winter Steelhead:	1.45 X 200 gpm	5.45" X 4 ponds	=	<u>6,322 lbs</u>
				9,558 lbs

Density Method **

Summer Steelhead:	.25 X 6,400 cu ft	X 6.29" X 2 pds	=	20,128 lbs
Winter Steelhead:	.25 X 6,400 cu ft	X 6.08" X 4 pds	=	<u>38,912 lbs</u>
				59,040 lbs

* Note: Flow calculations were computed for the month of September when production is constrained by available water. Numbers of fish the above poundages represent include 55,733 summer steelhead and 106,504 winter steelhead. By projecting release at 5 fish per pound the following spring, it is estimated that 32,455 pounds of smolts could potentially be produced. This number has been used to evaluate this facility.

** Note: Density calculations were computed for the month of November when space is constraining production. The above poundages represent 231,124 summer steelhead and 493,940 winter steelhead. By projecting release at 5 fish per pound the following spring, it is estimated that 145,012 pounds of smolts could potentially be produced. This number has been used to evaluate this facility.

Comparison of the 2 theoretical calculations indicates that flow is the limiting factor in production. All comparisons and numbers used are the projected smolt release poundages. The facility has low water supplies in early fall. Water is recirculated at this time and carrying capacity (according to Piper) is exceeded four fold. This may be causing stress and reduced growth rate in juveniles.

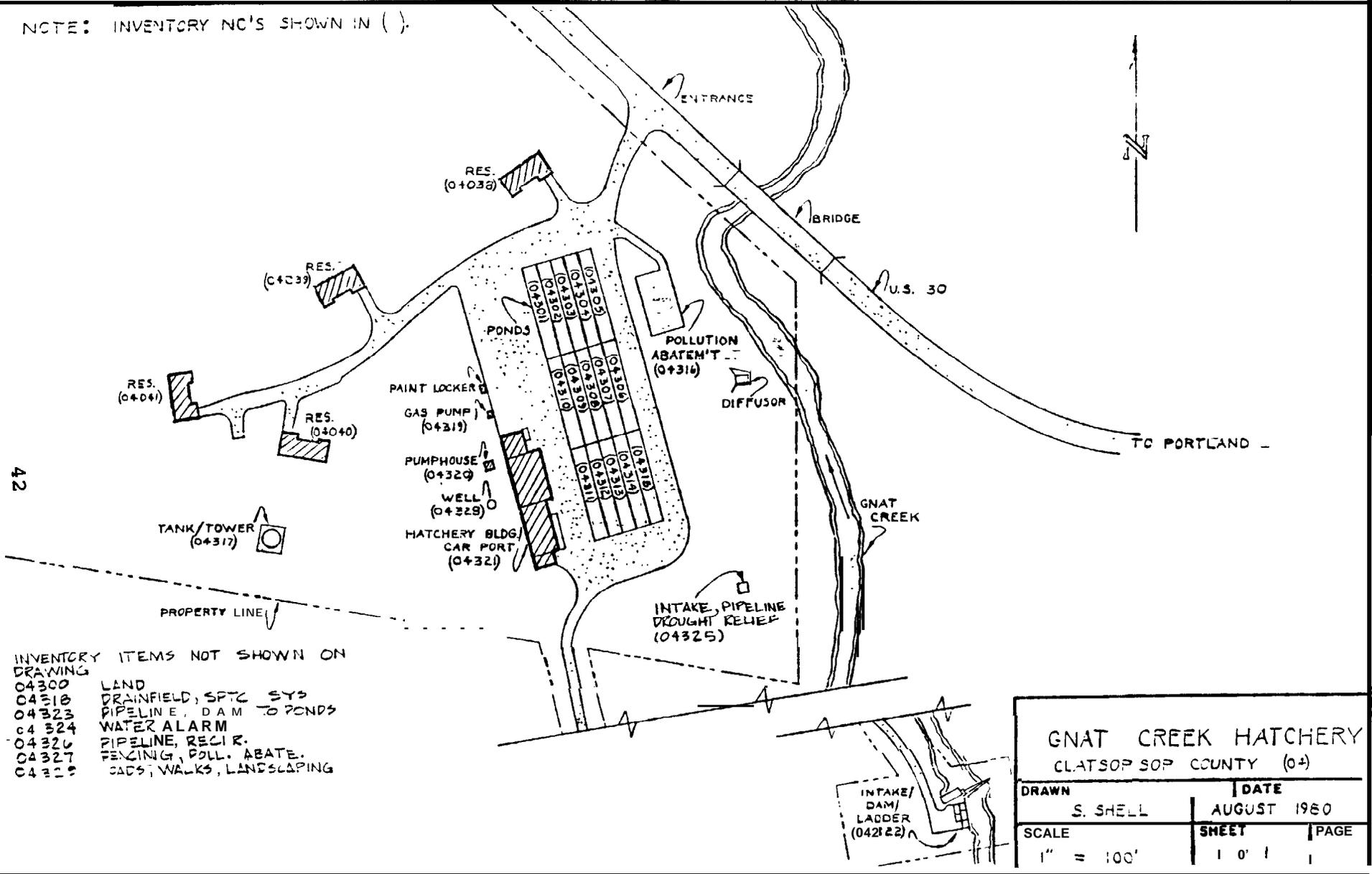
Hatchery Expansion Capability

Hatchery grounds cover 17 acres and is owned by ODFW. Approximately 90 percent of the area is being utilized. Little room is available for additional production facilities. Summer low flows in Gnat Creek preclude adding any additional production facilities at this time. As the watershed recovers from extensive logging the summer flows may increase. The potential for well water is unknown.

Repair of existing raceways and installation of an oxygen supplementation system for use during low flow summer/fall months would potentially permit production of better quality smolts. This would not allow an increase in production, but may increase adult survival by releasing healthier smolts.

No expansion capability is identified.

NOTE: INVENTORY NO'S SHOWN IN ().



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- INVENTORY ITEMS NOT SHOWN ON DRAWING
- 04300 LAND
 - 04310 DRAINFIELD, SPTC SYS
 - 04323 PIPELINE, DAM TO PONDS
 - 04324 WATER ALARM
 - 04326 PIPELINE, REG. R.
 - 04327 FENCING, POLL. ABATE.
 - 04328 CDS, WALKS, LANDSCAPING

GNAT CREEK HATCHERY		
CLATSOP COUNTY (0+)		
DRAWN	DATE	
S. SHELL	AUGUST 1980	
SCALE	SHEET	PAGE
1" = 100'	101	1

Trojan Rearing Ponds
Gnat Creek Hatchery
Rt. 2, Box 2198
Clatskanie, Or. 97016

Funding Agency: NMFS
Species Reared: Winter Steelhead
Sea-run Cutthroat
Coho

Manager: Mel Kelly
Phone #: (503) 455-2234

Introduction

Trojan Rearing Ponds are operated as a satellite of Gnat Creek Hatchery. The ponds are located at the Trojan Nuclear Power facility approximately 5 miles from Rainier. Elevation of the facility is 23 feet above sea level. Personnel from Gnat Creek operate this facility.

The rearing units consist of 2 gravel ponds which are in fair condition. Each pond is about 40,900 cubic feet.

Neither adult fish nor eggs are collected here. Fish are transferred in from Gnat Creek Hatchery during the winter and smolts are released usually off-site the following spring. Summer water temperatures and disease problems preclude rearing of fish during summer months.

Water is supplied from the Columbia River and temperature into the rearing ponds can be controlled by mixing heated water with raw river water. Heated water is provided by 2 pumps and total capacity of water supply system is 6,912 gpm (15.4 cfs). A maximum of 3,591 gpm was used during the study period. Water quality data listed in Summary Tables is only for the period when fish are present (November through May) and does not include summer months. Single pass water is supplied to each pond.

Current Production Constraints

Water temperatures are too warm during summer months for successfully rearing anadromous fish. Pump repairs at the power plant can limit flow into ponds. Shut down of heat exchanger at the power plant can affect water temperature. Water turbidity is an occasional problem during high flows.

Water being delivered to ponds is a little over 50 percent of listed capacity. Flow patterns in the present gravel ponds produce dead spots that limit circulation and cause disease problems.

A wide variety of diseases are a potential problem with water from the Columbia River.

Vegetation growing in ponds affects rearing potential. This would be corrected by asphaltting ponds.

Theoretical Production

Theoretical production based on the flow method is 37,350 pounds and based on density is 169,935 pounds. Average production was 24,021 pounds and the 1987 agency goal was 20,000 pounds. Theoretical calculations were computed for winter steelhead as follows:

Flow Method

$$1.25 \times 1,800 \text{ gpm} \times 8.3" \times 2 \text{ pds} = 37,350 \text{ lbs}$$

Density Method

$$.25 \times 40,900 \text{ cu ft} \times 8.3" \times 2 \text{ pds} = 169,935 \text{ lbs}$$

Note : There are 2 rearing ponds at Trojan each with 40,900 cubic feet of rearing space. Only 1 pond is used to rear steelhead. The other is used to rear sea run cutthroat trout. The agency goal and average production listed above do not include the sea run cutthroat trout produced from this pond.

If only the one pond used to rear steelhead is used in the theoretical calculations, then the figures listed above should be divided in half.

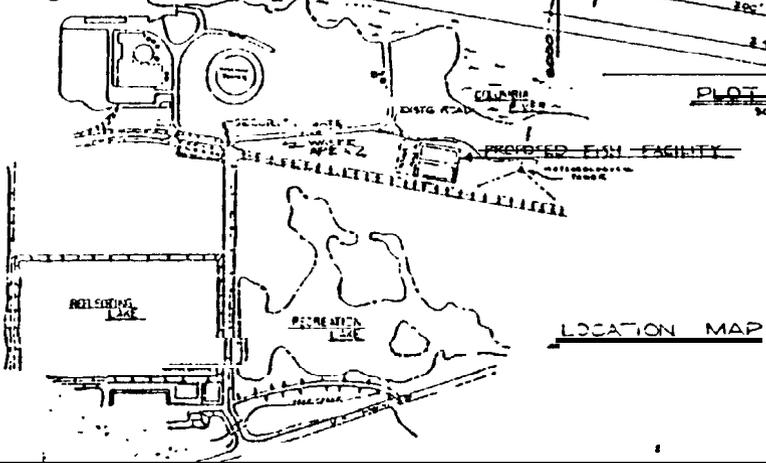
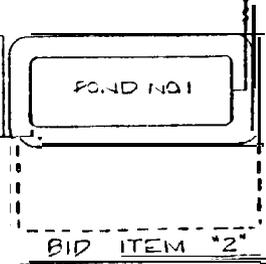
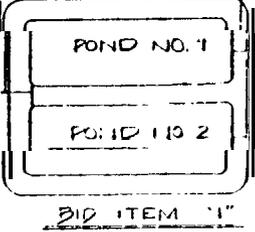
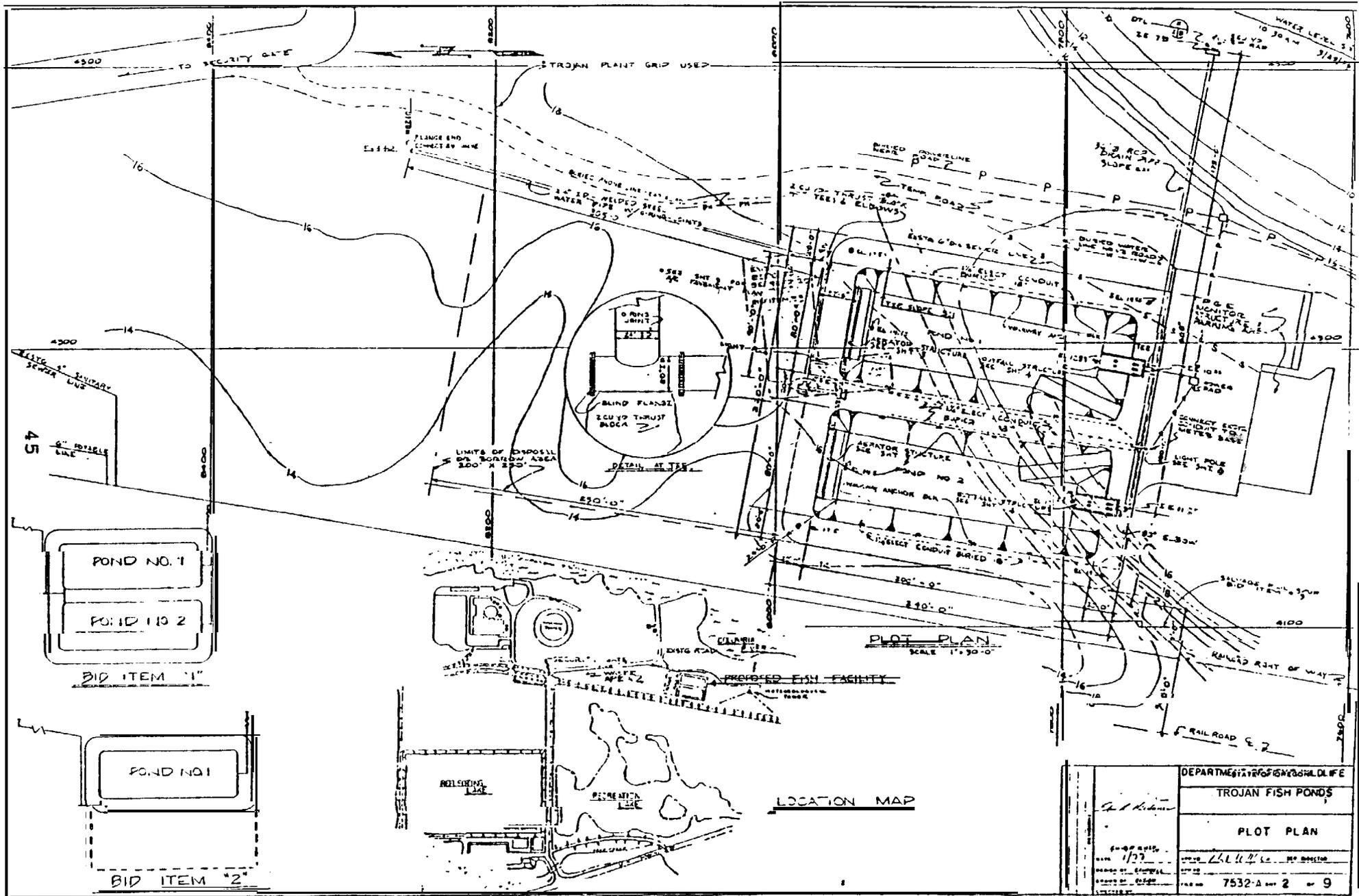
Comparison of the 2 theoretical calculations indicates that flow appears to be the limiting factor in production. This is slightly misleading as this pond is actually a cross between a raceway and large rearing pond. Neither density index fits this facility very well. If a density index of .03 is used then the theoretical calculation yields about 10,200 pounds per pond or 20,400 pounds total and pond space would then appear to be the limiting factor. Production equal to the agency goal requires a density index of approximately .06.

Hatchery Expansion Capability

Rearing ponds are located on Portland General Electric's Trojan Nuclear Power Plant and availability of additional land for expansion is unknown. Additional heated water from Trojan is available. The potential for well water is unknown.

The gravel ponds should be reconstructed to provide four new 40' x 200' concrete ponds. This would improve flow patterns, increase production, reduce disease problems, and ease cleaning. More water is available but would require additional pumps to supply the ponds. Potential production increases have not been quantified.

No expansion is currently identified.



PLOT PLAN
SCALE 1" = 30'-0"

DEPARTMENT OF FISH & WILDLIFE	
TROJAN FISH PONDS	
PLOT PLAN	
DATE 1/27	BY [Signature]
PROJECT NO. 7532-A	SHEET 2 OF 9

Irrigon Hatchery
Rt. 2, Box 149
Irrigon, Or. 97844

Manager: Ray Hill
Phone #: (503) 922-2762

Funding Agency: USFWS

Species Reared: Fall Chinook
Spring Chinook
Summer Steelhead

Introduction

Irrigon Hatchery is located along the Columbia River above John Day Dam near the town of Irrigon. Elevation of the facility is 277 feet above sea level. The hatchery was constructed and began operation in 1984 as part of the Lower Snake River Compensation Program (LSRCP) for mitigation of fish losses by federal hydro-electric dams constructed on the lower Snake River. The facility is staffed with 8 **FTE's**.

There are 32 raceways with 7,500 cubic feet each and 68 circular starting tanks with 68 cubic feet each. Rearing facilities are in excellent condition.

No adult collection occurs here. **Eggs, fry,** or fingerlings are transferred in from other hatcheries. Juveniles are reared and released as smolts or transferred to acclimation sites prior to release.

The hatchery water supply is provided from 2 wells which can deliver a total of approximately 21,000 gpm. Water rights and design capacity is about 25,000 gpm. The 21,000 gpm is available year round with actual low water use occurring in June when only 2,400 gpm is needed. Water flows from an upper series of raceways and is re-used in the lower series prior to discharge.

Current Production Constraints

Raceways supplied with re-use water require reduced rearing density. Enough water to allow single pass in the lower raceways would allow additional fish to be produced.

The lower raceways must be watched carefully to prevent disease outbreaks.

Pump and well capacity is limiting water delivery. As indicated above the 2 wells are 4,000 gpm under designed capacity. Collapsed side tunnels in the wells and sand damage to pumps require periodic maintenance.

Theoretical Production

Theoretical production based on the flow method is 286,113 pounds

and based on density is 553,899 pounds. Average production was 207,548 pounds and the 1987 agency goal was 290,400 pounds. Theoretical calculations were computed as follows:

Flow Method

Summer Steelhead:	1.55 X	600 gpm X	8.3" X	32 ponds =	247,008 lbs
Spring Chinook:	1.55 X	600 gpm X	5.11" X	pond =	4,752 lbs
Fall Chinook:	1.50 X	600 gpm X	3.47" X	11 ponds =	<u>34,353 lbs</u>
					286,113 lbs

Density Method

Summer Steelhead:	.25 X	7,000 cu ft X	8.3' X	32 pds =	lbs
Spring Chinook:	.25 X	7,000 cu ft X	5.11' X	pd =	468,900 lbs
Fall Chinook:	.3 X	7,000 cu ft X	3.47' X	11 pds =	<u>80,157 lbs</u>
					553,899 lbs

Note : Ponds used to calculate spring chinook and fall chinook are used twice in calculations. There are only a total of 32 raceways at this facility. The agency transfers out summer steelhead early in the spring to acclimation sites which allows double cropping of other species from the same raceways. Raceways supplied with re-use water would normally have reduced rearing densities.

comparison of the 2 theoretical calculations indicates that flow is probably the limiting factor in production. The hatchery first began operation in 1984 and production has increased each year since then. During the 3 years of this evaluation, pounds produced in 1985, 1986, 1987 were 82,119, 142,124, and 372,721 pounds respectively. With the increasing production the average listed above is not representative of what this facility is currently capable of producing. The pounds 1987 agency goal is probably a greater poundage than what can be held on station at any one time.

Hatchery Expansion Capability

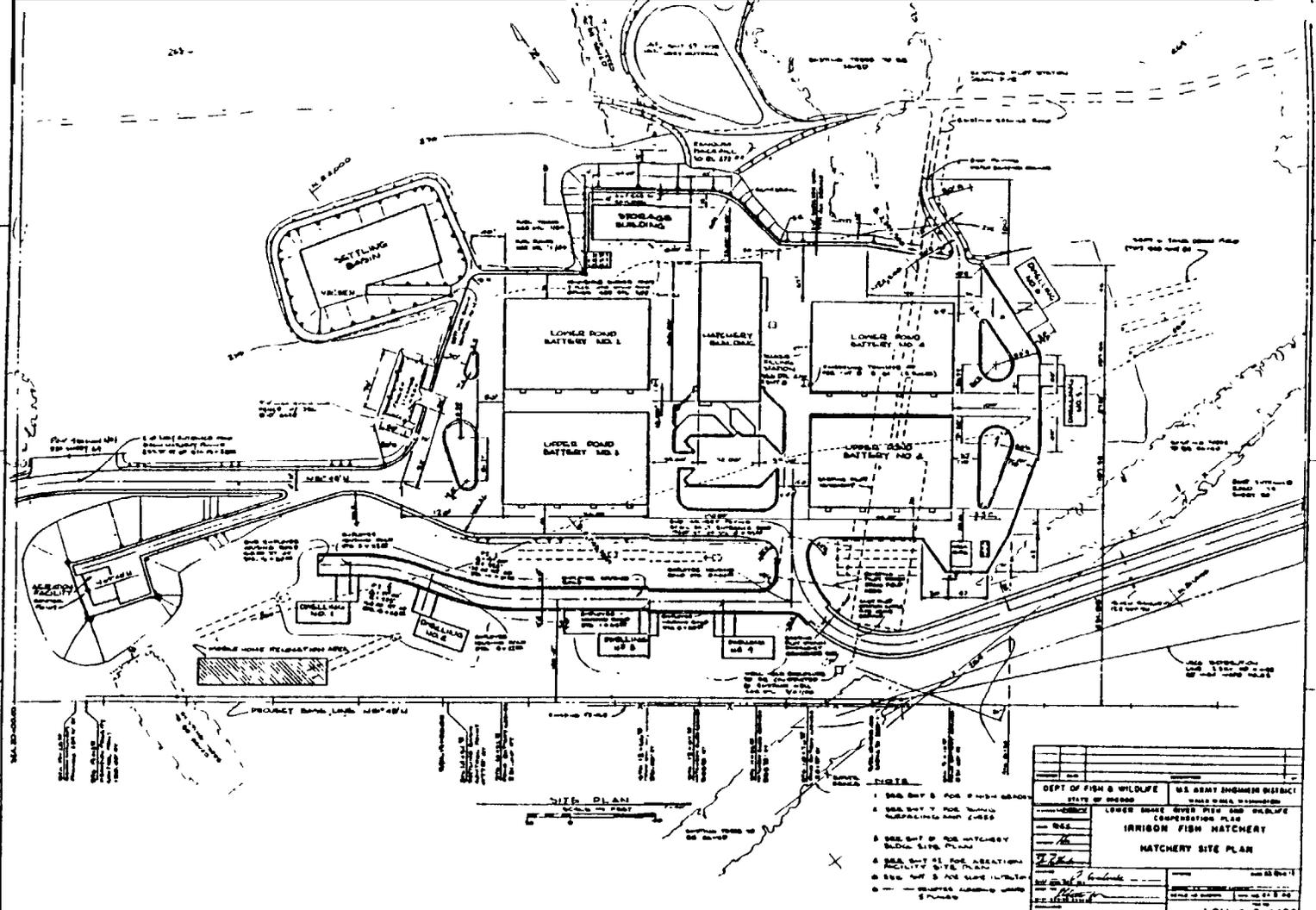
The hatchery is situated on 33 acres of land owned by the COE. Approximately 90% of the area is being utilized. There is no room for expansion on existing hatchery land. The availability of adjacent land is unknown. No surface water is available but additional well water is available. The Umatilla Hatchery is to be constructed next to this facility. Wells are to be drilled for that facility and may require utilization of all available well water in the area.

By scheduling species for short term rearing, additional production could be produced utilizing existing pond space and water. If the Umatilla Hatchery does not require all available well water, then production could be increased by supplying more water to existing ponds. This would require additional wells, pumps, and an oxygen supplementation system. Because the effectiveness of an oxygen

supplementation system and the amount of additional well water is not known, potential production increases can not be quantified.

No expansion capability is identified at this time. If oxygen supplementation is proven effective and/or additional well water becomes available then this facility could have potential to increase production.

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VALUE ENGINEERING PAYS

- 1. SEE SET OF FOR PUMP HOUSE
- 2. SEE SET OF FOR TRUCK REPAIR SHOP
- 3. SEE SET OF FOR HATCHERY BUILDING
- 4. SEE SET OF FOR CREATION FACILITY SITE PLAN
- 5. SEE SET OF FOR GROUND IMPROVEMENT
- 6. SEE SET OF FOR GROUND IMPROVEMENT

DEPT OF FISH & WILDLIFE		U.S. ARMY ENGINEER DISTRICT	
CITY OF IRRIGON		WASCO AREA DISTRICT	
LOWER ROAD GIVER FISH AND WILDLIFE COOPERATION PLAN		IRRIGON FISH HATCHERY	
HATCHERY SITE PLAN			
DATE: 1/15/69	BY: J. H. BROWN	SCALE: AS SHOWN	NO. 1384-1
APP. AUTHORITY: J. H. BROWN	DATE OF REVIEW: JAN 15 1969	NO. OF SHEETS: 1	OF 1
PROJECT NO. 1384-1-0-1/69		FORM 4 LSH-1-0-1/69	

Klaskanine Hatchery
Route 1, Box 764
Astoria, Or. 97103
Manager: Alan Meyer
Phone #: (503) 325-3653

Funding Agency: NMFS
Species Reared: Fall Chinook
Coho
Winter Steelhead

Introduction

Klaskanine Hatchery is located along the North Fork Klaskanine River approximately 12 miles southeast of Astoria. Elevation of the hatchery is about 25 feet above sea level. It was first operated in 1911 by the state of Oregon. In 1959 the hatchery was enlarged and renovated under the CRFDP (Mitchell Act). The facility is staffed with 4.75 FTE's.

Rearing facilities are in good condition and consist of 16 raceways of 4,800 cubic feet each, one raceway of 6,000 cubic feet, and 1 asphalt rearing pond of 210,000 cubic feet. There are also 19 troughs located inside the hatchery building which are in poor condition.

Adults of all species reared are collected, spawned, and reared. Few adult fall chinook are collected because of low flows in the river at the time they return. Eggs and/or fry are routinely received from Big Creek, Cascade, and Sandy Hatcheries. Most of the smolt production is released at the station.

Water is supplied by gravity flow and from 3 **intakes located on the** North Fork Klaskanine and Little North Fork Rivers. The current water right is for 22,442 gpm (50 cfs) although the maximum water usage is 11,000 gpm. Summer/fall flow is limiting and the hatchery utilizes the entire flow available from the river during this period (about 1,000 gpm). The water delivery system limits the amount of water which can be supplied during high flows.

Water is re-used in raceways from the large rearing pond during low flow periods. Recirculation pumps also are used in the large rearing pond during this period.

Current Production Constraints

Water turbidity is sometimes a problem. Turbidity will remain a problem and may get worse as logging continues in the watershed.

Summer low flows are an annual problem and have been contributing factors of fish losses in the past. Low flow also forces over crowding and limits production potential.

The pipeline from river intakes to rearing facilities limit the amount of water that can be used except during low flows. Currently only about 50 percent of the water right can be utilized.

A larger pipeline to allow additional water usage is desirable.

Theoretical Production

Theoretical production based on the flow method is 60,925 pounds and based on density is 105,781 pounds. Average production was 212,855 pounds and the 1987 agency goal was 161,333 pounds.

Theoretical calculations were computed as follows:

Flow Method

Coho:	1.55 X 2,300 gpm X 5.75"	=	20,499 lbs
Fall Chinook:	1.41 X 4,500 gpm X 3.33"	=	21,129 lbs
Winter Steelhead:	1.55 X 1,500 gpm X 8.3"	=	<u>19,297 lbs</u>
			60,925 lbs

Density Method *

Coho:	.03 X 200,520 cu ft X 5.75"	=	34,590 lbs
Fall Chinook:	.3 X 58,800 cu ft X 3.33"	=	58,741 lbs
Winter Steelhead:	.25 X 6,000 cu ft X 8.3"	=	<u>12,450 lbs</u>
			105,781 lbs

* Note: Coho were calculated using slightly different volume than provided in data table (210,000 cubic feet). This is due to rounding as the pond has sloped sides.

Fall chinook were calculated using 11 raceways of 4,800 cubic feet each and the 6,000 cubic foot raceway.

Winter steelhead were calculated using the 6,000 cubic foot raceway.

Only 11 of the 16 4,800 cubic foot raceways were used in calculations. This is because there are 2 brood years of coho and steelhead being held on station and the fingerlings take up pond space.

Comparison of the two theoretical calculations indicates that flow is probably the limiting factor in production. Average production listed above is more than can be held on station at any one time. During this evaluation, coho presmolts were transferred in from other hatcheries after Klaskanine smolts were released. These coho, reared for about 6 weeks were credited to Klaskanine Hatchery. The result is that coho releases for two out of the three years are double what can be carried on station at any one time.

The agency production goal is higher than either of the theoretical models used. Most of the increase in production over the theoretical capacity is occurring in the large rearing pond producing coho. This asphalt pond allows densities greater than

the .03 density index used in the theoretical calculation but will not support a density index of .25. Production in excess of 100,000 pounds have been held in this pond which gives a density index of about .09. Large rearing ponds vary greatly in ability to produce fish based on pond shape, flow patterns, vegetation growth, and construction material.

Hatchery Expansion Capability

The hatchery is situated on 15 acres of land owned by the ODFW. Approximately 50 percent of the area is being utilized. The topography of the remaining land is unsuitable for fish culture. Summer low flows will not permit hatchery expansion. There is no potential for well water. Well water is partly saline this close to ocean.

Installation of an oxygen supplementation system for use during low flow periods would permit better utilization of existing ponds, reduce disease problems, reduce stress, and increase survival of smolts. This would not allow an increase in juvenile production.

No expansion capability is identified.

Leaburg Hatchery
90700 Fish Hatchery Rd.
Leaburg, OR. 97489

Funding Agency: COE
Species Reared: Summer Steelhead
Spring Chinook

Manager: John Hoskins
Phone #: (503) 896-3294

Introduction

Leaburg Hatchery is located approximately 23 miles east of Springfield along the McKenzie River (Willamette Basin). The facility is 740 feet above sea level. This is a mitigation hatchery for fish habitat lost from dams in the Willamette Basin. A total of 7.8 FTE's are used to operate this facility.

There are 39 concrete raceways of 7,320 cubic feet each, 3 concrete raceways of 3,660 cubic feet, 6 circular ponds (used for display only and not used for production), 20 aluminum troughs used for incubation, and 4 Canadian troughs used as starting tanks. Two of the raceways are used for adult capture and holding. Only 4 raceways are used to rear anadromous fish with the remaining facilities utilized for the resident fish program. Only the anadromous fish production is summarized in this evaluation.

The only anadromous fish produced at this hatchery is summer steelhead. Resident fish make up the majority of fish produced. A small number of spring chinook were transferred in, reared a short time, and then transferred out during the years evaluated. McKenzie stock summer steelhead are reared and all production is released off-site.

The water rights total 44,883 gpm (100 cfs). This water is available year round from the McKenzie River. Water use varies with need throughout the year and is delivered by gravity except for a small amount of warmer water supplied by pumping for incubation. This warmer water totals about 140 gpm from the McKenzie River which is heated utilizing an electric water heater. All rearing facilities use single pass water.

Current Production Constraints

This hatchery has limited its production of anadromous fish to meeting mitigation requirements. The majority of the rearing facilities are utilized to fulfill a resident fish mitigation requirement.

A production raceway is used to capture adult steelhead and a second raceway is used to hold them until spawning. These 2 raceways are used to hold adults up to 9 months per year.

Water right and current production (resident and anadromous fish) are in balance. Low head limits water supply to incubation and

starting troughs and trough space limits number of eggs which can be held at any one time.

This facility is owned by the COE any changes in production will need to be negotiated.

Theoretical Production

Theoretical production based on the flow method is 54,054 pounds and for density is 61,653 pounds. These poundages were calculated only for the 4 raceways (out of 42 total on station) used to rear steelhead. The average production was 32,147 pounds and the 1987 agency goal was 24,000 pounds. Theoretical calculations were computed for steelhead as follows:

Flow Method

4 raceways: 1.53 X 4,272 gpm X 8.27" = 54,054 lbs

Density Method:

4 raceways: .25 X 29,820 cu ft X 8.27" = 61,653 lbs

Note : The above calculations were computed only for the 4 raceways currently rearing steelhead. There are 42 raceways which have 296,460 cubic feet of rearing space with 44,883 gpm water supply. If we assume all raceways were producing steelhead, the theoretical flow production would be 567,909 pounds and the density calculation would total 612,931 pounds.

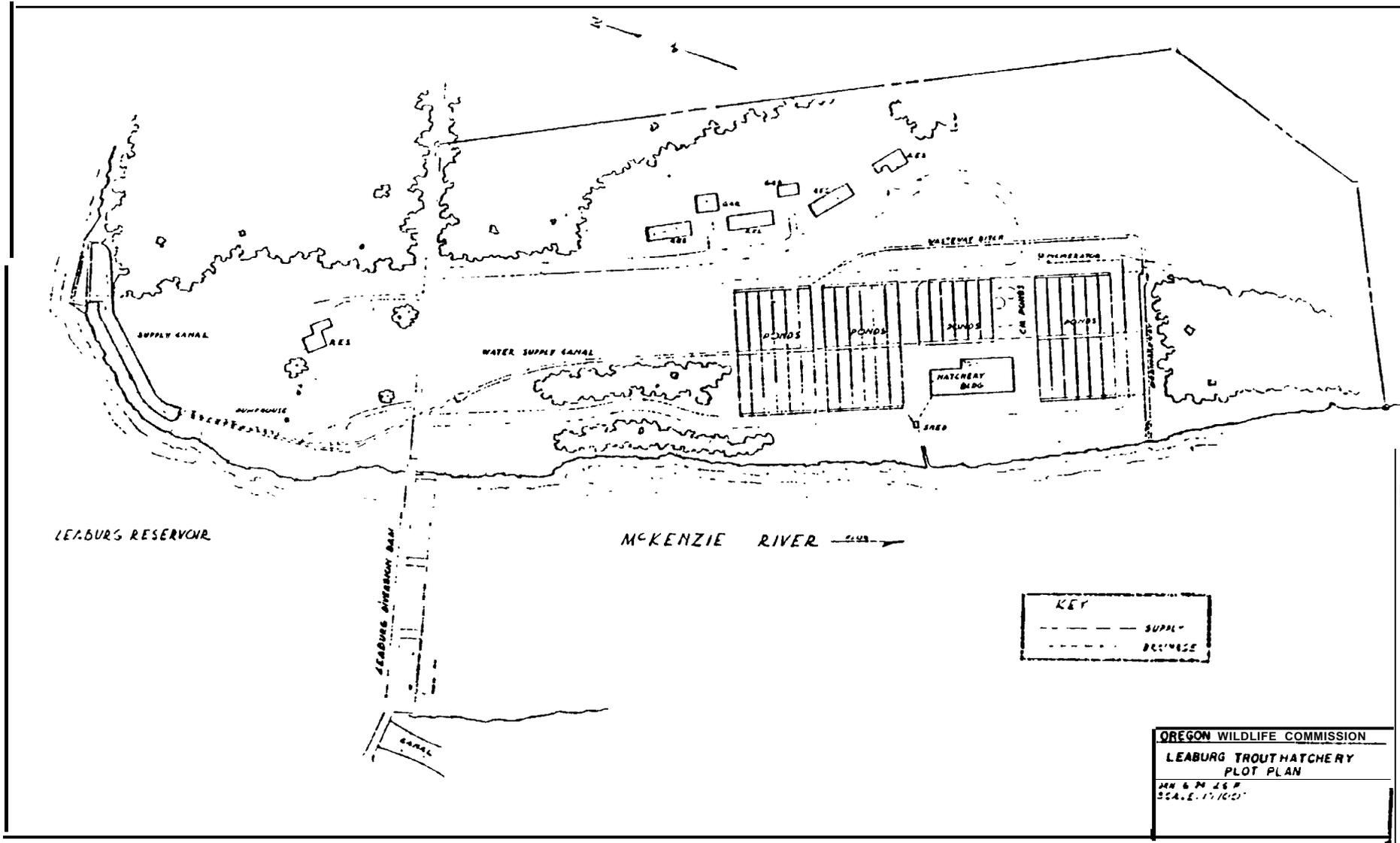
Comparison of the 2 theoretical calculations indicates that flow should be the limiting factor in production. Anadromous fish production has been restricted to meeting mitigation requirements. Average production is far less than either theoretical calculation as is the agency goal, but the agency indicates that the 4 raceways are currently being utilized to capacity.

Hatchery Expansion Capability

The hatchery is situated on 10 acres of land owned by the COE. Approximately 90 percent of the land is being utilized. The remaining area is unsuitable for expansion. An additional 21.5 acres of land owned by the COE is adjacent to the hatchery. It is unknown if the COE would allow hatchery expansion on this property. Additional water from the McKenzie River should be available. The potential for water from wells is unknown.

Hatchery expansion is possible only on the adjacent COE land. Six new ponds each 30' X 300' could be constructed on this site. Each

pond would need to be supplied with 898 gpm (2 cfs) of water which should be available from the McKenzie River. Additional incubation and starter capacity would also be required to handle the increased production. The new ponds should be able to produce 300,000 summer steelhead smolts weighing 60,000 pounds.



OREGON WILDLIFE COMMISSION
 LEABURG TROUT HATCHERY
 PLOT PLAN
 JAN 6 24 46 P
 SCALE 1" = 100'

Lookingglass Hatchery
76657 Lookingglass Rd.
Elgin, Or. 97827

Funding Agency: USFWS
Species Reared: Spring Chinook

Manager: Scott Lusted
Phone #: (503) 437-9723

Introduction

Lookingglass Hatchery is located along Lookingglass Creek, a Grande Ronde River tributary approximately 2 miles from Palmer Junction in northeast Oregon. The hatchery was constructed in 1982 by the COE as part of the LSRCP for federal dams constructed on the lower Snake River. The Imnaha Acclimation Pond is operated as a satellite facility. The hatchery is operated with 5.8 FTE's.

Rearing facilities are in excellent condition and include 18 raceways, 2 adult holding ponds (not used for rearing), and 32 Canadian starting troughs.

Spring chinook are raised here. Eggs are collected from adults returning to the hatchery and from adults collected at the Imnaha Acclimation Facility. Eggs have also been imported from Idaho, Carson NFH, and other Oregon hatcheries. Yearling smolts are released on-site, into the Grande Ronde River, and at the Imnaha satellite facility.

Water Rights total 38,782 gpm from Lookingglass Creek and wells. Water rights for Lookingglass Creek include 22,442 gpm for fish propagation and an additional 13,464 gpm for operation of a fishway constructed prior to the hatchery (located at hatchery intake). Flow equal to the water right is available year round in the creek, but is not needed at all times. Freezing of the intake and water supply is a problem during the winter. Well water is used to temper creek water and prevent raceways from filling with slush ice.

Water rights for the wells total 2,875 gpm and are used to temper creek water in the winter and for incubation/early rearing. Recent tests suggest that an additional 4,000 gpm well water may be available at this site.

All water used is single pass through the raceways.

Current Production Constraints

Production is limited by rearing space. The existing water supply could produce additional pounds if rearing space was available.

Ice at Lookingglass Creek intake threatens the water supply during cold periods in the winter. The recharge time for tempering well number 1 limits its use.

cold water temperatures limit fish growth in winter and early spring.

Theoretical Production

Theoretical production based on the flow method is 98,010 pounds and based on density is 74,250 pounds. Average production was 96,080 pounds and the 1987 agency goal was 90,110 pounds. Theoretical calculations were computed for spring chinook as follows:

Flow Method

$$1.65 \times 600 \text{ gpm} \times 5.5' \times 18 \text{ ponds} = 98,010 \text{ lbs}$$

Density Method

$$.25 \times 3,000 \text{ cu ft} \times 5.5' \times 18 \text{ ponds} = 74,250 \text{ lbs}$$

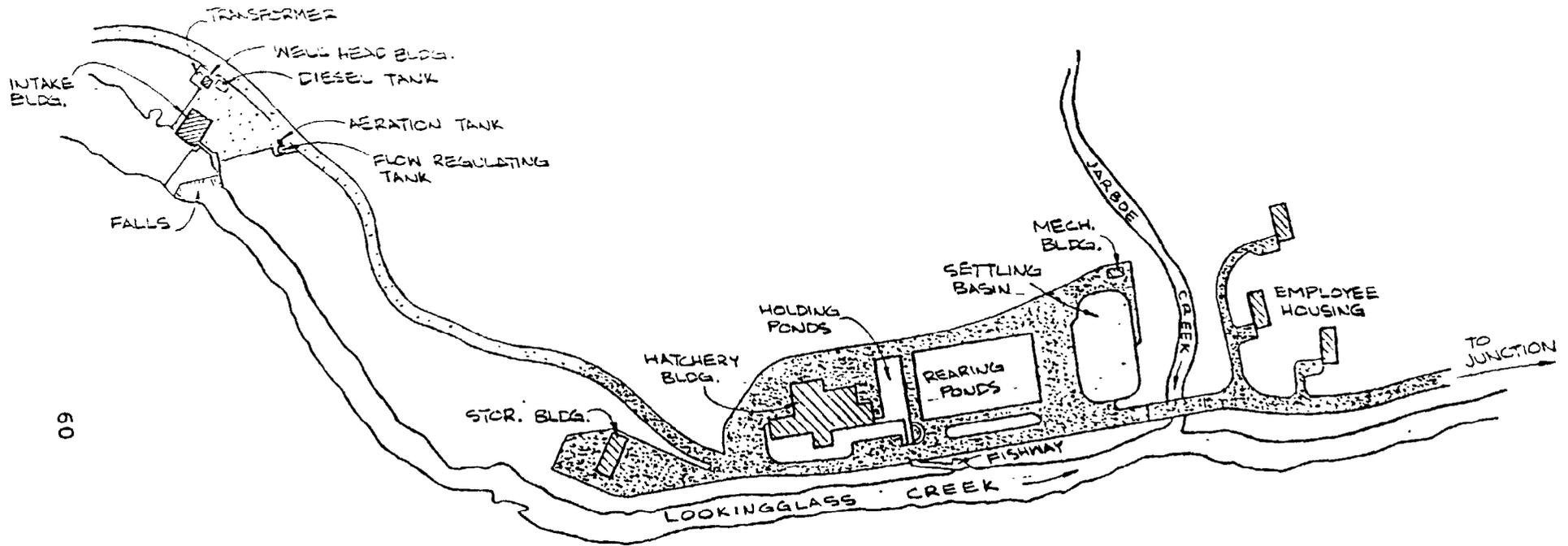
Comparison of the 2 theoretical calculations indicates that rearing space is probably the limiting factor in production. Only 50% of the water right is being utilized in the theoretical flow calculation above, so the amount of water available should be able to support twice the number of raceways. The ODFW considers rearing densities to be slightly above optimum limits.

Hatchery Expansion Capability

The hatchery is situated on 11 acres owned by the COE. Approximately 50 percent of the land is currently being utilized for fish propagation. Topography of the remaining property is suitable for hatchery expansion. Additional water from Lookingglass Creek and an estimated 4,000 gpm of additional well water may be available.

The current water right is sufficient to support twice the number of raceways and should be able to double production of smolts if sufficient new rearing ponds can be provided. Note that additional well water would also be required to temper river water temperatures in the winter to prevent slush ice.

An additional 18 raceways each 10' X 100' X 4' could be constructed. The potential production increase is estimated to be 1,400,000 spring chinook smolts weighing 70,000 pounds. This production increase would also require 144 new incubation trays, 32 Canadian starter troughs, and an increase in chiller capacity of 240 gpm.



-  PAVEMENT
-  GRAVEL
-  BUILDING

LOOKINGGLASS CREEK HATCHERY	
APRIL, 1987	SHEET 1 OF 1

Imnaha Acclimation Pond
76657 Lookingglass Rd.
Elgin, Or 97827

Funding Agency: USFWS
Species Reared: Spring Chinook

Manager: Scott Lusted
Phone #: (503) 437-9723

Introduction

The Imnaha Acclimation Pond is operated as a satellite of Lookingglass Hatchery. It is part of the LSRCP and is located along the middle section of the Imnaha River at an elevation of 3,760 feet above sea level. A temporary dirt acclimation pond was built and first began operating in 1982. A permanent concrete pond was completed in 1988. The facility is operated 7 days per week during March (when juveniles are being acclimated) and from June through mid September (when adults are being collected). The facility is staffed with **.5 FTE's**.

The facility consists of an acclimation/holding pond of approximately 12,665 cubic feet.

Imnaha River stock of spring chinook juveniles originating from adults trapped here are transferred in from Lookingglass Hatchery during March. After approximately-4 weeks of acclimation in the **pond**, smolts are released into the Imnaha River. For 2 out of 3 evaluation years, releases were credited to Lookingglass Hatchery (ODFW credits the originating hatchery if fish transferred are held less than 30 days). Adults are collected from June to September and transported to Lookingglass Hatchery where eggs are taken and incubated. Fish are reared at Lookingglass Hatchery until transferred back for final acclimation.

No major disease problems are evident in juvenile fish since they are held such a short time.

The water right from the Imnaha River totals 6,732 gpm. An additional water right is identified from Little Sheep Creek, but is not used. An average of 4,039 gpm is used in the pond. Water is delivered by gravity from the river intake and is single pass.

Current Production Constraints

The current facility was completed in 1988. There is insufficient data to determine production constraints at this time.

Theoretical Production

The ODFW indicated that there was insufficient data to provide information for this section. By using the 1987 agency production

goal from Lookingglass Hatchery for the Imnaha stock spring chinook, assuming a water temperature of 40 degrees fahrenheit, and average flow available, the NMFS has calculated the following theoretical production for spring chinook:

Flow Method $2.34 \times 4,039 \text{ gpm} \times 6.93" = 65,497 \text{ lbs}$

Density Method $.25 \times 12,665 \text{ cu ft} \times 6.93" = 21,942 \text{ lbs}$

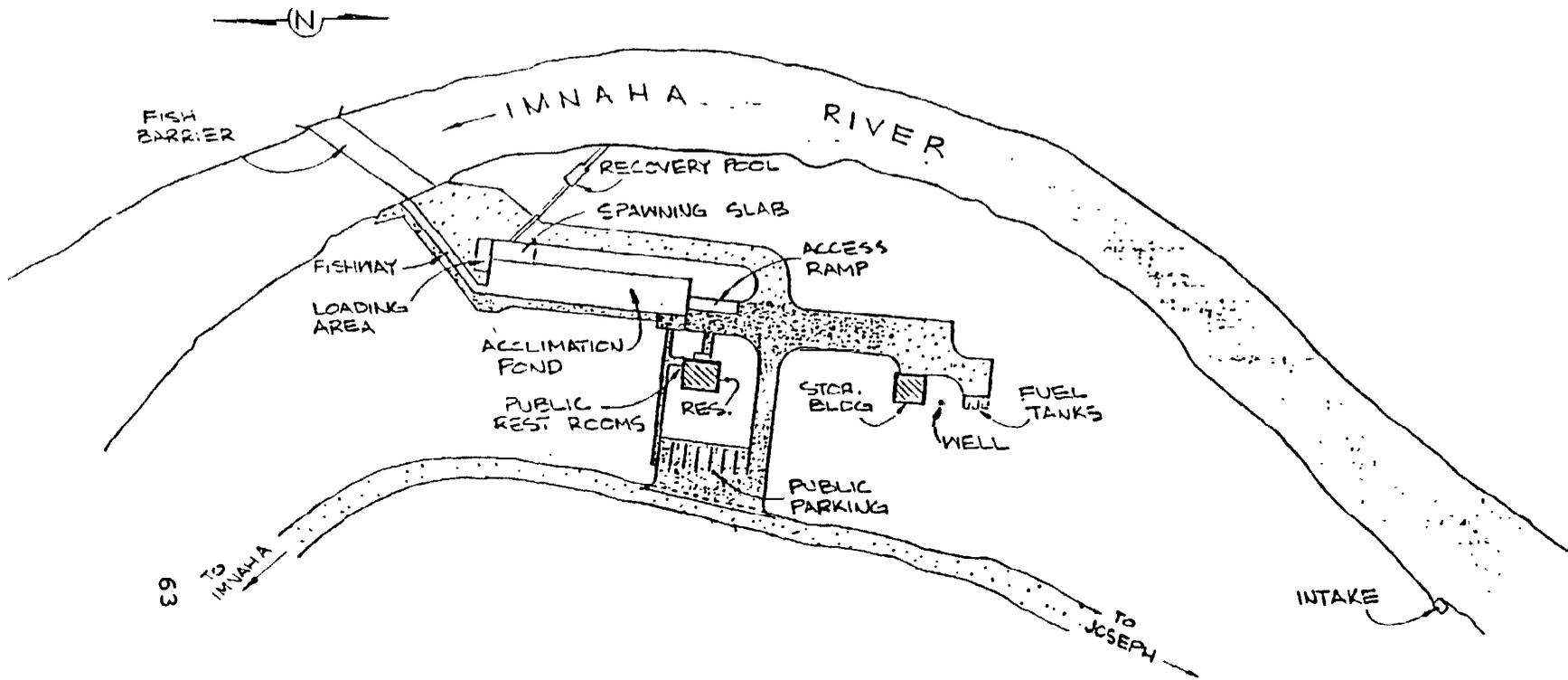
Note: The 1987 agency goal was to produce smolts of 10 fish per pound.

Comparison of the two theoretical calculations indicates that rearing space is probably the limiting factor in production. This pond was designed and constructed as a short term acclimation facility.

Hatchery Expansion Capability

The acclimation pond is situated on 4 acres owned by the USFS. Approximately 25 percent of the land is being utilized. The remaining area is suitable for expansion. Water should be available from the Imnaha River. The potential for well water is unknown.

No expansion capability is identified.



-  PAVEMENT
-  GRAVEL
-  BUILDING

IMNAHA SATELLITE FACILITIES

MAY, 1981

SHEET 1 c

Marion Forks Hatchery
Star Rt. Box 71
Idanha, Or. 97350

Funding Agency: COE 83%, ODFW 17%
Species Reared: Spring Chinook
Winter Steelhead

Manager: Terry Jones
Phone #: (503) 854-3522

Introduction

Marion Forks Hatchery is located along Marion and Horn Creeks (Santiam River tributaries in Willamette Basin) about 17 miles east of Detroit. It is situated 2,580 feet above sea level. The hatchery began operation in 1951. The COE funds the majority of operational costs as mitigation for Detroit and Big Cliff Dams constructed in the basin. The facility is staffed with 5.1 FTE's.

Rearing facilities are in good condition and include 8 raceways, 48 circular ponds, and 6 Canadian starting troughs.

Adults are not collected at this facility but at Minto Pond which is operated as a satellite facility. Adult returns to Minto Pond are credited to Marion Forks Hatchery. Minto Pond, located 33 miles downstream is not used for juvenile rearing. Most smolts are released off-site into various tributaries of the Santiam River. Spring chinook were reared in the circular ponds and winter steelhead in the 8 raceways during this evaluation. Coho were reared a short time and then transferred out during one of the years. The COE is responsible for funding the mitigation program for spring chinook and winter steelhead.

There is one water right totaling 15,260 gpm from Marion Creek although 2 sources are utilized. Water is supplied from Marion Creek from April through September and from Horn Creek October through March, although there is some overlap when water from both sources are utilized at the same time. Marion Creek freezes in the winter and is not a reliable source at that time. Water use in the hatchery is a maximum 12,890 gpm from Marion Creek and 7,400 gpm from Horn Creek with both occurring in March and April just prior to release of smolts. Low flow occurs during the winter, when the hatchery supply is restricted to 5,800 gpm from Horn Creek.

All rearing units utilize single pass water.

Current Production Constraints

Marion Creek freezes during the winter and can not be used. During very cold spells, Horn Creek flow is reduced to 5,800 gpm and is the total water available to the hatchery. The poundage which can be held on station during this period limits smolt production.

Yearling and fingerling fish compete for pond space during the spring when maximum poundage is on station.

Egg incubation is limited by the number of incubators. The cold water supply must be heated to speed up development of eggs and fry.

Cold water limits growth potential during much of the year. The circular ponds are good for starting fish but are inefficient in producing smolts.

Logging in the watershed is a potential threat to water quality.

This is a mitigation facility and any changes would need to be negotiated with COE.

Theoretical Production

Theoretical production based on the flow method is 130,488 pounds and based on density is 128,547 pounds. Average production was 70,503 pounds and the 1987 agency goal was 50,333 pounds.

Theoretical calculations were computed as follows:

Flow Method

Spring Chinook: (36 circulars)	2.27 X 5,400 gpm X 7.07"	= 86,664 lbs
Steelhead: (8 raceways)	1.65 X 3,200 gpm X 8.3"	= 43,824 lbs
		<hr/>
		130,488 lbs

Density Method

Spring Chinook: (36 circulars) *	.25 X 35,280 cu ft X 7.07"	= 62,357 lbs
Steelhead: (8 raceways)	.25 X 32,000 cu ft X 8.3"	= 66,400 lbs
		<hr/>
		128,547 lbs

* Note: Not all circular ponds are used in theoretical calculations. There are 48 circulars each with 980 cubic feet for a total of 47,040 cubic feet. There are two year classes of fish on station at time theoretical calculations were computed and fingerlings take up the remaining 12 circular ponds.

Comparison of the 2 theoretical calculations indicates that pond space and flow are in balance. These calculations are based on spring time flows. Production is being restricted by winter low flows.

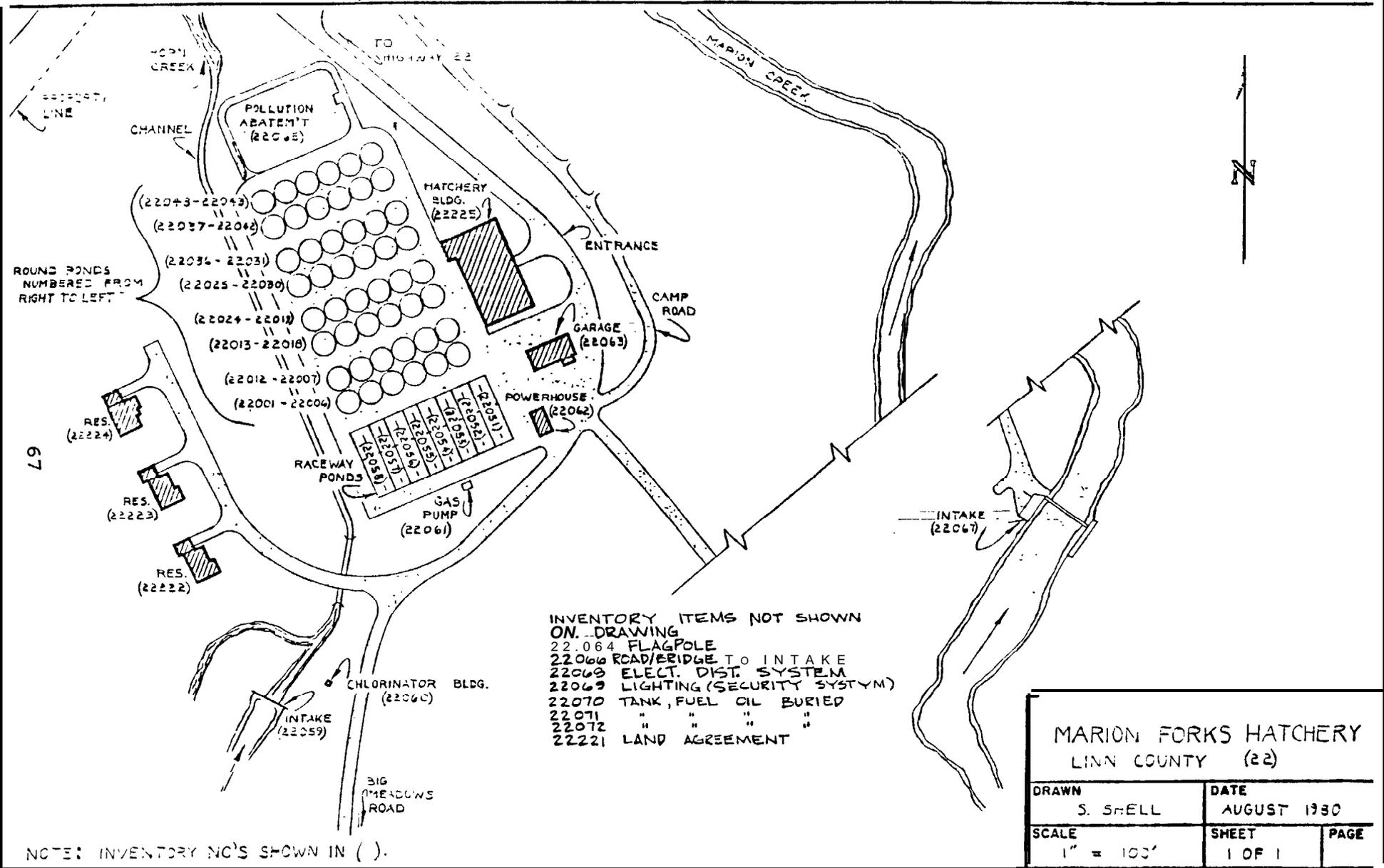
Hatchery Expansion Capability

Hatchery grounds cover 15 acres and are owned by the USFS. Approximately 90 percent of the area is being utilized. Limited expansion is feasible on the remaining property. Expansion is also possible on 40 acres adjacent to the hatchery owned by the USFS. It is unknown if the USFS would allow hatchery expansion at this site. Additional surface water is not available during winter months but should be during the spring. The potential for well water is unknown.

Winter low flow is currently restricted to 5,800 gpm during cold spells. An additional source of water or a re-use system would need to be developed to allow any expansion.

Five additional ponds each 20' X 100' could be built on existing property. Re-use water tied in with a supplemental oxygen system would be required to effectively utilize these ponds. But, until the supplemental oxygen system is proven effective the potential production increase can not be quantified.

No expansion capability is currently identified. If the oxygen supplementation system is proven effective this facility would have potential for increasing production.



MARION FORKS HATCHERY LINN COUNTY (22)		
DRAWN	DATE	
S. SHELL	AUGUST 1980	
SCALE	SHEET	PAGE
1" = 100'	1 OF 1	

McKenzie River Hatchery
43863 Greer Dr.
Leaburg, Or 97489

Funding Agency: COE 50%, ODFW 50%

Species Reared: Spring Chinook
Summer Steelhead

Manager: Dave Rogers
Phone #: (503) 896-3513

Introduction

McKenzie River Hatchery is located along the McKenzie River approximately 22 miles east of Springfield. Elevation of the facility is 700 feet above sea level. The hatchery is operated as a mitigation facility for dams in the Willamette Basin. The initial year of operation was 1975. The ODFW operated an old hatchery near this site prior to construction of the present facility. The facility is operated with 5.5 FTE's.

Rearing facilities are in good condition and consist of 30 raceways, 2 adult holding ponds, and 8 Canadian starting troughs. The adult holding ponds are not used to rear fish. Adults are collected and eggs taken at this station. All steelhead and spring chinook smolts are released off-station.

Water rights total 50,716 gpm from 6 sources. The McKenzie River and **Cogswell** Creek make up the majority of the water right and currently are the only sources supplying the hatchery. The amount of water available equals the water right for the McKenzie River all year and is supplied from a power canal. Flow from **Cogswell** Creek ranges from a low of only 449 gpm in the summer to 6,732 gpm during winter/spring. All raceways are supplied with single pass water. Adult holding ponds are supplied with re-use water from the raceways.

The remaining 4 water rights (Gate Creek, Finney Creek, Drift Creek, and Granite Creek) which total 19,300 gpm were not utilized during this evaluation period. These creeks are located up stream and are not near the present hatchery site.

Current Production Constraints

Rearing space is more limiting than available flow.

Unscheduled work on **Leaburg** Canal can interrupt water supply. Logging in **Cogswell** Creek watershed may reduce water quality.

Heating water for starting tanks leads to possible gas super saturation.

This is partially a mitigation facility and any changes would need to be negotiated with COE.

Theoretical Production

Theoretical production based on the flow method is 189,782 pounds and with density is 149,348 pounds. Average production was 118,177 pounds and the 1987 agency goal was 117,201 pounds. Theoretical calculations were computed as follows:

Flow Method

Spring Chinook:	1.86 X 600 gpm X 7.18" X 18 ponds =	144,231 lbs
Steelhead:	1.53 X 600 gpm X 8.27" X 6 ponds =	<u>45,551 lbs</u>
		189,782 lbs

Density

Spring Chinook:	.25 X 3,340 cu ft X 7.18" X 18 pds=	107,915 lbs
Steelhead:	.25 X 3,340 cu ft X 8.27" X 6 pds =	<u>41,433 lbs</u>
		149,348 lbs

Note: Only 24 of 30 raceways were used in calculations. The remaining raceways are being utilized by fingerlings as two year classes of fish are being held on station in the spring.

Comparison of the 2 theoretical calculations indicates that pond space is probably the limiting factor in production. Water use listed in calculations above is only about 50% of water right from **Mckenzie** River and **Cogswell** Creek. The existing water supply should be able to support a large increase in production given additional rearing facilities.

Hatchery Expansion Capability

The hatchery is situated on 16 acres owned by the COE and Eugene Water Electric Board. Approximately 75% of the area is currently being utilized. There is room for 27 additional rearing ponds on the existing hatchery grounds. In addition, there are also 33.12 acres adjoining the hatchery which may also be available from various land owners. The adjoining land is estimated to cost \$216,000.

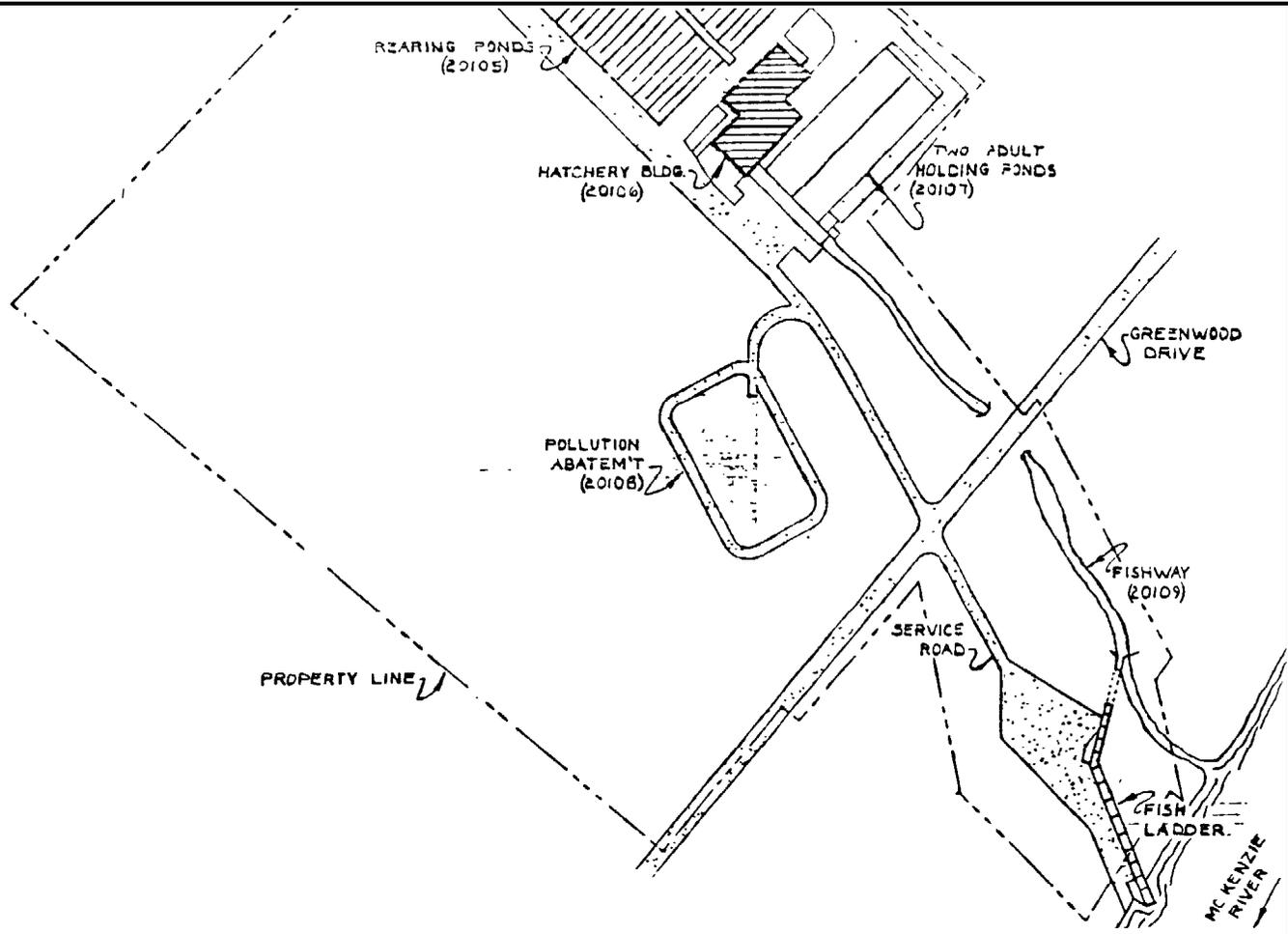
Only about 50% of the existing water right is being utilized. Additional water from the McKenzie River over the current water right should also be available if needed. The potential for well water is unknown.

There is potential to construct 27 additional rearing ponds each 20' X 80'. Each pond would need about 500 gpm of water. The current water right is sufficient and could be supplied from existing sources. Production from these ponds is estimate to be **1,800,000** smolts weighing 120,000 pounds. The agency recommends either coho or spring chinook. The existing incubation and starter ponds can accommodate this production.

NOTE: INVENTORY NO'S SHOWN IN ().

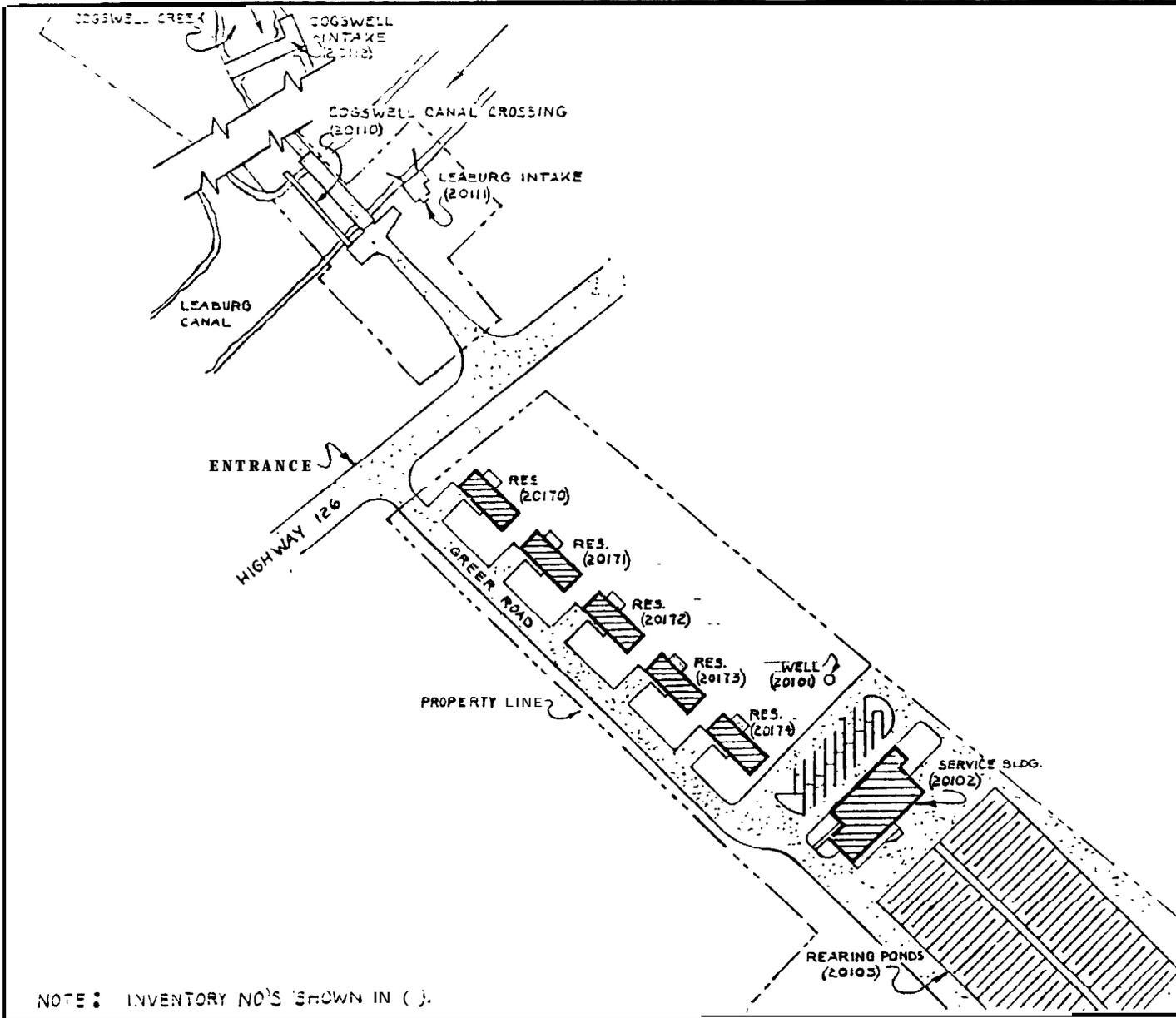


70



MC KENZIE RIVER HATCHERY LANE COUNTY (20)		
DRAWN S SHELL	DATE AUGUST 1920	
SCALE 1" = 100'	SHEET 1 OF 2	PAGE

17



MC KENZIE RIVER HATCHERY LANE COUNTY (20)		
DRAWN S SHELL	DATE AUGUST 1980	
SCALE 1" = 100'	SHEET 2 OF 2	PAGE

NOTE: INVENTORY NO'S SHOWN IN ().

Oak Springs Hatchery
Rt. 1, Box 443
Maupin, Or. 97037

Funding Agency: ODFW
Species Reared: Summer Steelhead
Resident Fish

Manager: Randy Robart
Phone #: (503) 395-2546

Introduction

Oak Springs Hatchery is located on the Deschutes River about 9 miles from the town of Maupin. The hatchery began operation in 1923 and is 850 feet above sea level. The facility produces both summer steelhead and resident trout. A total of 6.5 FTE's is used to operate the hatchery including the resident trout program.

There are a wide variety of rearing facilities. Condition of rearing units vary from poor (middle ponds) to good (circular and N-series ponds). The lower ponds are considered to be in fair condition. Rearing facilities include 5 circular ponds, 9 N-series ponds, and 9 lower ponds. The number of ponds rearing anadromous fish varied during the years evaluated. Four lower ponds and 2 N-series ponds were used in 1985, 3 Lower ponds and 3 N-series ponds in 1986, and 3 Lower ponds and 2 N-series ponds in 1987. The remaining facilities were used to rear resident fish.

The majority of production from this hatchery is resident trout. No adult summer steelhead are collected. Eggs are received from Minthorn Pond on the Umatilla River and from South Santiam Hatchery. Steelhead are reared to smolt size and all are released off-site into various rivers.

Water is supplied by gravity flow from several springs. Current water rights total 32,987 gpm but much of these water rights appear to be duplicated so water can be used for different purposes. The present water delivery system can deliver approximately 11,670 gpm to the hatchery. Some flow through mixing with re-use water occurs from one pond series to another.

Current Production Constraints

The water delivery system to the hatchery is limiting production. There is additional water from springs which is not currently being collected and used. The delivery system is limited to 11,670 gpm when a minimum of 23,115 gpm is available from the springs. Increased numbers and pounds could be produced if the additional water was supplied to existing ponds.

The middle rearing ponds are in poor condition with uneven bedrock bottoms which cannot be adequately cleaned. These ponds are currently only used for the resident trout program.

Agricultural run-off contaminates springs.

Disease problems have occurred with IHN in Umatilla River stock received from Minthorn Pond.

Theoretical Production

Theoretical production based on the flow method is 51,558 pounds and for density is 98,770 pounds. Average production was 53,125 pounds and the 1987 agency goal was 44,000 pounds. Theoretical calculations include only those ponds used to rear steelhead and were computed as follows:

Flow Method

4 L & 2 N ponds: $1.53 \times 4,060 \text{ gpm} \times 8.3'' = 51,558 \text{ lbs}$

Density Method

4 L & 2 N ponds: $.25 \times 47,600 \text{ cu ft} \times 8.3 = 98,770 \text{ lbs}$

Note: The majority of the rearing ponds are utilized to produce resident fish.

Comparison of the 2 theoretical calculations indicates that flow is the limiting factor in production. As indicated above, if additional water were supplied then total hatchery production could be increased in existing ponds.

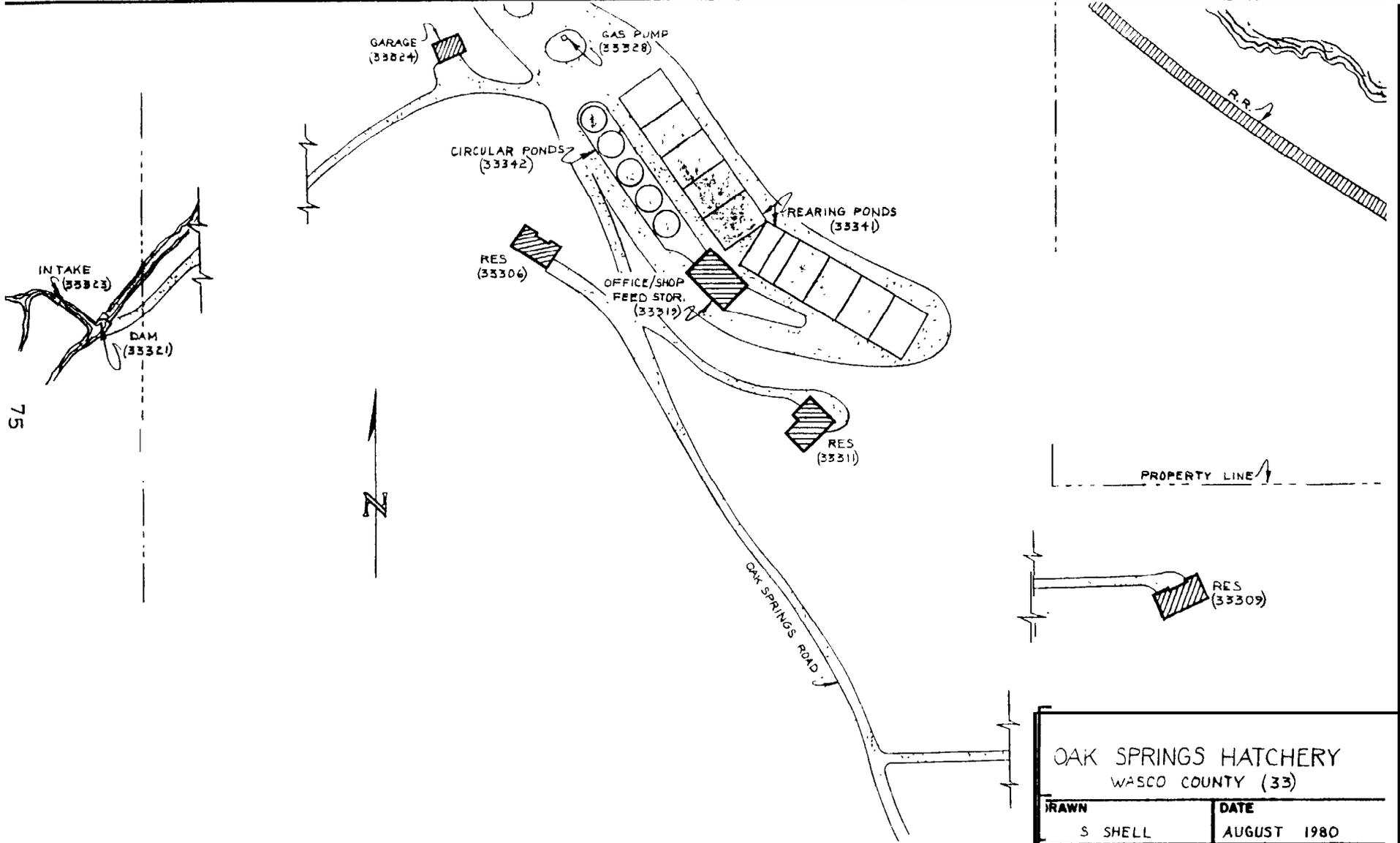
Hatchery Expansion Capability

The hatchery is situated on 203 acres owned by ODFW of which 10% is being used for fish culture. Topography limits potential expansion to an additional 10% or 20 acres. Additional water nearly equal to the amount currently being utilized is available with water rights already held by the state. The existing water delivery system would need to be enlarged. Water would be delivered by gravity flow but some pumping may also be required. The potential for well water is unknown.

The ODFW is presently planning to replace the middle bank of existing ponds with 8 new Michigan type raceways each 10' X 100' X 3.5'. These new ponds will have a capacity to produce 60,000 pounds of rainbow trout.

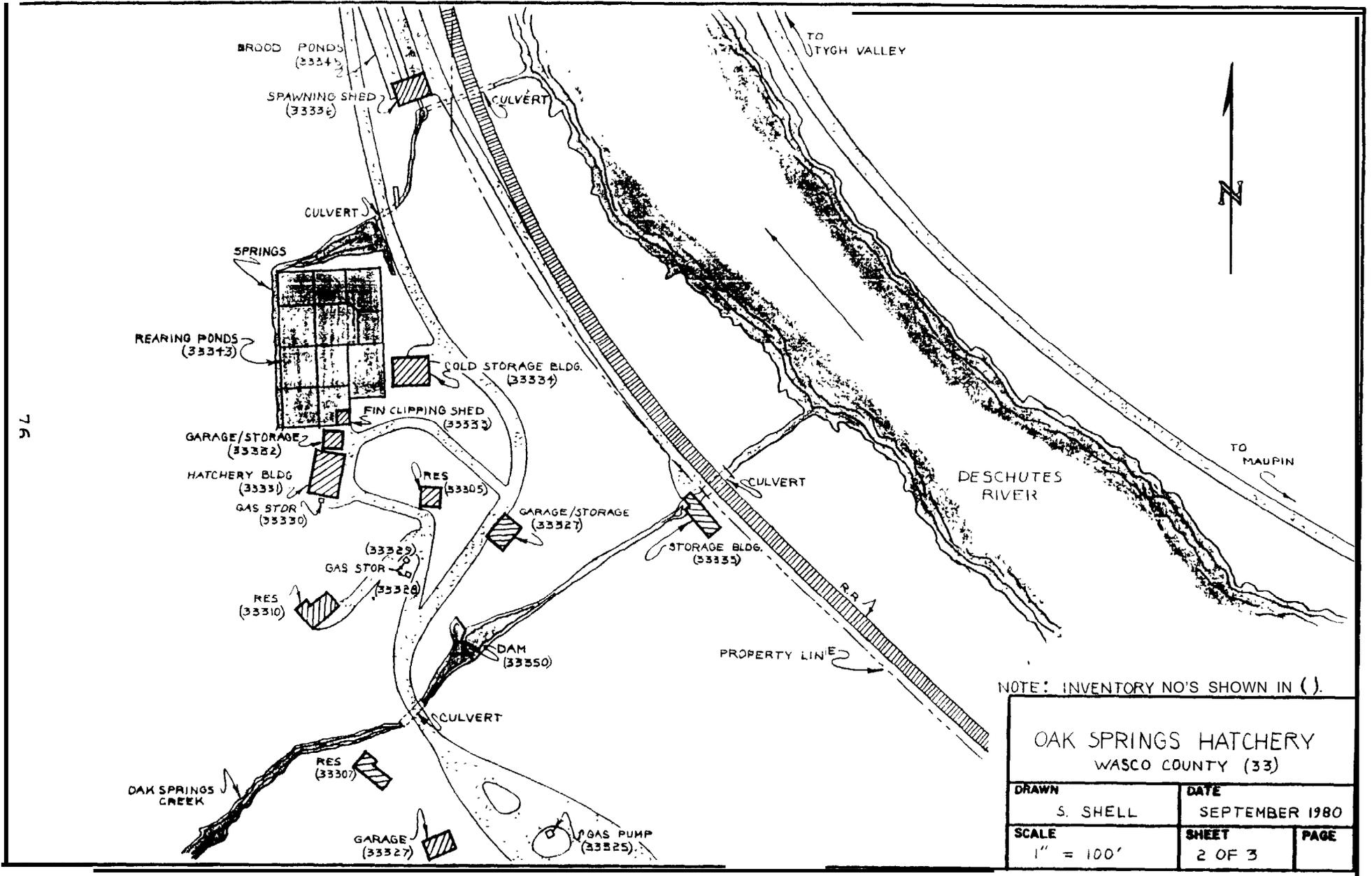
There is room to construct 4 additional Michigan type raceways with the same dimensions listed above. Water is available in springs that could easily be developed to supply about 1,795 gpm (4 cfs) additional water but some pumping may be required. These raceways would have a potential to rear 180,000 steelhead smolts weighing 30,000 pounds.

A supplemental oxygen system would be required to fully develop the potential for increased production utilizing the Michigan style ponds. Additional incubation and starter ponds would also be needed to support the increased production.



NOTE : INVENTORY NO'S SHOWN IN ()

OAK SPRINGS HATCHERY		
WASCO COUNTY (33)		
DRAWN	DATE	
S SHELL	AUGUST 1980	
SCALE	SHEET	PAGE
1" = 100'	1 OF 3	

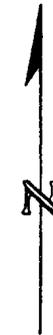
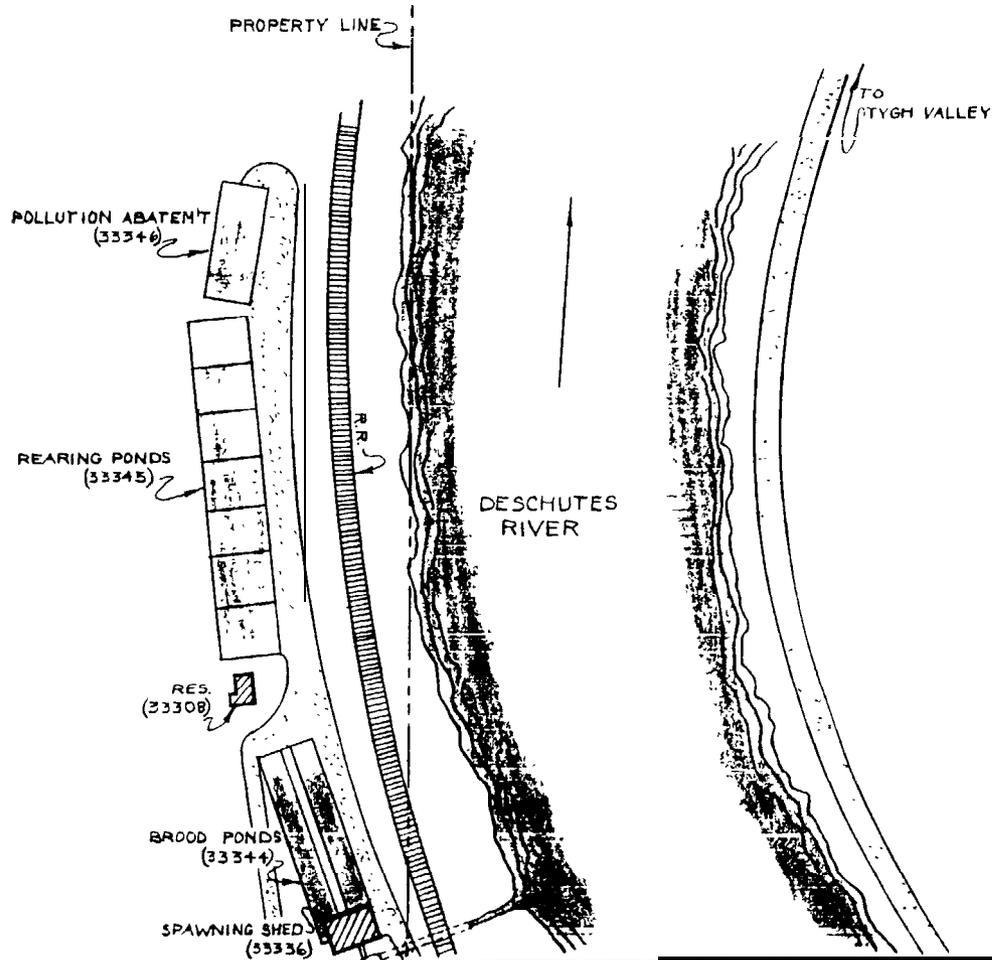


NOTE: INVENTORY NO'S SHOWN IN ().

OAK SPRINGS HATCHERY WASCO COUNTY (33)		
DRAWN S. SHELL	DATE SEPTEMBER 1980	
SCALE 1" = 100'	SHEET 2 OF 3	PAGE

NOTE: INVENTORY NO'S SHOWN IN ().

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OAK SPRINGS HATCHERY WASCO COUNTY (33)		
DRAWN	DATE	
S SHELL	SEPTEMBER 1980	
SCALE	SHEET	PAGE
1" = 100'	3 OF 3	

Oxbow Hatchery
Star Route, Box 750
Cascade Locks, Or 97014

Funding Agency: NMFS
Species Reared: Coho
Spring Chinook

Manager: Larry Dimmick
Phone #: (503) 374 8540

Introduction

Oxbow Hatchery is located approximately 2 miles east of Cascade Locks. The elevation is 100 feet above sea level. The hatchery began operation in 1938 as a state funded facility. It was remodeled in 1952 under the Mitchell Act and is currently operated as part of the CRFDP. Herman Creek Ponds and Wahkeena Pond are operated as satellite facilities. A total of 4.75 FTE's are used to operate the hatchery and its satellite ponds.

Rearing facilities are in fair to good condition and consist of 12 concrete raceways, 32 deep troughs, and 32 shallow troughs.

Production information for Oxbow includes Herman Creek Ponds. The state does not separate them out. No adults or eggs are collected at this facility. Eggs are transferred in from other stations.

This facility is usually not credited with smolt releases but is used for interim egg incubation and early rearing of fingerlings. Eggs are imported from other stations, hatched or transferred out, and fish reared a short time before all are transferred out. Usually by mid-summer no fish remain in hatchery raceways. Spring chinook for Clackamas Hatchery, coho from various hatcheries, and fall chinook from Bonneville and Big Creek Hatcheries are routinely handled.

Water rights total 53,405 gpm from Herman Creek and Little Herman Creek. The hatchery obtains its water supply from Oxbow Springs through gravity flow. No water right was listed for this supply. Oxbow Springs flow dwindles to about 300 gpm in summer and fall and is not used to rear fish during that time. Water temperature is a constant 45 degrees fahrenheit. Water is re-used from one series of raceways to a second series and from trough to trough.

Current Production Constraints

Production at this station is constrained by available water supply. Water from the spring declines to about 300 gpm during summer and early fall.

Oxbow Hatchery is set up to handle eggs and early rearing of fish for other stations. Smolts are not routinely produced at this station.

Theoretical Production

Theoretical production based on the flow method is 14,803 pounds and based on density is 54,602 pounds. Averaged production was 124,718 pounds and the agency goal was 2,000 pounds. Average production included 111,077 pounds of coho, most of which were probably reared at Herman Creek Ponds. These coho are transferred to Bonneville Hatchery prior to release. If coho are subtracted out it would leave 13,641 pounds produced at Oxbow. Theoretical calculations were computed as follows:

Flow Method

Coho:	2.25 X 1,950 gpm X 2.84"	=	12,460 lbs
Spring Chinook:	2.25 X 356 gpm X 2.8"	=	<u>2,343 lbs</u>
			14,803 lbs

Density Method

Coho: (12 ponds)	.3 X 56,340 cu ft X 2.84"	=	48,002 lbs
Spring Chinook: (2 ponds)	.25 X 9,429 cu ft X 2.8"	=	<u>6,600 lbs</u>
			54,602 lbs

Note : There are only 12 ponds at Oxbow Hatchery. The two ponds used to calculate spring chinook have been used twice in calculations. This is accomplished by double cropping from the same ponds.

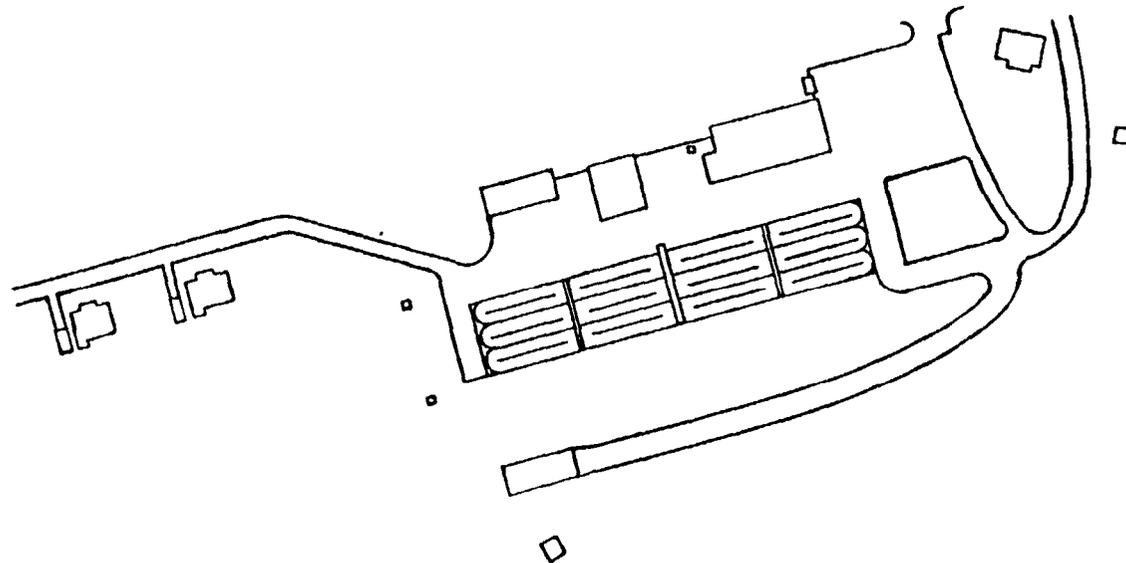
Comparison of the 2 theoretical calculations indicates that flow is the limiting factor in production. There is insufficient water to operate this hatchery during summer and fall months. If an additional water supply could be found, production should be able to be increased.

Hatchery Expansion Capability

The hatchery is situated on 30 acres owned by ODFW. This includes the Herman Creek Ponds site. Approximately 80% is currently being utilized. There is room for some expansion but the water supply does not allow full utilization of existing raceways let alone any expansion. No additional surface water is available and it is unknown if wells could be developed.

No expansion capability is identified.

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OXBOW SPRINGS HATCHERY

DRAWN & REVISED

SCALE 1" = 100'

Herman Creek Ponds
Star Route, Box 750
Cascade Locks, OR. 97014

Funding Agency: NMFS
Species Reared: Coho
Spring Chinook

Manager: Larry **Dimmick**
Phone #: (503) 374-8540

Introduction

Herman Creek Ponds are operated as a satellite of Oxbow Hatchery and are located about 1/2 mile east of the hatchery. Elevation of this hatchery is 100 feet above sea level. The current ponds were constructed and began operation in 1977 as part of the CRFDP. The old Herman Creek Hatchery was located downstream from the present ponds and dated back to the early **1900's**. The old hatchery was abandoned after Bonneville Dam was constructed and backed up water which partially flooded the site.

Rearing facilities are in fair to good condition and consist of 2 asphalt rearing ponds and 2 concrete raceways. Raceways are used to start fish and the rearing ponds used for long term rearing. The facility is operated by personnel from Oxbow Hatchery.

No eggs are taken nor are adults collected at this site. Fish are transferred in for interim rearing from other stations. In recent years coho have been the species most often reared. Coho are normally transferred in from Sandy and Cascade Hatcheries and reared to presmolt size. They are then transferred to Bonneville Hatchery 4 to 6 weeks prior to release for acclimation. Releases are credited to Bonneville Hatchery.

Water rights total 47,127 gpm from Herman Creek. Low flow occurs from July to September when approximately 4,800 gpm is available. The water rights date to 1922 so were probably originally obtained for the old Herman Creek Hatchery. Water is supplied to the ponds by gravity flow. Single pass water is used although recirculation pumps are on site. The pumps have never been used.

Current Production Constraints

The water delivery system limits flow to ponds. Low head pressure, pipe size, and gravel in the intake all combine to restrict flow.

Flow patterns in the asphalt ponds leave several areas with poor water exchange. This leads to disease and pond cleaning problems.

The asphalt ponds are beginning to develop cracks. Ponds require approximately one month of drying time to allow needed repairs each year.

Theoretical Production

Theoretical production based on the flow method is 36,375 pounds and based on density is 163,775 pounds. Average production is included and reported in the Oxbow Hatchery section of this report. Most of the 111,077 pounds of coho credited to Oxbow Hatchery were reared at Herman Creek Ponds and is the poundage being used to evaluate this facility. No agency goal is identified for this site. Theoretical calculations were computed for coho as follows:

Flow Method

$$1.25 \times 5,000 \text{ gpm} \times 5.82" = 36,375 \text{ lbs}$$

Density Method

$$.3 \times 93,800 \text{ cu ft} \times 5.82" = 163,775 \text{ lbs}$$

Comparison of the 2 theoretical calculations indicates that flow is probably the limiting factor in production. This is slightly misleading as these rearing ponds probably cannot produce quality smolts using the density index for raceways. If the .03 density index for large ponds is used, then theoretical production based on density would be 16,377 pounds and it would appear that pond space would be the limiting factor. In reality, an index between the two used in this evaluation is probably more appropriate for this facility. The average coho production (111,077 pounds) is quite a bit larger than the flow calculation, requires a density index of (.2) to accomplish, and is probably being achieved because of the large rearing volume.

Hatchery Expansion Capability

The land is owned by the ODFW and is described in the Oxbow Hatchery section of this report. Additional surface water is not available during summer months although it is probably available during spring months. The potential for well water is unknown.

Reconstruction of the existing Herman Creek asphalt ponds to provide 20 concrete raceways each 10' X 100' would allow greater production flexibility and better utilization of water. The raceways would be constructed in two series of 10 ponds each. There might be a potential to increase production slightly.

No expansion capability is identified.

Wahkeena Pond
Star Rt. Box 750
Cascade Locks, Or. 97014

Funding Agency: NMFS
Species Reared: Coho

Manager: Larry Dimmick
Phone #: (503) 374-8540

Introduction

Wahkeena Pond is operated as a satellite of Oxbow Hatchery and was constructed and began operation in 1961. It is located along the Columbia River approximately 11 miles west of Bonneville Dam and is operated as part of the CRFDP. Elevation of the site is 40 feet above sea level. The pond is operated with personnel from Oxbow Hatchery. The pond covers approximately 18 surface acres with an estimated volume of 180 acre feet or 7,840,800 cubic feet.

During the three evaluation years coho were transferred in from oxbow Hatchery in July and were reared until release the following April or June. No adults are collected at this site.

In recent years this pond has experienced major fish losses. In 1987 only 98,532 smolts were produced out of the 2,000,000 expected. The cause of the mortality was not determined although bird predation was suspected at the time. Major fish losses also occurred in 1988 and 1989. The 1989 losses were caused by eye flukes which blinded the smolts. For eye fluke to become a problem, it requires birds, snails, and fish each of which carry a different stage of the organism. To break this cycle, the pond was treated to kill the snails during the summer of 1989. The 1990 smolt release was approximately 1.3 million, the first significant production from this pond in several years.

Water rights total 14,363 gpm and 180 acre feet of storage. The pond is supplied with gravity flow from Wahkeena Creek. The entire creek flows into the pond. Low flow occurs in December when as little as 1,850 gpm is available. Additional water is supplied through groundwater seepage, but the amount has not been determined.

Current Production Constraints

The large (18 acre) pond has an irregular shape. Large ponds/lakes like Wahkeena usually have poor flow patterns and production based on any standard density index probably can not be achieved. Water is delivered into the same end of the pond as the exit is located.

Temperature varies with depth in the pond. Surface can freeze in winter and heat up to 72 degrees fahrenheit in the summer.

High mortality has occurred in every year since 1987. Bird predation was suspected. In 1989 bird netting was installed on

part of the pond in an attempt to alleviate the problem. In that year extensive eye fluke infestation was diagnosed and high losses again occurred.

Flow into the pond is variable.

Theoretical Production

Theoretical production based on the flow method is 15,742 pounds and based on density is 1,352,400 pounds. Average production was 89,419 pounds and the 1987 agency goal was 133,333 pounds. Average production is smaller than normal due to 95% loss of smolts in 1987. Theoretical calculations were computed for coho as follows:

Flow Method

$$1.22 \times 2,244 \text{ gpm} \times 5.75" = 15,742 \text{ lbs}$$

Density Method

$$.03 \times 7,840,000 \text{ cu ft} \times 5.75" = 1,352,400 \text{ lbs}$$

Comparison of the 2 theoretical calculations indicates that flow is the limiting factor in production. As indicated previously, large ponds or lakes are unlikely to be able to produce fish based on any standard density index no matter how much water is **provided**. The pond is far larger than needed to achieve production goal, but the size of the pond is allowing production far **in** excess of what flow alone would allow. Production based on the above density index is not achievable.

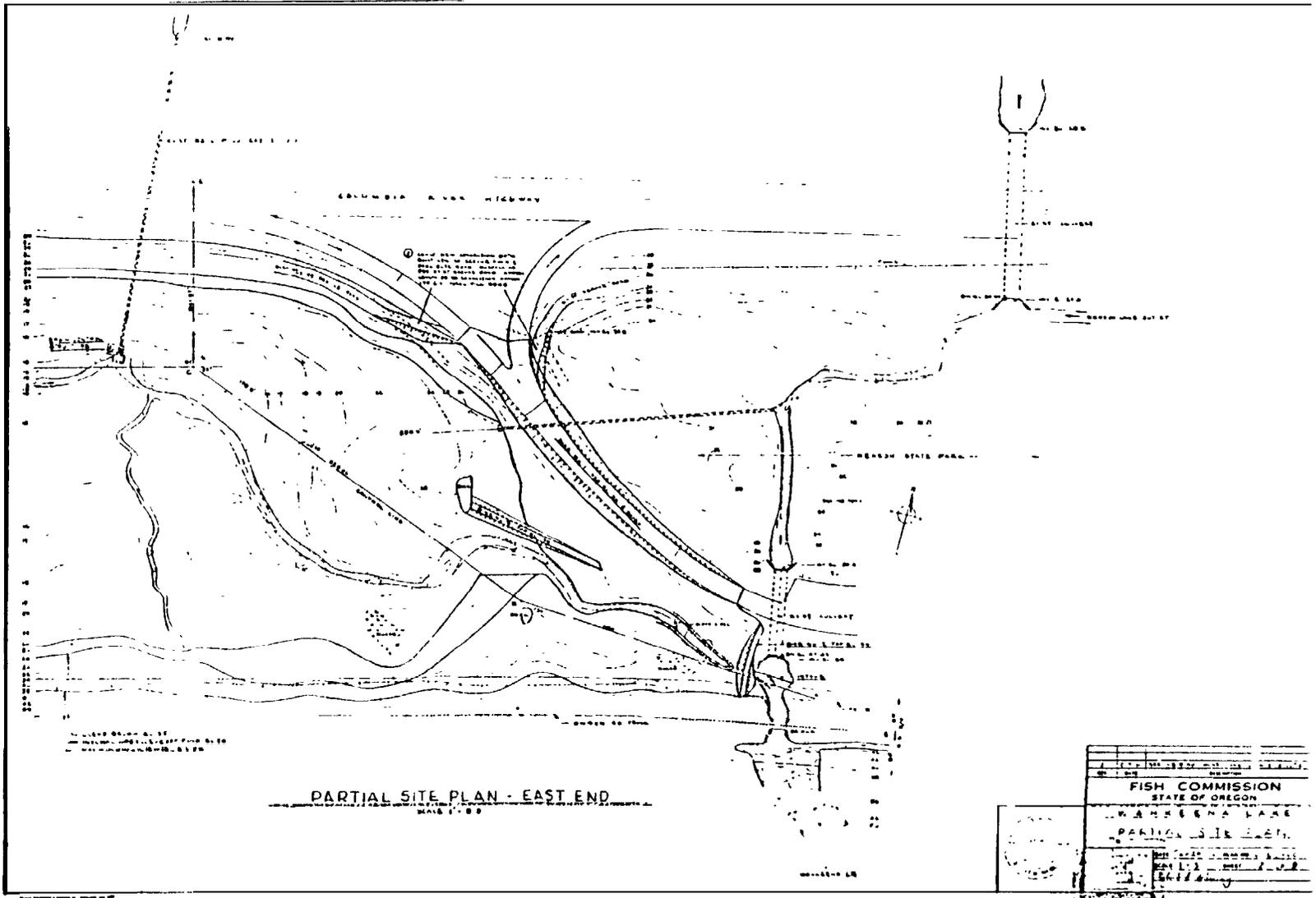
The 1985 and 1986 production was 110,500 and 154,800 pounds respectively. The 1985 and 1986 production and agency goal are well above the theoretical flow method. Based on available flow, the production goal may be too high.

Mortality has reduced production to less than 3,000 pounds per year since 1987. The first significant smolt release in several years occurred in 1990. Hopefully, pond treatment and installation of bird netting will allow continued successful operation.

Hatchery Expansion Capability

The pond is situated on 20 acres owned by the Oregon Department of Transportation. Approximately 90% of the area is currently being utilized. The remaining area is unsuitable for expansion. The volume of the existing pond is far greater than is needed to meet agency production goal or to be in balance with available flow. No additional water from Wahkeena Creek is available. Water from the Columbia River is available but would probably need to be pumped. The potential for well water is unknown.

No expansion capability is identified.



PARTIAL SITE PLAN - EAST END

FISH COMMISSION
STATE OF OREGON
WASHEENA LAKE
PARTIAL SITE PLAN
DATE: 1-1-59

Roaring River Hatchery
42255 Fish Hatchery Drive
Scio, Or. 97374

Funding Agency: ODFW
Species Reared: Summer Steelhead
Winter Steelhead

Manager: Don Faulhaber
Phone #: (503) 394-2496

Introduction

Roaring River Hatchery is located along Roaring River (tributary to Crabtree Creek of the South Santiam River in the Willamette Basin) about 18 miles northeast of Albany. Facility elevation is 570 feet above sea level. The facility first began operation in 1924 and is staffed with 5.1 FTE's.

Rearing facilities were rebuilt in 1987 and are in good condition. The hatchery consists of several types of rearing units with varying dimensions (see Summary Table 3). During 1985 and 1986 ponds 8 through 13 were used for anadromous fish and in 1987 ponds 10 through 13 (hatchery was being reconstructed this year) were used.

This is a mixed stock facility producing both anadromous fish and resident trout. Most of the rearing ponds are utilized for the resident trout program. This report deals only with the anadromous fish portion.

No adult anadromous fish are collected here. Eggs or fish are imported from other stations. Summer steelhead are imported mainly from South Santiam Hatchery and winter steelhead from Big Creek or Klaskanine Hatcheries. Anadromous fish are reared as yearling smolts and released off-station into the North Santiam or Molalla Rivers.

The water rights total 7,630 gpm from Roaring River. Water is delivered by gravity flow. Some water is pumped through a filter system to insure a clean supply for egg incubation and starter tanks. Low flow available to the hatchery is 3,366 gpm in October and high flow is about 10,100 gpm during the winter/spring. Water temperature ranges from 35 to 56 degrees fahrenheit. Water is re-used from upper ponds to lower ponds.

Current Production Constraints

Remodeling in 1987 corrected many production constraints.

Water supply is limiting, especially during late summer and early fall. Logging in watershed above hatchery is having an adverse effect on water quality.

Hatchery is primarily devoted to resident trout **production**.

Theoretical Production

Theoretical production based on the flow method is 56,860 pounds and based on density is 112,030. Average production was 35,064 pounds and the 1987 agency goal was 42,500 pounds. These figures are only for those ponds used to rear anadromous fish and do not include the resident trout program. The average production listed above is about 25% lower than normal due to construction in 1987 which temporally eliminated some raceways. Theoretical calculations were computed as follows:

Flow Method

Winter Steelhead:	1.67 X 1,400 gpm X 7.78" =	18,190 lbs
Summer Steelhead:	1.67 X 2,800 gpm X 8.27" =	<u>38,670 lbs</u>
		56,860 lbs

Density Method

Winter Steelhead:	.25 X 15,000 cu ft X 7.78" =	29,175 lbs
Summer Steelhead:	.25 X 40,075 cu ft X 8.27" =	<u>82,855 lbs</u>
		112,030 lbs

Comparison of the 2 theoretical calculations indicates that flow is probably the limiting factor in production. Production during the three years evaluated ranged from 15,703 to 52,464 pounds and at least during one year approached the theoretical flow calculation. If additional water could be supplied then production could probably be increased in the existing rearing space.

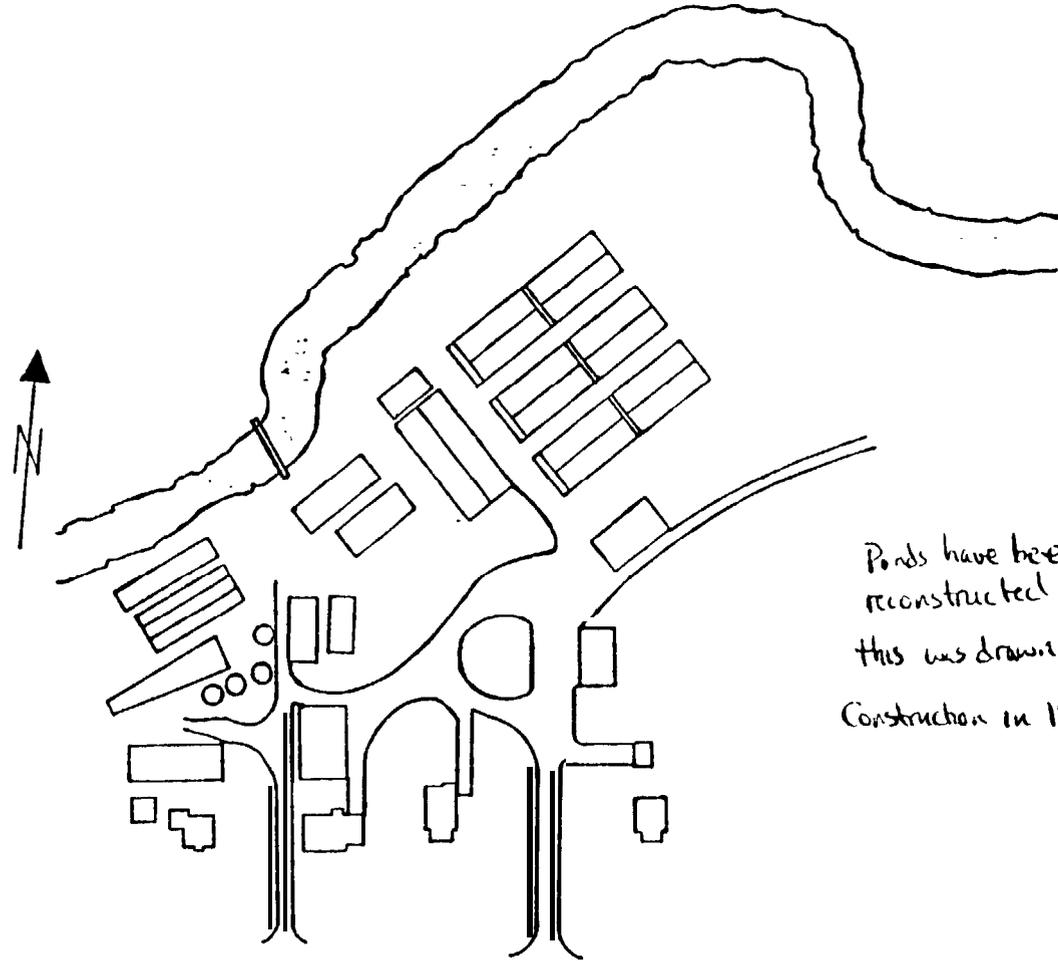
Hatchery Expansion Capability

Hatchery grounds cover 41 acres owned by ODFW. Approximately 20% of the area is currently being utilized. Nearly 19 acres is suitable for hatchery expansion. Current production is constrained by the amount of water available so a new source would need to be developed. There is no surface water available and the potential for well water is very limited.

The hatchery is presently operated at or near capacity. Without additional water the only potential for an increase in production would be for construction of new ponds and the installation of an oxygen supplementation system to more efficiently utilize the presently available water supplies.

No expansion is identified at this time.

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Ponds have been
reconstructed since
this was drawn.
Construction in 1987

ROARING RIVER HATCHERY	
DRAWN J. IRVIN	SCALE 1" = 100'

Round Butte Hatchery
P.O. Box 15
Madras, Or. 97741

Funding Agency: PGE
Species Reared: Spring Chinook
Summer Steelhead

Manager: Bill Nyara
Phone #: (503) 475-6393

Introduction

Round Butte Hatchery is located in a canyon at the base of Round Butte Dam on the Deschutes River 11 miles west of Madras. Hatchery elevation is 1,745 feet above sea level. The facility was constructed and began operation in 1974 and is operated as a mitigation facility for loss of habitat caused by Round Butte Dam. The Pelton Ladder rearing facility is operated as a satellite. The hatchery is staffed with 4.7 FTE's and includes personnel required to operate the Pelton Ladder facility.

Rearing facilities are in good condition and consist of 10 Burrows Ponds, 1 oval pond, 2 adult holding ponds, and 28 starter tanks.

Adults return to a trap below Pelton Ladder and are transported to Round Butte Hatchery for spawning. Most juvenile spring chinook are transferred to Pelton Fishway several months prior to release to complete their rearing. Most smolts are released off station into various areas of the Deschutes River. Past problems with IHN have led to destruction of many summer steelhead eggs.

Water rights total 8,977 gpm from an unnamed spring. The hatchery water is supplied from West Spring with 8,977 gpm available year round. A second spring (East Spring), also supplies a constant 200 gpm to the hatchery. Both springs are located in the canyon walls below Round Butte Dam. Gravity flow delivers water from both springs. Water is not re-used in any of the rearing units at this facility.

Current Production Constraints

The Burrows pond design is not as efficient as raceways for rearing fish.

Water delivery pipe size limits flows that can be delivered to the hatchery. Rearing ponds could utilize additional water.

Springs are high in total dissolved gas. A nitrogen stripping and oxygen supplementation system would be needed to increase production in the present ponds.

Drainage system for starting tanks is poor. Starting tank Ultra Violet (UV) light system limits flow for summer steelhead to 10 gpm per tank.

Incubation chiller and heater capacity is limited to 10 gpm. Egg and fry clean up area is small and inadequate.

Adult summer steelhead diagnosed with IHN has led to destruction of large numbers of eggs in the past.

Theoretical Production

Theoretical production based on the flow method is 101,970 pounds and based on density is 73,609 pounds. Average production was 52,998 and the 1987 agency goal was 36,000 pounds. Theoretical calculations were computed as follows:

Flow Method

Spring Chinook:	1.71 X 800 gpm X 8.22" X 2 ponds =	22,490 lbs
Steelhead:	1.71 X 800 gpm X 8.3" X 7 ponds =	<u>79,480 lbs</u>
		101,970 lbs

Density Method

Spring Chinook:	.25 X 3,950 cu ft X 8.22' X 2 pds =	16,235 lbs
Steelhead:	.25 X 3,950 cu ft X 8.3" X 7 ponds =	<u>57,374 lbs</u>
		73,609 lbs

Note: Only 9 of the 10 Burrows ponds were used in theoretical calculations. Two year classes of fish are held on station and the fingerlings take up pond space.

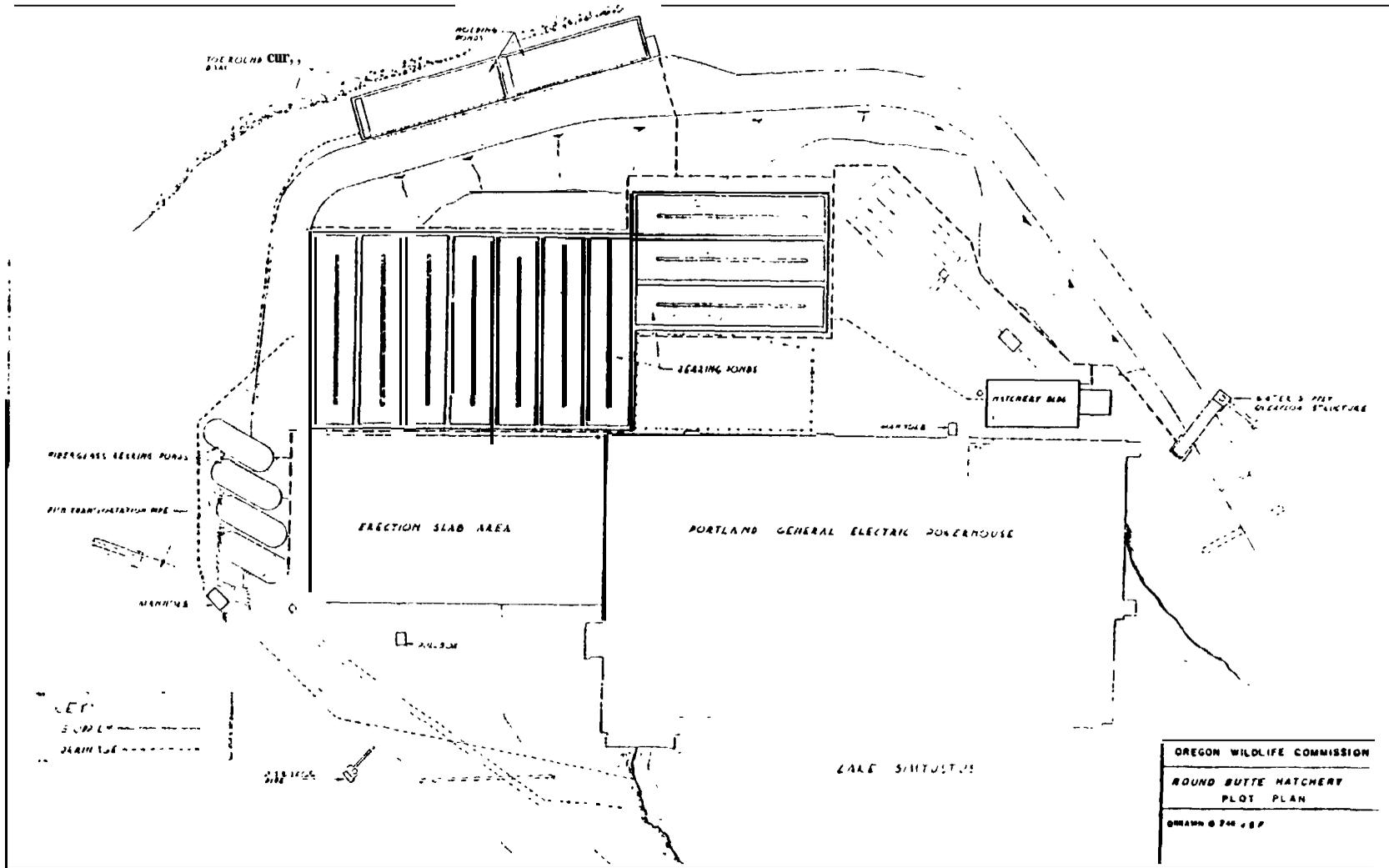
Comparison of the 2 theoretical calculations indicates that pond space appears to be the limiting factor in production. The average and agency goal are both less than either theoretical calculation. This can at least be partially explained by the reduced efficiency of Burrows ponds when compared to standard raceways. Also, stocking constraints imposed because of IHN in steelhead has reduced production requirements.

Hatchery Expansion Capability

The hatchery is situated on 3 acres of land owned by the Confederated Tribes of Warm Springs (CTWS). The area is being utilized 100% for salmonid propagation. Very little adjacent land (owned by BLM and PGE) is suitable for hatchery expansion. An unknown amount of additional water is available from the east spring which is fed from the reservoir above the dam. The potential for well water is unknown.

There is space to construct one new pond 75' X 16 feet near the

present ponds. There is also room for three more ponds of the same size higher up that would require pumping to supply water. The existing water right and additional water available should be able to support these facilities. If steelhead are produced then no additional incubation or starter capacity would be required. If spring chinook were produced then additional incubation and starter ponds would be required. An estimated 112,000 steelhead weighing 28,000 pounds could be produced.



Pelton Ladder
Round Butte Hatchery
P.O. Box 15
Madras, Or. 97741

Funding Agency: PGE
Species Reared: Spring Chinook

Manager: Bill Nyara
Phone #: (503) 475-6393

Introduction

Pelton Ladder is a former fish passage ladder which has had sections converted to rear fish. It is located at the base of Pelton Reservoir (Lake Simtustis), an impoundment on the Deschutes River. Fish production began in 1974 and is operated as a satellite of Round Butte Hatchery. Site elevation is 1,750 feet above sea level. Personnel to operate the facility are included in the Round Butte Hatchery report summary.

The rearing units are in good condition and consist of 3 sections, each providing about 24,200 cubic feet. Depth and width of ladder varies so dimensions provided in Summary Table 3 are averages. There are no incubation or starting facilities. Spring chinook are transferred in from Round Butte Hatchery and reared several months (normally November through May) prior to release in the spring. The ladder is not used during the remainder of the year. All releases were volitional during this evaluation.

Adults return to a trap at this site but are transferred to Round Butte Hatchery for spawning. All adult return information is credited to and can be found in the Round Butte Hatchery section of this report.

No water right is held for this facility. A constant 3,591 gpm is provided by gravity flow from Lake Simtustis. The water is serially re-used through the 3 ladder sections.

Current Production Constraints

Facility is a converted fish ladder. Water is re-used 3 times which reduces production potential in sections 2 and 3. There is practically no limit on water available. The rearing units can not utilize any additional water because of problems associated with flow rate and hydraulics.

Theoretical Production

Theoretical production based on the flow method is 33,423 pounds and based on density is 137,866 pounds. Average production was 23,853 pounds and the 1987 agency goal was 23,333 pounds. Theoretical calculations were computed for spring chinook as follows:

Flow Method *

$$1.225 \times 3,590 \text{ gpm} \times 7.6" = 33,423 \text{ lbs}$$

Density Method

$$.25 \times 72,561 \text{ cu ft} \times 7.6" = 137,866 \text{ lbs}$$

* Note: Theoretical flow calculation uses only the amount of water provided to the first rearing pond. This same amount of water is re-used in the second pond and again in the last pond. No aeration occurs between ponds, therefore you could view this facility as one long raceway with one inflow.

Comparison of the 2 theoretical calculations indicates that flow may be the limiting factor in production. For reasons mentioned previously, no additional water can be utilized in existing units. The serial layout of the rearing units in the ladder restricts amount of water that can be used. In addition, with water being utilized 3 times the potential production is reduced in lower ponds. The agency considers this facility to be near capacity at present, but has excellent potential for expansion.

Hatchery Expansion Capability

Land where the ladder is located is owned by PGE. Additional sections of the former fish ladder could be converted for fish rearing. A major problem as more rearing ponds are constructed is that the same water is used from top of ladder to bottom. Before expansion can occur, serious consideration should be given to design of a plumbing system to remove water after it has been used in 2 or 3 ponds and to add fresh flow along the ladder as needed. A large amount of surface water is available with an additional 14,362 gpm possible through the existing delivery system. The potential for well water is unknown.

An additional 15 ladder sections can be converted to **rearing** units, This will require construction of diversion pipes, weirs, rotary screens, and a roadway. The ladder has a capacity for 17,953 gpm (40 cfs) of water which is enough to supply the additional sections. Separate water distribution systems would be needed.

Additional production is estimated to be between 700,000 to 1,000,000 spring chinook smolts weighing 93,333 to 133,333 pounds. This increase would require additional incubation and starter pond capacity at Round Butte Hatchery to support this production. For purposes of this report, the lesser of the two numbers and pounds listed above is considered to be the expansion capability.

Sandy Hatchery
39800 SE Fish Hatchery Rd.
Sandy, Or. 97055

Funding Agency: NMFS
Species Reared: Coho

Manager: Ken Bourne
Phone #: (503) 668-4222

Introduction

Sandy Hatchery is located along Cedar Creek (Sandy River tributary) near the town of Sandy. Elevation of the hatchery is 500 feet above sea level. The facility was constructed and began operation in 1959 under the CRFDP. Personnel to operate the hatchery total 4.5 FTE's.

Rearing units are in fair to good condition and consist of 20 raceways, 24 incubation troughs, and 1 adult holding pond.

Coho are the only species reared at this station. Adults are collected, spawned and in most years excess eggs taken. Eggs are supplied to various other facilities and to Oregon's Salmon and Trout Enhancement Program (STEP). Approximately 900,000 yearling smolts were released annually during this evaluation. All smolts are released on-site. In addition, 200,000 to 300,000 fingerlings were outplanted into various tributaries each year.

Water rights total 12,577 gpm from an unnamed spring and an unnamed stream. A storage water right for 3.12 acre feet is held for Cedar Creek. Water is supplied to the hatchery by gravity flow from Cedar Creek with a high flow of 8,000 gpm in March and a low flow of 1,800 gpm in July/August. A small amount of spring water is also used. The delivery system is designed to handle over 10,000 gpm when it is available in the stream.

Water is recirculated in the rearing ponds by pump (1,800 gpm capacity) during the summer months. Adult holding ponds are supplied with water from rearing ponds.

Current Production Constraints

Available water is limiting production. A maximum of 65% of the water right is being used. Low flow and high temperature in the summer limits pounds which can be held on station and ultimately smolt production. If additional water were available to match pond space production could be increased.

Homes and a private trout farm are located upstream from hatchery intake. These present a potential threat to water quality and source for importing disease organisms.

Adult holding pond is too small for the large number of fish

handled at this station.

Theoretical Production

Theoretical production based on the flow method is 63,342 pounds and based on density is 173,880 pounds. Average production was 71,266 pounds and the 1987 agency goal was 66,700 pounds. Theoretical calculations were computed for coho salmon as follows:

Flow Method *

$$1.7 \times 6,480 \text{ gpm} \times 5.75" = 63,342 \text{ lbs}$$

Density Method *

$$.3 \times 5,600 \text{ cu ft} \times 5.75" \times 18 \text{ ponds} = 173,880 \text{ lbs}$$

* Note: Only 18 of the 20 ponds are used in theoretical calculations. There are two year classes of coho held on station in the spring and the fingerlings take up the remaining water and space.

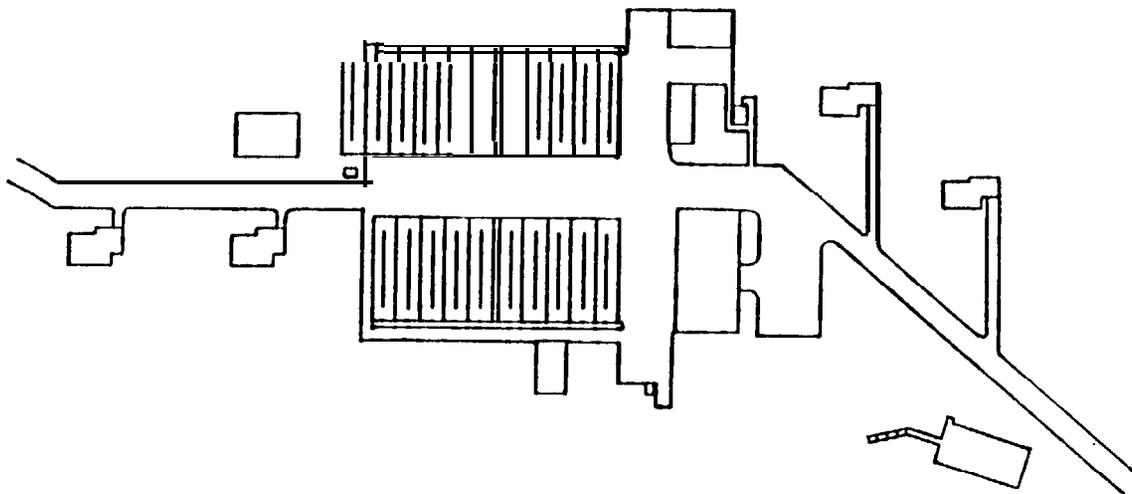
Comparison of the 2 theoretical calculations indicates that flow is limiting factor in production. Production is restricted **by** available flow to hatchery rearing units especially during summer months. There is no additional surface water that can be utilized in the summer.

Hatchery Expansion Capability

The hatchery is situated on 12.34 acres owned by ODFW. Approximately 100% of the area is being utilized and there is no room for expansion. No more surface water is available to operate any additional ponds even if space for expansion existed. The potential for well water is unknown.

Summer low flows are limiting at this facility. If additional water could be supplied to existing facilities production should be able to be expanded. The only potential source for **this** water would be from wells. A feasibility study is required to determine **the** amount of water which could be provided before an estimate of production potential can be made. Without well water, the only potential capability for expansion would be to install an oxygen supplementation system to better utilize the present water supply.

No expansion capability is identified.



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SANDY RIVER HATCHERY	
DRAWN J. PRIN	SCALE 1"=100'

South Santiam Hatchery
43182 N. River Dr.
Sweet Home, Or. 97386

Funding Agency: COE 70%, ODFW 30%

Species Reared: Spring Chinook
Summer Steelhead
Coho

Manager: Gene Middaugh
Phone #: **(503) 367-3437**

Introduction

South Santiam Hatchery is located on the South Santiam River (Willamette Basin) just downstream from Foster Dam. Elevation of the facility is 500 feet above sea level. The hatchery began operation in 1925. It was remodeled in 1968 and again in 1984. The COE began funding operations as mitigation for federal dams after 1968. Aumsville Ponds and **Stayton** Pond are operated as satellite facilities, but receive funding from NMFS as part of the CRFDP. Staffing to operate the facility totals 5.0 **FTE's** and does not include personnel needed to operate the satellite facilities.

The rearing facilities are in good condition and include 10 Burrows ponds of 4,147 cubic feet each and 4 Burrows ponds of 5,022 cubic feet each. The adult holding pond is not used for rearing.

Adult spring chinook and summer steelhead are collected and spawned. Adult winter steelhead also return but are not normally incorporated into the production program. Spring chinook and summer steelhead eggs are eyed up and transferred out prior to hatching. The hatchery receives fingerling fish back and rears them until release as yearling smolts. Coho salmon were transferred in and reared for **2** years of the evaluation. Smolts are released on-site and into various tributaries.

A single water right dating back to 1928 for 2,244 gpm from Coal Creek is recorded. This water supply is no longer used. The hatchery currently receives water from Foster Reservoir. A total of 8,400 gpm is available for the rearing units. An additional 5,500 gpm is used in the adult holding pond. Water temperature to rearing ponds can **be** controlled by adjusting the shallow and deep reservoir intakes. The adult holding pond is only supplied from the deep intake. Rearing ponds all receive single pass water.

Current Production Constraints

The adult holding pond is too small. The water supply from the deep reservoir intake is low in dissolved oxygen. The pond also has poor water distribution. Flow in the spring chinook portion of the adult holding pond flows over adult steelhead. Construction of a new adult holding pond is needed to adequately hold both spring chinook and summer steelhead in separate ponds and to reduce loss from disease.

Isolated egg incubation is required due to incidence of IHN. This reduces the egg incubation capacity.

There is no way to release fish from rearing ponds directly into the river. They must be loaded into liberation trucks for release.

If Burrows ponds were converted to standard raceways fish health and survival rate of smolts should improve. A limited increase in production could possibly also be accomplished. The water distribution system and pollution abatement pond would need to be enlarged.

Any change in production or expansion would need to be coordinated with COE.

Theoretical Production

Theoretical production based on the flow method is 113,858 pounds and with density is 118,859 pounds. Average production was 76,104 pounds and the 1987 agency goal was 84,350 pounds. Theoretical calculations were computed as follows:

Flow Method

Steelhead:	1.86 X 600 gpm X 8.3" X 7 ponds =	64,839 lbs
Coho:	1.39 X 600 gpm X 5.75" X 3 ponds=	14,387 lbs
Spring Chinook:	1.95 X 600 gpm X 7.4" X 4 ponds=	<u>34,632 lbs</u>
		113,858 lbs

Density Method

Steelhead:	.25 X 4,147 cu ft X 8.3" X 7 pds =	60,235 lbs
Coho:	.3 X 4,147 cu ft X 5.75" X 3 pds =	21,461 lbs
Spring Chinook:	.25 X 5,022 cu ft X 7.4' X 4 pds =	<u>37,163 lbs</u>
		118,859 lbs

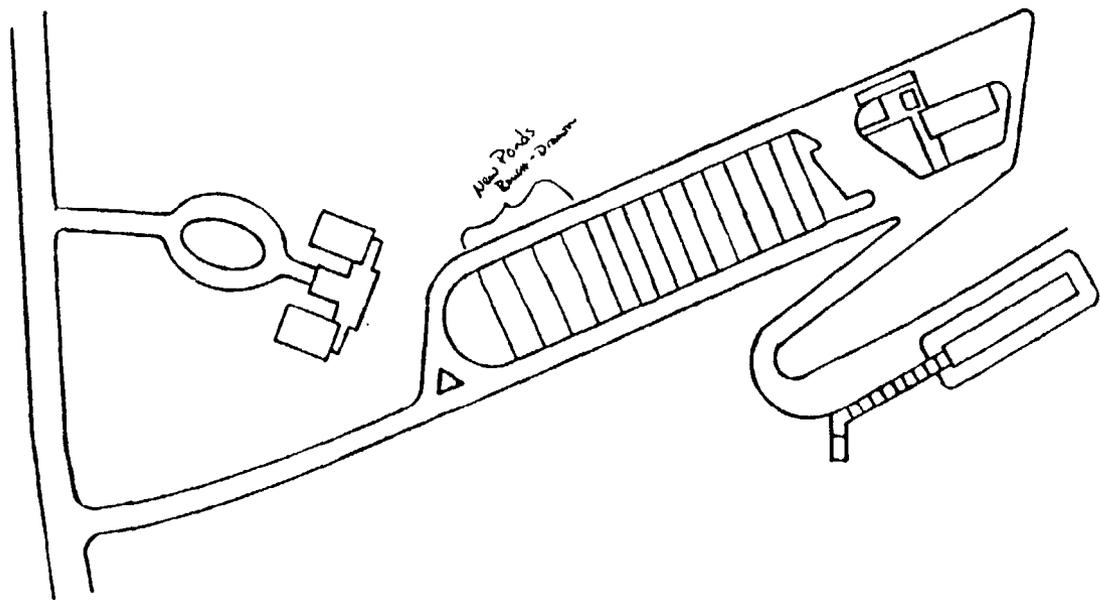
Comparison of the 2 theoretical calculations indicates that flow and pond space appear to be in balance. The agency considers this facility to be at capacity.

Hatchery Expansion Capability

The hatchery is situated on 13 acres owned by COE. Approximately 90% of the area is currently used for fish culture. The remaining land is suitable for expansion. Sufficient water for any expansion should be available from Foster Reservoir. The existing water delivery system can not provide any additional water. The potential for well water is unknown.

No expansion capability is identified.

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S. SANTIAM HATCHERY

DRAWN J. IRVIN

SCALE 1"=100'

Aumsville Ponds
South Santiam Hatchery
43182 N. River Dr.
Sweet Home, Or. 97386

Funding Agency: NMFS
Species Reared: Fall Chinook

Manager: Gene Middaugh
Phone #: (503) 367-3437

Introduction

Aumsville Ponds are located 2 miles east of Aumsville (Willamette Basin). They are operated as a satellite facility of South Santiam Hatchery. Elevation of the ponds is 500 feet above sea level. The facility is staffed with 1.3 FTE's and is the same personnel used to operate Stayton Pond.

The ponds are made of dirt and gravel and are in good condition. There are 6 ponds each with 9,000 cubic feet. No adults are collected at this site and there are no egg incubation facilities. The ponds are used to start fall chinook for Stayton Pond and do not release any fish. Fry and/or fingerlings are normally transferred in from Bonneville Hatchery in December. They are reared until 300 to 600 fish per pound and then transferred to Stayton Pond, usually in February to complete the rearing cycle. In the past, problems associated with Myxobolus insidiosus, a protozoan parasite, have occurred in fish held later than February.

No water right is held for Aumsville Ponds. The ODFW purchases 2,244 gpm of water from the Santiam Water Control District. Actual flow provided to the ponds ranges from 2,244 gpm to 4,488 gpm. Water availability during the irrigation season is questionable. In addition, parasitic diseases do not allow utilization of ponds for more than a short period in the winter. All ponds receive single pass water.

Current Production Constraints

Water is purchased and obtained from an irrigation canal. There are potential problems associated with chemical contamination of irrigation return water from farms in the area. Purchased water may not be available during summer months when irrigation demand is highest.

Myxobolus insidiosus infestations require removal of fish by the middle of February.

Ponds sometimes ice up in the winter. Screens and dam boards need repairing or replacement. Gravel is needed for ponds and truck loading area.

Theoretical Production

Theoretical production based on the flow method is 18,322 pounds and based on density is 34,992 pounds. Average production was 16,039 pounds and there was no 1987 agency goal. The average production includes only fish transferred to stayton Pond as no smolts are produced. Theoretical calculations were computed for fall chinook as follows:

Flow Method

$$1.89 \times 4,488 \text{ gpm} \times 2.16" = 18,322 \text{ lbs}$$

Density Method

$$.3 \times 9,000 \text{ cu ft} \times 2.16" \times 6 \text{ ponds} = 34,992 \text{ lbs}$$

Comparison of the 2 theoretical calculations indicates that flow is probably the limiting factor in production.

Hatchery Expansion Capability

The hatchery is situated on 20 acres owned by Marion County. Approximately 40% of the land is currently utilized for fish culture. An additional 40% (about 8 acres) of land is suitable for expansion. Additional surface water may not be available. The existing supply is unsuitable for rearing except during a short period in the winter and should not be considered as a source for hatchery expansion. The potential for well water is unknown.

Due to limited water source, disease problems, and potential for agriculture and chemical contamination of surface water, ODFW does not consider this facility as having any potential for expansion.

No expansion capability is identified.

Stayton Pond
South Santiam Hatchery
43182 N. River Drive
Sweet Home, Or. 97386

Funding Agency: NMFS
Species Reared: Fall Chinook

Manager: Gene Middaugh
Phone #: (503) 367-3437

Introduction

Stayton Pond is located on the North Fork Santiam River near the town of Stayton. It is operated as a satellite facility of South Santiam Hatchery. Elevation of the pond is 448 feet above sea level. The pond was first operated in 1971 when the site was leased from the owners. In 1984, land the pond is situated on was purchased by ODFW. The pond was developed to provide a rearing facility for the Willamette River fall chinook program and is currently operated as part of the CRFDP. The facility is staffed with 1.33 FTE*s (shared with Aumsville Ponds).

Rearing facilities consist of old gravel pits which were mined to varying depths and irregular shapes. There are 2 dirt and gravel ponds located at this site, an upper and lower pond. The upper pond is not currently used as a rearing pond. Fish production and capacities deal only with the lower pond in this report. The rearing pond has about 11 surface acres with approximately 3,920,000 cubic feet.

No adults are presently collected at this facility. Fingerling fall chinook are transferred in from Aumsville Pond in mid February at 300 to 600 fish per pound. They are reared until release in May as zero age smolts. The fall chinook usually originate from eggs taken at Bonneville Hatchery. The pond is not normally used during the remainder of the year. Fish are released into various tributaries of the Willamette River. Spring chinook were reared experimentally 1 year during this evaluation.

The water right totals 22,532 gpm from the North Santiam River and a spring. The spring totals 90 gpm of the water right and is used for domestic purposes. The entire water right from the North Santiam River is used in the pond. Water first flows into an upper pond and exits that pond through a screen into the lower pond where fish are reared. Water is used once through the pond.

Current Production Constraints

The large irregular depth and shape of the pond prevents any treatment for disease problems should they occur. The pond also has irregular flow patterns.

Part of the water delivery system from river intake to upper pond

is an open canal. Vegetation grows in the canal and pond. Weeds can plug screens between upper and lower ponds. The lower pond can be drained but a culvert is needed to drain upper pond so weeds will freeze in winter.

The pond area currently has no power source.

Theoretical Production

Theoretical production based on the flow method is 108,018 pounds and with density is 449,232 pounds. Average production was 87,580 pounds and the 1987 goal was 91,667 pounds. Average production includes spring chinook which were reared experimentally in 1985 after fall chinook were released. Theoretical calculations were computed for fall chinook as follows:

Flow Method

$$1.26 \times 22,442 \text{ gpm} \times 3.82" = 108,018 \text{ lbs}$$

Density Method

$$.03 \times 3,920,000 \text{ cu ft} \times 3.82" = 449,232 \text{ lbs}$$

Comparison of the 2 theoretical calculations seems to indicate that flow is limiting factor in production. This is a little misleading as large rearing ponds like this one can almost never approach production based on theoretical density calculations. It is unrealistic to expect production based on the density formula at this facility.

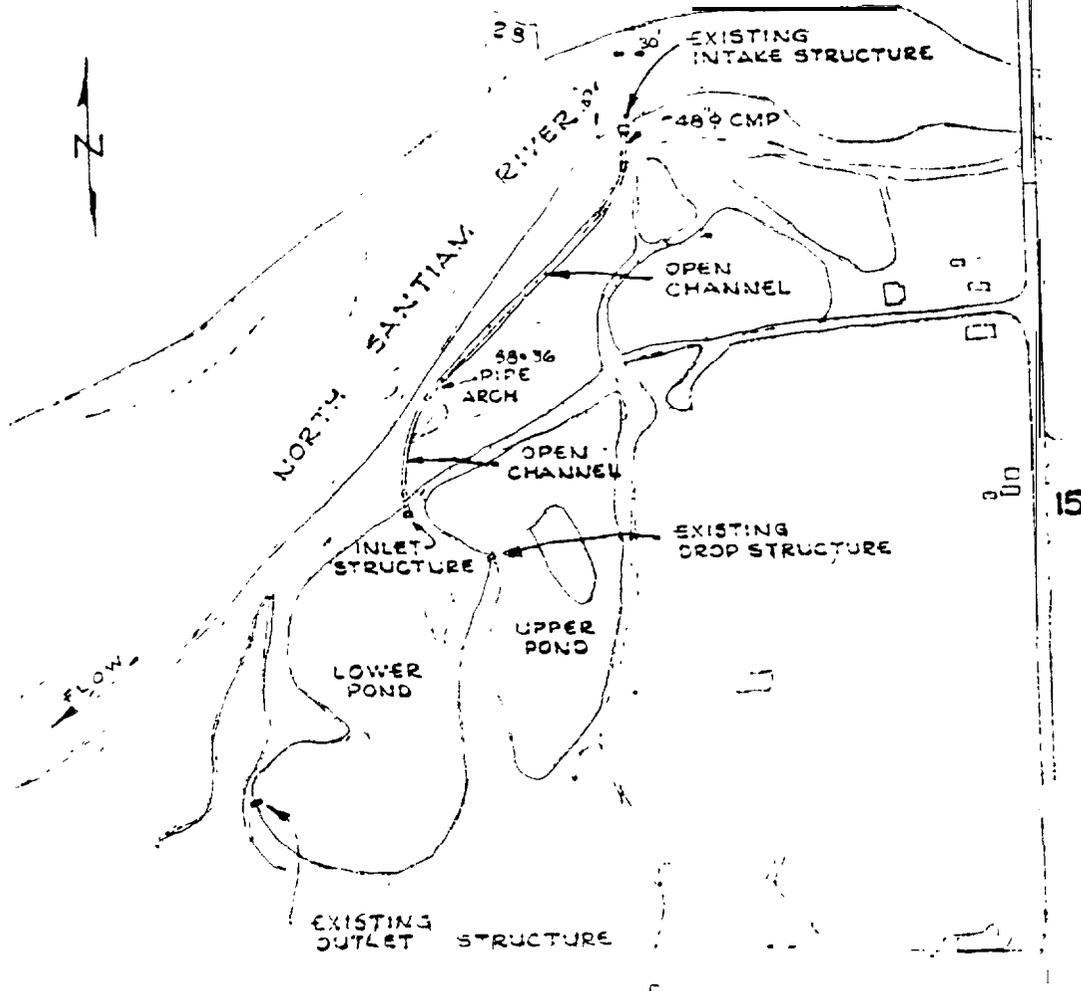
This large pond with its uneven flow patterns, long water turnover time, and dead areas may also prevent the theoretical production based on flow from being achieved. This facility produces high quality smolts that survive very well. Even though the agency goal and average production are below theoretical flow calculations, production should be considered to be near capacity based on the success of the current program.

Hatchery Expansion Capability

This facility is situated on 30 acres owned by ODFW. Currently 50% of the area is being utilized. The remaining area is suitable for expansion. The upper pond could also be converted to rear fish. Additional water from the North Santiam River is available. The potential for well water is unknown. Power would have to be provided before wells could be pumped.

The present 3 acre upper pond could be used to rear fish and could be rebuilt or enlarged at minimal cost. The water supply system

could be constructed to operate both ponds as separate units or as one enlarged area. Reconstruction of the water supply canal with a buried pipeline, river intake, and water control structure between the two ponds would be needed. The potential production increase is estimated at 3,600,000 fall chinook smolts weighing 90,000 pounds.



SITE PLAN

1" = 400'

STAYTON RIVER

Wallowa Hatchery
Route 1, Box 278
Enterprise, Or. 97828

Funding Agency: COE, USFWS, ODFW

Species Reared: Summer Chinook
Resident Trout
Resident Coho

Manager: John Isley
Phone #: (503) 426-4467

Introduction

Wallowa Hatchery is located along Spring Creek, a tributary of the Wallowa River (Grande Ronde River system) near the town of Enterprise in northeast Oregon. It is situated 3,700 feet above sea level. The hatchery was constructed and began operation in 1920 producing resident trout. In 1985, the hatchery was renovated and 2 acclimation ponds constructed under the LSRCP to also rear summer steelhead. Big Canyon and Little Sheep Acclimation Ponds are operated as satellite facilities. The majority of fish production at this facility consists of resident fish. The hatchery is staffed with 3 FTE's.

There are many types of rearing units at this facility. Summer steelhead production occurs only in the 2 acclimation ponds each with 44,100 cubic feet of rearing space. The acclimation ponds were constructed in 1985 and are in good condition. An adult holding pond with 7,200 cubic feet is used to hold adult summer steelhead and spring chinook, but is not used for juvenile rearing. Water use, juvenile production, and rearing capacities in this report include only those facilities used to rear anadromous fish (the 2 acclimation ponds). Summary Table 3 also lists facilities used for the resident trout program.

Adult summer steelhead are collected and spawned here. Eggs are shipped to Irrigon Hatchery for incubation and juveniles are reared until just prior to release. Presmolts are then transferred back to Wallowa Hatchery for acclimation 4 to 6 weeks prior to release. Depending on the length of time fish are acclimated, either Irrigon or Wallowa Hatcheries may receive credit for the smolt releases. Some of the releases credited to this facility include groups of fish acclimated for a short time at Little Sheep Acclimation Pond. Yearling smolts are released on-site and into various tributaries of the Grande Ronde River.

Diseases cause no major problems in juvenile fish due to short time they are held.

Water rights for the entire hatchery total 23,813 gpm from several sources. The acclimation ponds receive water from Spring Creek with a water right of 7,630 gpm (part of the total water right above). Water is supplied by gravity flow and the entire amount is available for use. Temperature and flow information in Summary Tables are only for February through April, those months the acclimation ponds have been operated.

Water is re-used from the upper acclimation pond to the lower one. The adult holding pond also receives water after it has passed through acclimation ponds.

Current Production Constraints

The available water supply is limiting production. Production has recently been reduced from 600,000 to 500,000 smolts because of limited water supply.

Spring Creek is contaminated from agricultural run-off. High turbidity and low dissolved oxygen are also problems. Low flows and high water temperatures in the summer are obstacles to year round rearing. Ponds often freeze over during the winter.

High adult mortality is a major problem and has aggravated egg shortages in past years. High egg losses have also occurred. These losses may be related to water supply.

There is insufficient flow to run trough and incubators at the same time.

Theoretical Production

Theoretical production based on the flow method is 51,875 pounds and with density is 183,015 pounds. Average production was 119,688 pounds and the 1987 agency goal was 200,000 pounds. Production has recently been reduced to 500,000 smolts weighting 100,000 pounds because of limited water supply. Theoretical calculations were computed for summer steelhead as follows:

Flow Method *

$$1.25 \times 5,000 \text{ gpm} \times 8.3" = 51,875 \text{ lbs}$$

Density Method

$$.25 \times 44,100 \text{ cu ft} \times 8.3" \times 2 \text{ pds} = 183,015 \text{ lbs}$$

* Note: The flow used in calculation is only the water being supplied to the first pond. The second pond also receives the 5,000 gpm as re-use from the first pond. If the same water supply is used in the second pond it would double the theoretical flow calculation to 103,750 pounds. There is no aeration between ponds and the ODFW considers the two ponds as one long pond with a single water supply.

Comparison of the 2 theoretical calculations indicates that flow is

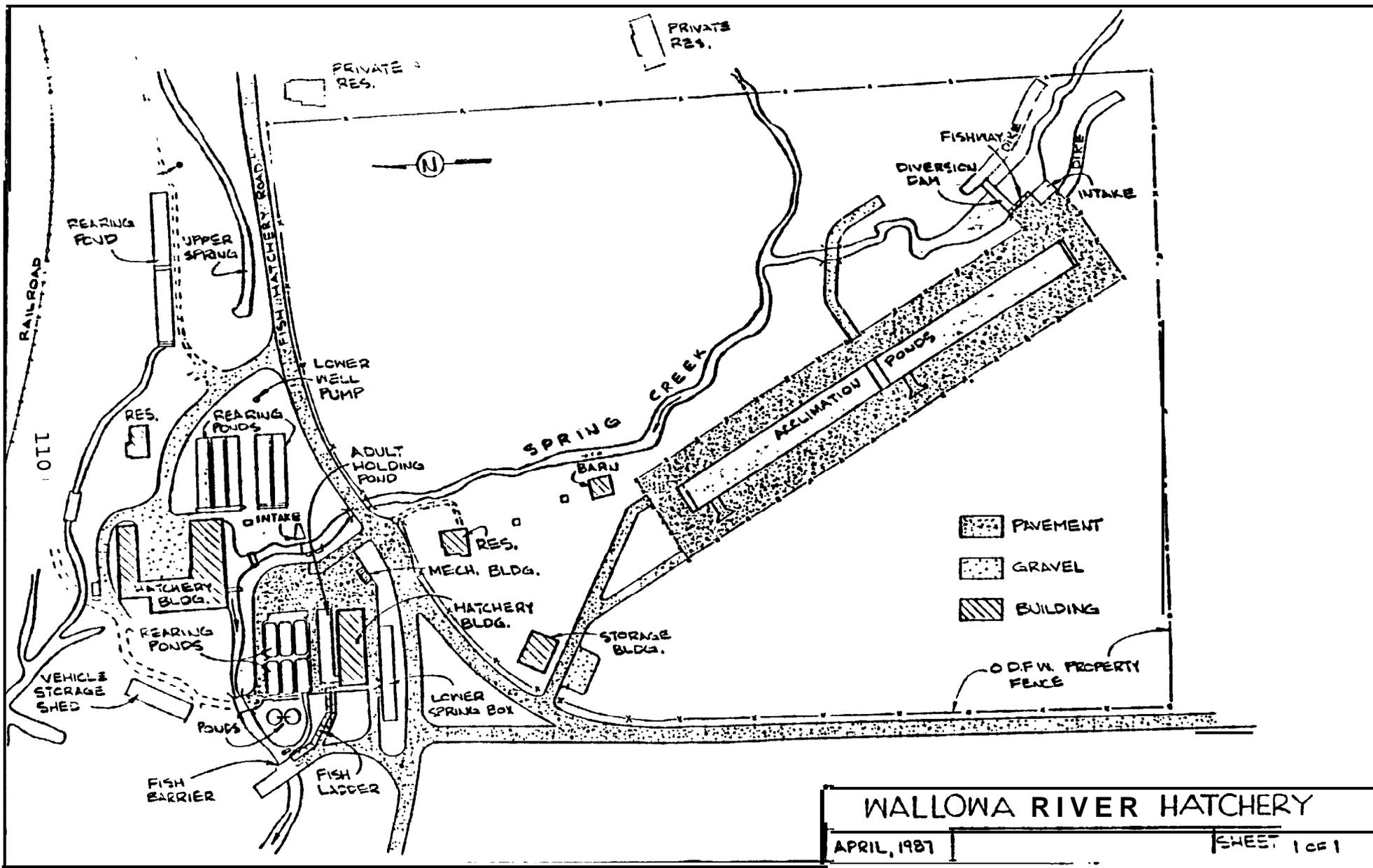
the limiting factor in production. The recent reduction in the agency goal bears this out. The 1987 goal is well above what can be produced based on the 'water supply and available flow and is even slightly higher than density calculations. If additional water could be found and single pass could be provided to each pond then production could probably be increased quite a bit.

Based on available flow and agency experience, a realistic production capacity is about 100,000 pounds with existing facilities. To improve smolt quality a total of 10,000 gpm should be supplied to the ponds (5,000 gpm for each pond).

Hatchery Expansion Capability

The hatchery is situated on 111 acres own by ODFW. Most of the area is in wildlife area and horse pasture. There is room for hatchery expansion but additional water supplies of good quality are not readily available from surface sources. The potential for well water is not known.

No expansion capability is identified.



WALLOWA RIVER HATCHERY

APRIL, 1987

SHEET 1 OF 1

Big Canyon Acclimation Pond
Wallowa Hatchery
Route 1, Box 277
Enterprise, Or. 97828

Funding Agency: USFWS
Species Reared: Spring Chinook
Summer Steelhead

Manager: John Isley
Phone #: (503) 426-4467

Introduction

Big Canyon Acclimation Pond is located at the junction of Deer Creek and the Wallowa River east of the town of Minam. Elevation of the site is 2,590 feet above sea level. The facility was constructed and began operation in 1987 under the LSRCF. The facility is operated with .3 FTE's. It was not in operation during this evaluation period.

The facility consists of 2 ponds each with 15,750 cubic feet used for summer steelhead acclimation, 1 pond with 7,350 cubic feet used for spring chinook acclimation, and an adult holding pond with 1,350 cubic feet. The adult holding pond is not used to rear juveniles.

This facility is used to collect adults and for short term acclimation of smolts prior to release. Smolts are transferred in from Irrigon or Lookingglass Hatcheries 4 to 6 weeks prior to release.

Water rights total 5,835 gpm from Deer Creek. The facility obtains its water from Deer Creek. Maximum flow available is 3,000 gpm in March and the lowest is 800 gpm in February. This flow data is only for February and March, the time when smolts are being acclimated. Available flow is much less in late summer and fall when spring chinook adults are being collected and held.

Water is re-used from the upper steelhead pond to the lower one. The spring chinook rearing pond uses single pass water. The adult holding ponds can receive water from rearing ponds if needed.

Current Production Constraints

A limited water supply is available in late summer and fall. It is cold in winter and spring and warm in later summer and early fall. Year round rearing is not feasible with existing water supply.

Theoretical Production

Theoretical production based on the flow method is 32,578 pounds and with density is 71,536 pounds. No releases were made during this evaluation period. Theoretical calculations were computed as

follows:

Flow Method

Steelhead: *	1.75 X 2,000 gpm X 8.3"	= 29,050 lbs
Spring Chinook:	1.75 X 600 gpm X 3.36"	= <u>3,528 lbs</u>
		32,578 lbs

Density Method

Steelhead:	.25 X 15,750 cu ft X 8.3" X 2 pds	= 65,362 lbs
Spring Chinook:	.25 X 7,350 cu ft X 3.36" X 1 pd	= <u>6,174 lbs</u>
		71,536 lbs

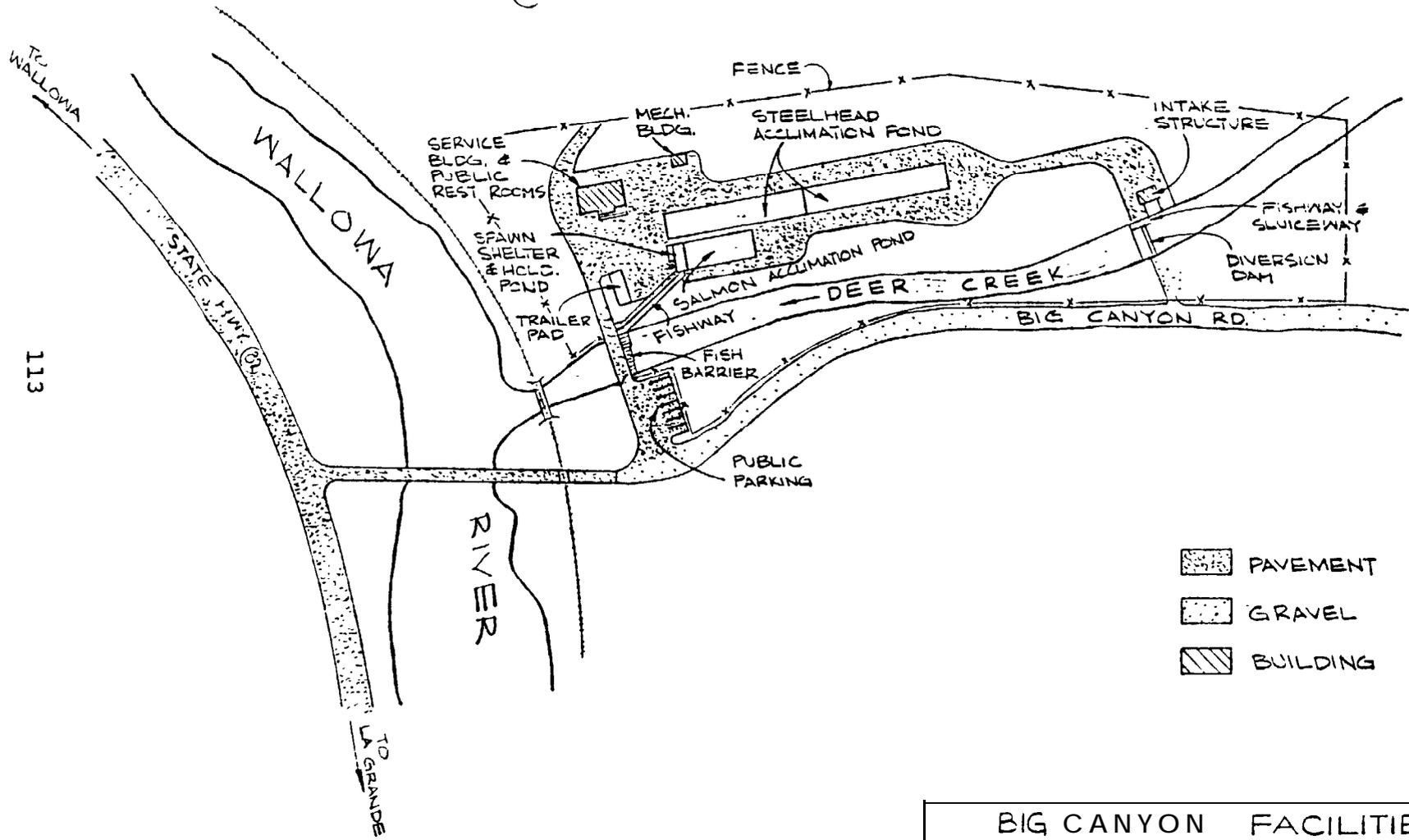
* Note: Only flow supplied to upper steelhead acclimation pond is used in calculation. The same amount of water is re-used in lower steelhead pond. If the same amount of water is used in calculation for lower pond, then the steelhead poundage would double to 58,100 pounds. Water is not aerated between ponds and the ODFW treats both ponds as if they were one continuous pond.

Comparison of the 2 theoretical calculations indicates that flow appears to be the limiting factor in production. This is slightly misleading as water is re-used in lower steelhead acclimation pond. This is an acclimation facility and was not designed for long term rearing.

Hatchery Expansion capability

This facility is situated on land owned by the COE and is currently 100% in use. There is no room for additional rearing facilities. The existing water supply is limited, is basically supplied from snow melt, and will not support year round or additional facilities. Also, the water supply dries up during late summer and fall, The potential for developing enough water from wells to operate this facility is very limited.

No expansion capability is identified.



-  PAVEMENT
-  GRAVEL
-  BUILDING

Flow Method

$$1.31 \times 2,000 \text{ gpm} \times 8.3" = 21,746 \text{ lbs}$$

Density Method

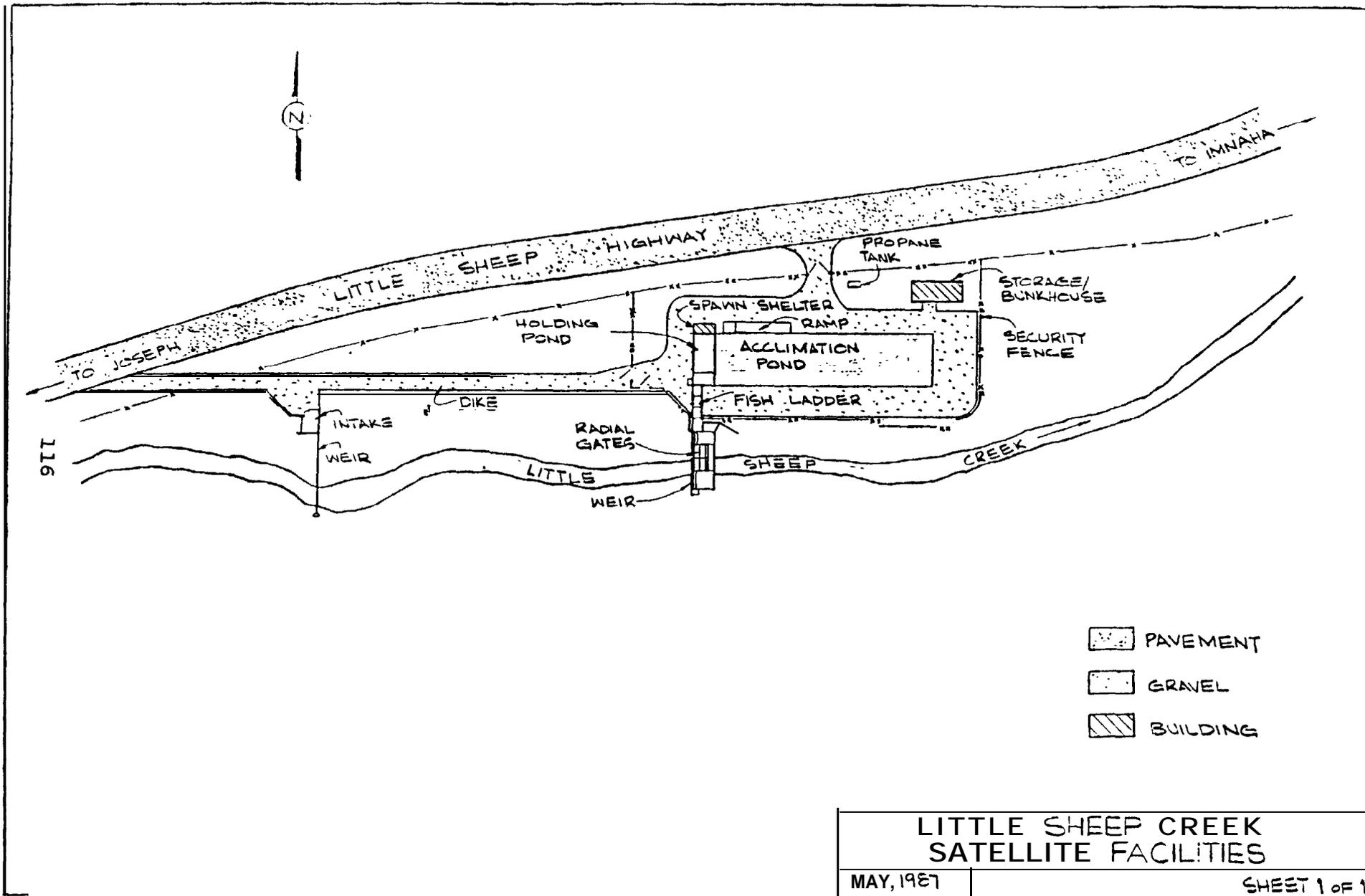
$$.25 \times 34,125 \text{ cu ft} \times 8.3' = 70,809 \text{ lbs}$$

Comparison of the 2 theoretical calculations indicates that flow is probably the limiting factor in production. It appears that the agency goal of 50,000 pounds may be a little high based on a flow of 2,000 gpm being supplied to the pond. The water right held is 8,797 gpm, but ODFW indicates that no additional water is available.

Hatchery Expansion Capability

This facility is situated on 5 acres of land owned by the USFS. Approximately 20% of the site is in use. The remaining area is not suitable for expansion. There is no additional water available from the Little Sheep Creek. The existing water supply can not support year round operation as the creek dries up in late summer and early fall. The facility was designed only as acclimation site for spring release and adult recapture. The potential for water from wells is unknown.

No expansion capability is identified.



Willamette Hatchery
76389 Fish Hatchery Rd.
Oakridge, Or. 97463

Funding Agency: COE 83.75%
ODFW 16.25%

Manager: Tom Herbst
Phone #: (503) 782-2933

Species Reared: Spring Chinook
Winter Steelhead
Summer Steelhead

Introduction

Willamette Hatchery is located along Salmon Creek approximately 3 miles upstream from its confluence with the Middle Fork Willamette River near the town of Oakridge. Elevation of the facility is 1,217 feet above sea level. The Dexter Rearing Pond is operated as a satellite facility. Staffing to operate the hatchery totals 10.7 FTE's.

The rearing units are in fair to good condition and consist of 10 raceways, 40 modified Burrows ponds, 4 circular ponds, 2 adult trout brood ponds, and 1 adult salmon holding pond. The adult salmon pond is irregularly shaped and constructed of dirt. In 1989, seven of the modified Burrows ponds were remodeled into 4 standard raceways and 3 ponds into 2 three pass Michigan style ponds. The hatchery is basically split into separate salmon and trout rearing sections. This report summarizes only the anadromous fish production which are the primary species reared at this station.

Adult spring chinook are collected at Dexter Rearing Pond and transferred in. They are the only species spawned. Summer and winter steelhead are usually received as fingerlings from several different hatcheries. All smolts are released off-site.

Water rights total 37,028 gpm from Salmon Creek. Flow available to the hatchery based on the water delivery system capacity ranges from a low of 29,623 gpm to a high of 37,028 gpm. All facilities receive single pass water except for the trout broodstock ponds which can also re-use water from rearing ponds, and the Michigan style ponds which re-use water in a three-pass system.

Current Production Constraints

The spring chinook adult holding pond is irregularly shaped and made of dirt.

There are possible flow restrictions in September/October. After the rains begin, usually late in October, flows are no longer a problem.

Mud and silt load in the water supply can be severe. If eggs are placed in redwood troughs some loss occurs. Debris on intake screens in fall and early winter can restrict flow to rearing ponds

for periods of time.

There is no capability for on-site releases.

Theoretical Production

Theoretical production based on the flow method is 278,506 pounds and with density is 310,253 pounds. Average production was 172,395 pounds and the 1987 goal was 143,439 pounds. Theoretical calculations were computed as follows:

Flow Method *

Summer Steelhead:	1.36 X 900 gpm X 7.8" X 3 ponds	=	28,642 lbs
Spring Chinook:	1.45 X 600 gpm X 7.18" X 40 pds	=	<u>249,864 lbs</u>
			278,506 lbs

Density Method *

Summer Steelhead:	.25 X 7,500 cu ft X 7.8" X 3 pds	=	43,875 lbs
Spring Chinook:	.25 X 3,710 cu ft X 7.18" X 40 pds	=	<u>266,378 lbs</u>
			310,253 lbs

* Note: There are a total of 40 Burrows ponds and 10 standard raceways at this facility. The 7 raceways not used in calculations were rearing resident trout.

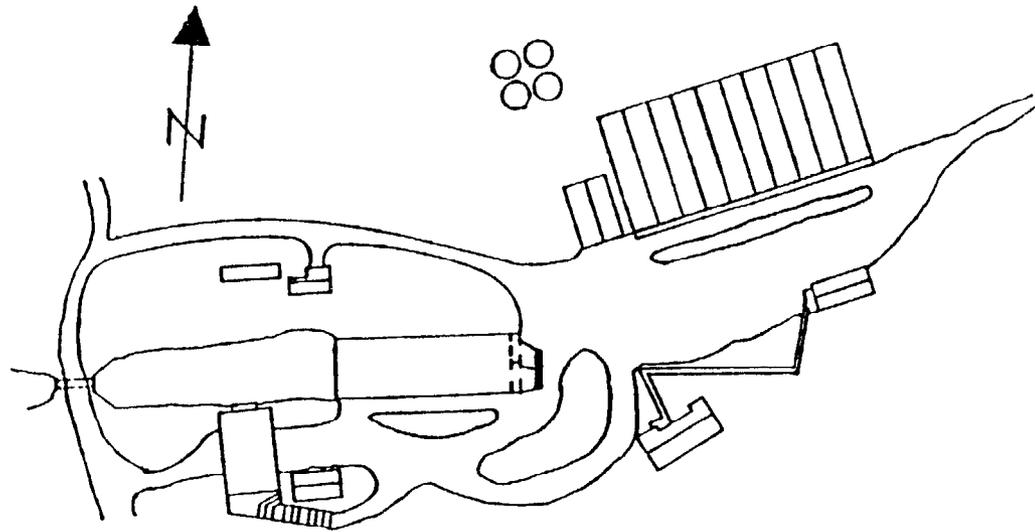
Comparison of the 2 theoretical calculations indicates that flow may be a slight limiting factor in production.

Hatchery Expansion Capability

The hatchery is situated on 75 acres owned by the USFS. Approximately 8% of the area is currently being utilized for fish culture. The remaining land is suitable for hatchery expansion. Additional surface water is not available during low flow periods of the year. The potential for well water is unknown.

No expansion capability is identified.

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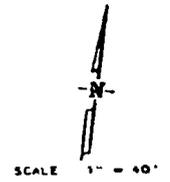
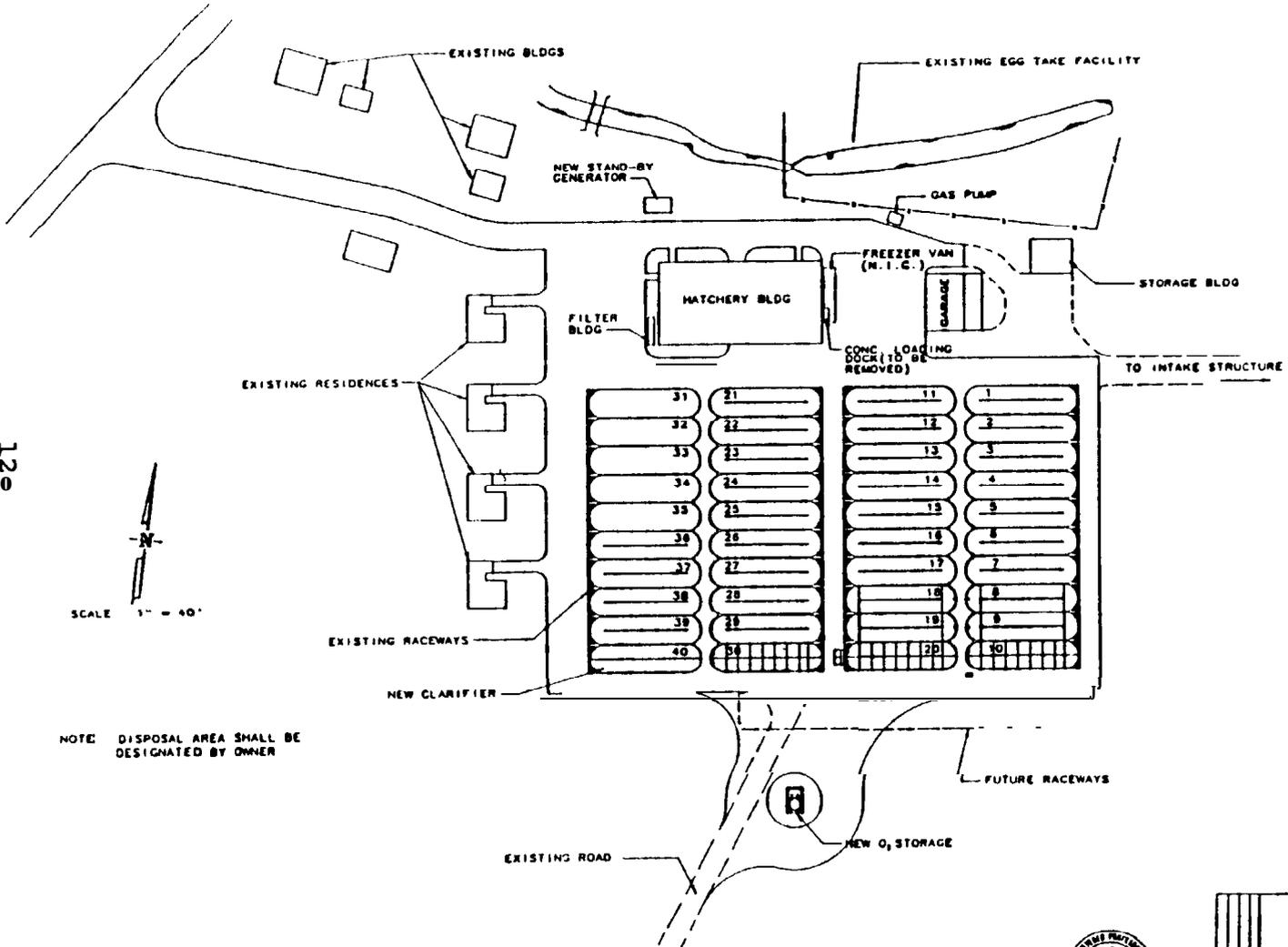


WILLAMETTE RIVER HATCHERY

DRAWN J. RV:V

SCALE 1" = 100'

120



NOTE: DISPOSAL AREA SHALL BE DESIGNATED BY OWNER

WILLAMETTE FISH HATCHERY



Date: 9/9/89 Title: [unclear]	DEPARTMENT OF FISH & WILDLIFE STATE OF OREGON
	WILLAMETTE HATCHERY OXYGEN SUPPLEMENTATION
	SITE PLAN POND AREA
	Date: 9/9/89 Title: [unclear]

Dexter Rearing Pond
P.O. Box 75
Lowell, Or. 97452

Funding Agency: COE 83.75%
ODFW 16.25%

Species Reared: Spring Chinook

Manager: Tom Herbst
Phone #: (503) 937-2714

Introduction

Dexter Rearing Pond is located near the town of Lowell on the Middle Fork Willamette River. It is operated as a satellite of Willamette Hatchery. Elevation of the site is 675 feet above sea level. It is staffed with 1 FTE.

Rearing facilities are in good condition. They consist of 4 raceways, 1 asphalt rearing pond, and 1 adult holding pond. There are no incubation or starting tanks at this facility. The adult holding pond is also used for juvenile rearing.

Adult spring chinook are collected and normally transferred to Willamette Hatchery for spawning. Fingerlings are transferred back for rearing. Smolt releases during this evaluation occurred both in the fall and spring of each year. Releases are made both on-site and into various tributaries.

No water right is held for this facility. Water is supplied by gravity flow to the rearing units from Dexter Reservoir. The delivery system is capable of supplying about 30,071 gpm year round. Water temperatures range from 38 to 58 degrees fahrenheit throughout the year. All rearing units receive single pass water.

Current Production Constraints

Leaves and other debris on the intake screen can be a problem at certain times.

Adult spring chinook do not do well in holding pond.

If water temperature exceeds 57 degrees fahrenheit columnaris becomes a problem.

The facility is owned by the COE and any changes would need to be coordinated with them.

Theoretical Production

Theoretical production based on the flow method is 487,956 pounds and with density is 211,657 pounds (in the spring). Average production was 200,425 pounds and the agency goal was 101,250 pounds. Approximately 1/3 of releases were made in the fall and

the remaining in the spring. Theoretical calculations were computed for spring chinook during March as follows:

Flow Method

$$2.26 \times 30,071 \text{ gpm} \times 7.18" = 487,956 \text{ lbs}$$

Density Method

$$.25 \times 117,915 \text{ cu ft} \times 7.18" = 211,657 \text{ lbs}$$

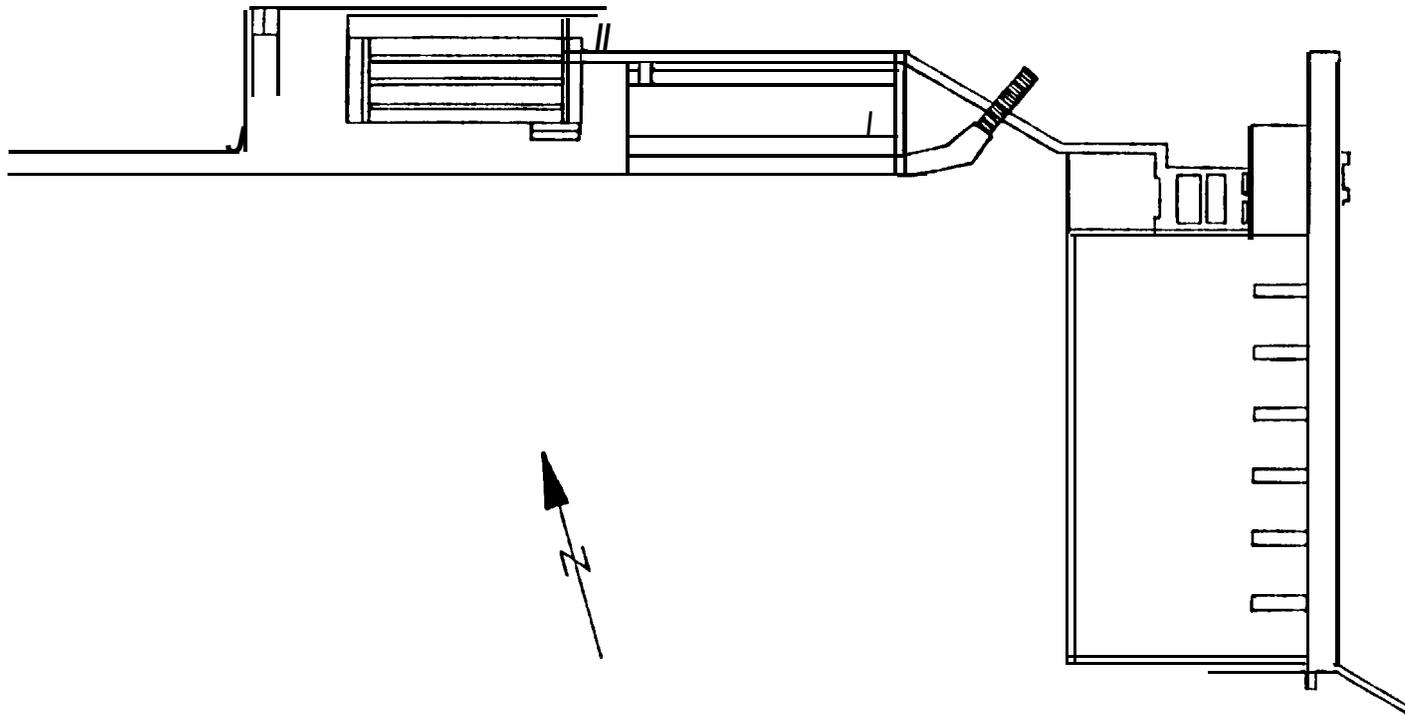
Comparison of the 2 theoretical calculations indicates that pond space appears to be the limiting factor in production. The existing water supply should be able to support twice the number of rearing ponds.

Hatchery Expansion Capability

This facility is situated on land owned by the COE. Approximately 8 acres of land on the present site is suitable for expansion. Agreement would be needed by the COE before expansion could occur. The existing water supply and delivery system should be able to support nearly twice the number of rearing ponds. Additional water should be available from Dexter Reservoir, but may require modification of the delivery system if increased flow is required. The potential for well water is unknown.

A pond similar to the present asphalt pond could be built. If exactly the same, it would provide approximately 53,520 cubic feet of rearing space. There is also room for adding six additional rearing ponds each 20' X 100'. Production could be increased by an estimated 1,050,000 spring chinook smolts weighing 131,250 pounds.

Additional incubation and starter capacity at Willamette Hatchery would be required to accomplish this increase in production.



DEXTER FISH-FACILITIES	
DRAWN J. IRVING	SCALE 1" = 100'

LITERATURE CITED

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Washington, Dr. Percy, Survey of Artificial Production of Anadromous Salmonids in the Columbia River Basin. November 1985. Final Report Submitted to the Bonneville Power Administration, Contract No. DE-AI-7984BP17100, Project No. 84-51. Copies available from Bonneville Power Administration, Division of Fish and Wildlife, Public Information Officer - PJ, P.O. Box 3621, Portland Oregon 97208. 221 p.

Summary Tables
For
Oregon Department Of Fish And Wildlife

Summary Table 1. List Of Hatcheries, Staffing Levels, And Operation And Maintenance Costs For All Facilities Operated By The Oregon Department Of Fish And Wildlife Which Produce Anadromous Fish In The Columbia River Basin.

Hatchery	Staffing in FTE's	Operation and Maintenance Costs		
		1985	1986	1987
Aumsville Ponds *				
Big Canyon Ponds	.3			
Big Creek	7.3	287,031	278,160	298,838
Bonneville	13.0	851,010	889,473	976,156
Cascade	6.5	283,010	265,544	258,658
Clackamas	4.5	245,572	303,887	404,165
Dexter Pond	1.0			
Gnat Creek	4.5	289,151	237,078	225,859
Herman Creek Ponds **				
Imnaha Pond	.5			
Irrigon	8.0	275,379	358,148	358,148
Klaskanine	4.75	247,486	246,669	237,310
Leaburg	7.8	383,370	383,481	407,253
Little Sheep Creek Pond	.3			
Lookingglass	5.8	221,410	281,686	254,458
Marion Forks	5.1	272,005	262,589	236,989
McKenzie	5.5	286,404	258,090	273,439
Oak Springs	6.5	270,854	242,790	247,820
Oxbow	4.75	235,953	178,766	191,952
Pelton Fish Ladder ***				
Roaring River	5.1	180,173	204,139	199,808
Round Butte	4.7	136,756	166,518	143,233
Sandy	4.5	178,282	178,530	189,505
South Santiam	5.0	172,069	200,236	196,537
Stayton Pond	1.33	115,824	99,760	89,465
Trojan Rearing Pond *				
Wahkeena Pond **				
Wallowa	3.0	91,710	195,254	203,332
Willamette	10.7	597,454	564,077	604,738

* Costs and staffing levels are shared at Aumsville and Stayton Ponds.

** Herman Creek and Wahkeena Ponds are operated as satellites of Oxbow Hatchery. Costs and staffing are included with Oxbow.

*** Pelton Fish Ladder is operated as a satellite of Round Butte Hatchery. Costs and staffing are included with Round Butte.

Summary Table 2. The Initial Year Hatchery Operated, Land Available, Percent Land In Use, And Land Ownership For Hatcheries Operated By The Oregon Department Of Fish And Wildlife Which Produce Anadromous Fish In The Columbia River Basin.

Hatchery	Initial Year of Operation	Hatchery Acres	Land Available % in Use	Land Ownership
Aumsville		20	40	Marion County
Big Canyon Pond	1987		100	COE
Big Creek	1941	48	40	ODFW
Bonneville	1894	22.46	100	COE
Cascade	1959	3.5	100	USFS
Clackamas	1979	17	60	ODFW
Dexter	1954			COE
Gnat Creek	1960	17	90	OR Dept Forestry
Herman Creek Ponds	1977	See Oxbow Hat.		ODFW
Imnaha Pond	1982	4	25	USFS
Irrigon	1984	33	90	COE
Klaskanine	1911	15	50	ODFW
Leaburg	1953	10	90	COE
Little Sheep Cr. Pd.	1982	5	20	USFS
Lookingglass	1982	11	50	COE
Marion Forks	1951	15	90	USFS
McKenzie River	1975	16	75	COE/EWEB
Oak Springs	1923	203	10	ODFW
Oxbow	1938	30	80	ODFW
Pelton Ladder	1974			PGE
Roaring River	1924	41	20	ODFW
Round Butte	1974	3	100	CTWS
Sandy	1951	12.34	100	ODFW

Summary Table 2. Continued

Hatchery	Initial Year of Operation	Hatchery Acres	Land Available % in Use	Land Ownership
South Santiam	1925	13	90	COE
Stayton Pond	1971	30	50	ODFW
Trojan Rearing Pond	1981			PGE
Wahkeena Pond	1961	20	90	OR Dept of Trans.
Wallowa	1920	111		ODFW
Willamette	1911	75	8	USFS

Summary Table 3. List Of Existing Rearing Facilities For Each Hatchery Operated By The Oregon Department Of Fish And Wildlife Which Produce Anadromous Fish In The Columbia River Basin. Figures For Length, Width, And Depth Are Listed In Feet And Volunes Are Given In Cubic Feet.

Hatchery	Rearing Unit	Unit Dimension			Unit Volume	# of Units	Total Volume	Construction Material	Rearing Units		
		Length	Width	Depth					Age	Condition	Comments
Aumsville Ponds											
	Raceways	100	30	3	9,000	6	54,000	Dirt/Gravel		Good	Water from irrigation
Big Canyon Pond											
	Adult Holding Pond	30	10	4.5	1,350	1	1,350	Concrete	2	Good	
	Salmon Acclimation Pd	70	30	3.5	7,350	1	7,350	Concrete	2	Good	
	Steelhead Acclimation Pd	150	30	3.5	15,750	2	31,500	Concrete	2	Good	
Big Creek											
	Adult Holding Pond	80	29.5	2.76	6,513	1	6,513	Concrete	27	Fair	
	Adult Holding Pond	95	36.5	4.58	15,880	1	15,880	Concrete	17	Good	
	Canadian Troughs	21	2.58	2	108	2	216	Fiberglass	2		
	Heath Vertical Incubator					64		Fiberglass	12	Good	four 16 tray stacks
	Raceways	160	10	2.75	4,400	9	39,600	Concrete	37	Fair	
	Raceways	80	20	2.75	4,400	21	92,400	Concrete	37	Fair	
	Rearing Pond	85	30	4.75	12,112	1	12,112	Concrete	14	Good	
	Troughs	15.5	1.42	.58	13	48	624	Fiberglass	12	Good	
	Troughs	15.5	1.33	1.25	26	16	416	Fiberglass	12	Good	
Bonneville											
	Adult Holding/Rearing Pd	154	27	6	24,948	1	24,948	Concrete	15	Good	
	Adult Holding/Rearing Pd	123	76	7	65,436	1	65,436	Concrete	15	Good	Divided into 2 ponds
	Burrows Ponds	75	16	3	3,600	14	50,400	Concrete	15	Good	
	Converted Burrows Pd	75	16	3	3,600	14	50,400	Concrete	15	Good	
	Deep Troughs	14	1.08	1.42	21	60	1,260	Fiberglass	15	Good	
	F.A.L Vertical Incubator					416		Fiberglass	5	Good	26, 16 tray stacks
	Heath Vertical Incubator					1,824		Fiberglass	15	Good	114, 16 tray stacks
	Raceways	80	20	2.75	4,400	30	132,000	Concrete	40	Fair-Good	
Cascade											
	Adult Holding Pond	210	35	4.0	22,050	1	22,050	Concrete	30	Fair	Very irregular shape
	Deep Troughs	14	1.33	1.17	22	12	264	Wood	30	Fair-Poor	
	Raceways	78	16	2.5	3,120	30	93,600	Concrete	30	Fair	
	Shallow Trough	14	1.33	.5	9	28	252	Wood	30	Fair-Poor	
Clackamas											
	Adult Holding Ponds	84	15	4.0	5,040	2	10,800	Concrete	10	Good	
	Heath Vertical Incubator					320		Fiberglass	10	Good	40, 8 Tray stacks
	Raceways	75	17	3.2	4,080	10	40,800	Concrete	10		
	Rearing Ponds	300	50	4.5	67,500	3	202,500	Asphalt/Concrete	10	Good	
	Troughs	16	1.42	1.25	28	2	56	Fiberglass	2	Good	

Summary Table 3. Continued

Hatchery	Rearing Unit	Unit Length	Dimension Width	Dimension Depth	Unit Volume	# of Units	Total Volume	Construction Material	Rearing Units Age	Units Condition	Comments
Dexter Rearing Pond											
	Adult Holding Pond	75	18	4.5	6,075	1	6,075	Concrete		Good	
	Raceways	135	18	6	14,580	4	58,320	Concrete	12	Good	Rebuilt in 1977
	Rearing Pond	192	62.7	6	53,520	1	53,520	Asphalt	13	Good	Rebuilt in 1976
Gnat Creek											
	Raceways	100	16	4	6,400	15	96,000	Concrete	29	Fair-Poor	
	Starter Tanks	30	3	2.5	225	6	1,350	Concrete	29	Good	
	Troughs					24		Aluminum	29	Good	
Herrn Creek Ponds											
	Raceways	62	14	3	2,604	2	5,208	Concrete		Good-Fair	
	Rearing Ponds	200	50	6	46,900	2	93,800	Asphalt	13	Good-Fair	Surface area
Imaha Pond											
	Acclimation Pond				12,665	1	12,665	Concrete	1	Good	Rearing/adult holding
Irrigon											
	Circular Starter Tanks		6	2.42	68	68	4,624	Fiberglass	4	Excellent	
	Heath Incubators					288		Fiberglass	4	Excellent	
	Raceways	100	20	3.75	7,500	32	240,000	Concrete	4	Excellent	
Klaskanine											
	F.A.L Heath Incubators					320		Fiberglass	5	Excellent	
	Raceway	150	16	2.5	6,000	1	6,000	Concrete			For adults/juveniles
	Raceways	80	20	3	4,800	16	76,800	Concrete	39	Good	Bottoms replaced/1985
	Rearing Pond			7	210,000	1	210,000	Asphalt	9		.75 acre rearing pond
	Troughs					19				Poor	
Leaburg											
	Canadian Tanks					4					
	Circular Rearing Ponds		20	2.2	690	6	4,140	Concrete			For display only
	Incubation Troughs	18	1.17	.5	11	20	211	Aluminum			
	Raceways	50	20	3.66	3,660	3	10,980	Concrete			1 for adult holding
	Raceways	100	20	3.66	7,320	39	285,480	Concrete			1 for adult capture
	Starter Troughs	21	2.66	1.5	84	4	336	Fiberglass			
Little Sheep Creek Pond											
	Adult Holding Pond	40	20	5	4,000	1	4,000	Concrete	2	Good	Adult Collection
	Steelhead Acclimation	195	50	3.5	34,125	1	34,125	Concrete	2	Good	

Summary Table 3. Continued

Hatchery	Rearing Unit	Unit Length	Dimension Width	Dimension Depth	Unit Volume	# of Units	Total Volume	Construction Material	Rearing Age	Units Condition	Comments
Lookingglass											
	Adult Holding Ponds	76	20	3	4,560	2	9,120	Concrete	7	Excellent	
	Heath Incubators					288		Fiberglass	7	Excellent	
	Raceways	100	10	3	3,000	18	54,000	Concrete	7	Excellent	
	Starter Troughs	19	2.5	1.5	71	32	2,272	Fiberglass	7	Excellent	
Marion Forks											
	Canadian Troughs	21	2.67	1.75	98	6	588	Fiberglass	4	Good	
	Circular Rearing Ponds		24	2.16	980	48	47,040	Concrete		Good	
	Raceways	80	20	2.5	4,000	3	32,000	Concrete		Good	Vol. < by center wall
	Vertical Incubators					272		Fiberglass	4	Good	
McKenzie											
	Adult Holding Pond	135	30	5	20,250	2	40,500	Concrete	13	Good	
	Canadian Troughs	20	2.67	1.67	89	8	186	Fiberglass	5	Good	
	Heath Incubators					640		Fiberglass	13	Good	
	Raceways	75	16.67	2.67	3,338	30	100,140	Concrete	13	Good	Vol. < by center wall
Oak Springs											
	Brood Ponds	140.5	22	3.5	10,818	2	21,637	Concrete	51	Fair	For Trout Brood Stock
	Barrows Ponds	50	19.5	2.8	2,680	2	5,360	Concrete	20		Vol. < by center wall
	Circular Tanks		30	3	2,120	5	10,600	Concrete	20	Good	
	Heath Incubators					128		Fiberglass			8 stacks of 16 trays
	Lower Ponds	38.5	46.8	4	7,207	7	50,449	Concrete	51	Fair	2 RB brood/5 rearing
	Middle Ponds					10	63,810	Concrete/Stone	55	Poor	
	N Ponds	50.5	40	4.67	9,433	9	84,897	Concrete	33	Good	
	Troughs	15.17	1.17	.58	10	30	300	Aluminum		Good	
Oxbow											
	Deep Troughs	15.5	1.4	1.3	28	32	896	Fiberglass	8	Good	
	Raceways	80	20	3	4,695	12	56,340	Concrete	37	Good-Fair	Vol. < by center wall
	Shallow Troughs	15.5	1.4	.6	13	32	416	Fiberglass	8	Good	
Pelton Fish Ladder											
	Converted Fish Ladder	300	10.75	7.5	24,187	3	72,561	Concrete		Good	More ladder space available
Roaring River											
	Brood Pond	100	45	3.3	14,850	2	29,700	Concrete	20		Rainbow Brood Ponds
	Canadian Troughs	20	2.67	1.75	93	6	558	Fiberglass			
	Circular Rearing Ponds		16	2.5	502	5	1,506	Concrete	45		For display only
	Circular Starter Tanks		6	3	85	2	170	Fiberglass			
	Heath Incubators					248		Fiberglass			

Summary Table 3. Continued

Hatchery	Rearing Unit	Unit Length	Dimension Width	Dimension Depth	Unit Volume	# of Units	Total Volume	Construction Material	Rearing Age	Units Condition	Comments
Roaring River - Continued											
	Raceway	100	19	5	9,500	1	9,500	Concrete	13		
	Raceways	86.8	19.17	3	4,992	1	4,992	Concrete	45		
	Raceways	100	20	5	10,000	6	60,000	Concrete	2		
	Raceways	70	20	3	4,200	12	50,400	Concrete	34		
	Raceways	85.7	10.8	2	1,851	3	5,553	Concrete	45		
	Troughs	15.6	1.17	.5	9	10	90	Aluminum			
Round Butte											
	Adult Holding Pond	50.5	15	3.59	2,720	2	5,440	Concrete	17	Good	
	Burrows Raceways	75	17	3.25	3,950	10	39,500	Concrete	17	Good	Vol. < by center wall
	Circular Starter Tanks		6	2.5	71	28	1,988	Fiberglass	9	Good	
	Heath Incubators					160		Fiberglass	19	Good	
	Oval Raceway	19.7	9.25	2.25	310	1	310	Fiberglass	4	Good	
Sandy											
	Adult Holding Pond	78	35	3	8,190	1	8,190	Concrete	29	Fair-Good	
	Raceways	80	20	3.5	5,600	20	112,000	Concrete	24	Fair-Good	
	Troughs	14	1.4	1.17	23	24	552	Concrete	24	Good-Fair	
South Santiam											
	Adult Holding Pond					1		Asphalt	21	Good	
	Burrows Ponds	75	17	3.33	4,147	10	41,470	Concrete	21	Good	VOL. < by center wall
	Burrows Ponds	75	20.5	3.33	5,022	4	20,088	Concrete	5	Good	Vol. < by center wall
	Heath Incubators					480		Fiberglass		Good	4 to 21 years old
Stayton Pond											
	11 Acre Pond			9	3,920,400	1	3,920,400	Earth/Gravel		Fair	Old gravel pit
Trojan Rearing Pond											
	Rearing Pond	185	67.5	4	40,900	2	81,800	Gravel	9	Fair	Bottom is 165'x49'
Wahkeena Pond											
	20 Acre Rearing Pond				7,840,800	1	7,840,800	Dirt	27	Fair	Depth varies 0-17'
Willowa											
	Acclimation Ponds	300	42	3.5	44,100	2	88,200	Concrete	5	Good	For anadromous fish
	Adult Holding Pond	80	20	4.5	7,200	1	7,200	Concrete	5	Good	For anadromous fish
	Adult Trap	25	8.6	4.33	931	1	931	Concrete	5	Good	For anadromous fish
	Circular Ponds		19	2.5	708	2	1,416	Concrete		Good	Resident fish
	Heath Incubators					300		Fiberglass	5	Good	

Summary Table 3. Continued

Hatchery	Rearing Unit	Unit Dimension			Unit Volume	# of Units	Total Volume	Construction Material	Rearing Units		Comments
		Length	Width	Depth					Age	Condition	
Willowa - Continued											
	Oval Series Raceways	47.2	20	3.5	3,000	6	18,000	Concrete		Fair	Resident fish
	Rectangular Raceways	100	20	4.5	9,000	2	18,000	Concrete		Good	Resident fish
	Rectangular Raceways	100	20	4.5	9,000	5	45,000	Concrete		Fair	Resident fish
	Shallow Troughs	15.5	1.17	.6	11	16	176	wood		Good	
	Starter Tanks	14	4	2.75	154	12	1,848	Wood		Good	
Willanette											
	Adult Sal. Holding Pd	250	20	1.9	9,500	1	9,500	Dirt			
	Burrows Ponds	80	20	2.5	3,710	40	148,400	Concrete		Fair	Vol. < by center wall
	Canadian Starter Tanks	16	2.67	1.75	75	13	975	Fiberglass		Good	
	Circular Ponds		25	2.1	1,030	4	4,120	Concrete			Not used
	Heath Incubators	20	16			780		Fiberglass	10	Good	For salmon eggs
	Heath Incubators	16.5	16			30		Fiberglass	10	Good	For trout eggs
	Standard Raceways	100	20	3.75	7,500	10	75,000	Concrete		Fair	Used for trout
	Starter Tanks	15	5	2.5	188	1	188	Concrete		Good	Used for trout spawn.
	Troughs	15.33	1.33	.63	13	1	13	Redwood	37	Fair	Used for salmon
	Troughs	15.5	1.13	.67	12	21	252	Redwood	37	Fair	Used for trout
	Trout Brood Ponds	74	26.5	3.5	6,864	2	13,728	Concrete			Used for trout

Note: Rearing unit volumes do not agree with dimensions in all cases due to rounding errors and correction for center walls in ponds.

Summary Table 4. Water Right Information And Water Available Which Delivery System Can Supply For Use At Each Hatchery Operated By The Oregon Department Of Fish And Wildlife Which Rear Anadromous Fish In The Columbia River Basin.

Hatchery Permit #	Water Source	Date	Water Right GPH	Water Available in GPM During Year			Comments
				Low Flow	High Flow	Average Flow	
Aumsville							
	N. Santiam Wt. Dist			2,244	4,488	3,468	Fish Culture
		Total	0	2,244	4,488	3,468	
Big Canyon Pond							
S49178	Deer Creek	12/26/84	5,835	800	3,000	1,800	Fish Culture
		Total	5,835	800	3,000	1,800	
Big Creek							
S23301	Big Creek	12/03/54	13				Fish Culture
S38989	Big Creek	12/06/74	5,386				Fish Culture
R1694	Big Creek	12/03/54					Storage
S6373	Big Creek	07/15/24	11,221	7,350	21,000		Fish Culture
S7027	Mill Creek	07/19/24	449				Fish Culture
S38990	Mill Creek	12/06/74	8,977				Fish Culture
s31933	Mill Creek	02/17/66	4,039				Fish Culture
S38992	Unnamed Spring	12/06/74	224				Fish Culture
S38991	Unnamed Spring	12/06/74	898	125			Fish Culture
S32442	Upper Spring	03/16/67	449	100			Fish Culture
		Total	31,656	7,575	21,000	0	
Bonneville							
G-5646	4 Wells	11/30/72	996	14,407	18,303	17,370	Fish Culture
s-1310	Tanner Creek	08/01/11	22,440	0	15,709	12,791	Fish Culture
		Total	23,436	14,407	34,012	30,161	
Cascade							
S-24930	Eagle Creek	06/06/57	15,709	4,920	10,608	7,117	Fish Culture
R-20270	Eagle Creek	06/06/57					Storage
S-27519	Eagle Creek	08/30/61	4,488				Fish Culture
		Total	20,197	4,920	10,608	7,117	

Summary Table 4. Continued

Hatchery Permit #	Water Source	Date	Water Right CPM	Water Available in GPM During Year			Comments
				Low Flow	High Flow	Average Flow	
Clackamas							
S49433	Clackamas River	09/03/85	2,244				Fish Culture
S42105	Clackamas River	08/04/77	20,197	15,000	15,000	15,000	Fish Culture
S40513	Clackamas River	04/07/76	20,197				Fish Culture
S5888	Delph Creek	01/23/23	1,346				Fish Culture
G8257	Well	09/01/78	370	200	200	200	Fish Culture
		Total	44,354	15,200	15,200	15,200	
Dexter Rearing Pond							
	Dexter Reservoir			30,071	30,071	30,071	Fish Culture
		Total		30,071	30,071	30,071	
Gnat Creek							
S-27067	Gnat Creek	11/07/60	2,693				Fish Culture
S-25369	Gnat Creek	02/27/58	17,953	1,200	15,700	4,850	Fish Culture
S-43378	Unnamed Stream	07/13/78	898				Fish Culture
G-1131	Well	10/17/58	99				Domestic Water
		Total	21,643	1,200	15,700	4,850	
Herman Creek Ponds							
3849	Herman Creek	11/15/22	44,883	4,800			Fish Culture
	Little Herman Cr.	04/17/22	2,244				Fish Culture
		Total	47,127	4,800	0	0	
Imnaha Pond							
S46466	Imnaha River	02/15/82	6,732			4,039	Fish Culture
S46465	Little Sheep Creek	02/05/82	4,488				Fish Culture
		Total	11,220	0	0	4,039	
Irrigon							
G-10945	Well #1	11/17/83	9,008				Fish Culture
G-10945	Well #2	11/17/83	16,014	21,000	21,000	21,000	Fish Culture
		Total	25,022	21,000	21,000	21,000	

Summary Table 4. Continued

Hatchery Permit #	Water Source	Date	Water Right GPM	Water Available in GPM During Year			Comments
				Low Flow	High Flow	Average Flow	
Klaskanine							
S-6465	Klaskanine River	06/16/24	22,442	1,000	11,000	5,666	Fish Culture
		Total	22,442	1,000	11,000	5,666	
Leaburg							
21289	McKenzie River	04/08/52	26,930	26,930	26,930	26,930	Fish Culture
20954	McKenzie River	10/27/49	17,953	17,953	17,953	17,953	Fish Culture
		Total	44,883	44,883	44,883	44,883	
Little Sheep Cr. Pond							
P49179	Little Sheep Creek	12/26/84	8,797	1,000	3,000	2,000	Fish Culture
		Total	8,797	1,000	3,000	2,000	
Lookingglass							
G-44943	Lookingglass Creek	08/02/79	22,442	22,442			Fish Culture
s-27091	Lookingglass Creek	01/16/61	13,465				Operate Fishway
G-10491	Temper Wells	03/11/85	1,800				Fish Culture
G-10442	Well	04/25/84	400				Fish Culture
G-10518	Well	06/24/85	675				Fish Culture
		Total	38,782	22,442	0	0	
Marion Forks							
	Horn Creek			5,800	7,400		Fish Culture
P-18690	Marion Creek	02/28/49	15,260	0	12,890		Fish Culture
		Total	15,260	5,800	20,290	0	
McKenzie River							
S-12052r	Cogswell Creek	01/30/36	2,244				Fish Culture
s-37190	Cogswell Creek	09/01/72	6,732	449	6,732	3,142	Fish Culture
S-7796	Drift Creek	11/27/26	2,244				Fish Culture
s-1351	Finney Creek	07/17/12	1,346				Fish Culture
S-6265	Gate Creek	08/24/23	224				Irrigation
S-6265	Gate Creek	03/27/24	10,996				Irrigation
s-7795	Granite Creek	11/27/26	4,488				fish Culture
S-36776	McKenzie River	12/26/72	22,442	22,442	22,442	22,442	Fish Culture
		Total	50,716	22,891	29,174	25,584	

Summary Table 4. Continued

Hatchery Permit #	Water Source	Date	Water Right GPM	Water Available in GPH During Year			Comments
				Low Flow	High Flow	Average Flow	
Oak Springs							
S-11936	Four Oak Spring	11/01/35	1,342				Fish Culture
S-11936	Four Oak Spring	11/01/35	5				Domestic
S-8911	Oak Spring	02/11/29	898				
R-1894	Oak Spring	07/23/56					Fish Culture
S-24326	Oak Spring	06/15/56	9,425	9,425	9,425	9,425	Fish Culture
S-7563	Oak Spring	08/27/26	224	224	224	224	Fish Culture
S-12051	Oak Spring	01/28/36	2,693				Fish Culture
S-8093	Oak Spring	06/17/27	4,488				Fish Culture/Domestic
s-11159	Oak Spring #1	08/09/33	1,122				Fish Culture/Domestic
s-11159	Oak Spring #2	08/09/33	1,122	2,693	2,693	2,693	Fish Culture/Domestic
s-11159	Oak Spring #3	08/09/33	1,122	10,772	10,772	10,772	Fish Culture/Domestic
s-11159	Oak Spring #4	08/09/33	1,122				Fish Culture/Domestic
s-19000	Oak Spring Creek	09/21/49	6,732				Fish Culture
S-5887	Oak Spring Creek	01/23/23	1,346				Fish Culture
S-5886	Oak Springs	01/23/23	1,346				Fish Culture
		Total	32,987	23,114	23,114	23,114	
Oxbow							
S-5683	Herman Creek	11/15/22	44,883				Fish Culture
s-77	Little Herman Cr.	08/10/09	18				Domestic
s-5399	Little Herman Cr.	03/24/22	45				Domestic
s-77	Little Herman Cr.	08/10/09	3,958				Fish Culture
S-20629	Little Herman Cr.	08/09/51	4,488				Fish Culture
R-1695	Little Herman Cr.	12/03/54					Fish Culture
	Oxbow Springs			300			Fish Culture
S-23302	Ponds	12/03/54	13				Fish Culture
		Total	53,405	300	0	0	
Pelton Ladder							
	Lake Sintustis			3,591	3,591	3,591	Fish Culture
		Total	0	3,591	3,591	3,591	
Roaring River							
s-7901	Roaring River	04/29/27	4,488	3,366	10,099		Fish Culture
s-6851	Roaring River	02/16/25	3,142				Fish Culture
		Total	7,630	3,364	10,099	0	

Summary Table 4. Continued

Hatchery Permit #	Water Source	Date	Water Right GPM	Water Available in CPM During Year			Comments
				Low Flow	High Flow	Average Flow	
Round Butte							
s- 37974	East Spring	04/13/73	8,977	200	200	200	Fish Culture
	Unnamed Spring						Fish Culture
	West Spring			8,977	8,977	8,977	Fish Culture
	Total		8,977	9,177	9,177	9,177	
Sandy							
s- 23300	Cedar Creek	12/03/54		1,800	8,000	6,300	Fish Culture
R- 1693	Cedar Creek	12/03/54					3.12 AF of Storage
s- 19917	Unnamed Spring	01/12/50	449				Fish Culture
s- 19917	Unnamed Spring	12/15/49	11,221				Fish Culture
S- 25952	Unnamed Stream	01/20/59	907				Fish Culture
R- 22177	Unnamed Stream	01/20/59					Fish Culture
	Total		12,577	1,800	8,000	6,300	
South Santiam							
S- 8971	Coal Creek	06/25/28	2,244				Fish Culture
	Foster Res. Deep			5,500	5,500	5,500	Fish Culture
	Foster Reservoir			8,400	8,400	8,400	Fish Culture
	Total		2,244	13,900	13,900	13,900	
Stayton Pond							
s- 47986	North Santiam River	08/10/83	22,442	22,442	22,442	22,442	Fish Culture
s- 7756	Spring	12/20/26	90				Domestic
	Total		22,532	22,442	22,442	22,442	
Trojan Rearing Pond							
	Columbia River			3,591	3,591	3,591	Fish Culture
	Total		0	3,591	3,591	3,591	
Wahkeena Pond							
S- 5891	Dead Point Creek	04/28/23	898				Fish Culture
S- 26806	Wahkeena Creek	03/25/60	13,465	1,850			Fish Culture
R- 2363	Wahkeena Lake	03/25/60					Fish Culture
	Total		14,363	1,850	0	0	

Summary Table 4. Continued

Hatchery Permit #	Water Source	Date	Water Right GPM	Water Available in GPM During Year			Comments
				Low Flow	High Flow	Average Flow	
Wallowa							
S- 18674	Clear Creek	05/31/45	8, 079				Fish Culture
R- 591	Hurricane Cr/Spr Cr	05/23/24					Fish Culture
S- 7819	Hurricane Creek	05/23/24	2, 244				Fish Culture
S- 7818	Spring Creek	05/23/24	4, 488				Fish Culture
S- 48005	Spring Creek	08/24/83	7, 630	4, 982	7,630	6, 284	Fish Culture
R- 592	Springs	05/23/24					Fish Culture
S- 7817	Unnamed Spring	05/23/24	1, 122				Fish Cult./Domestic
G- 8610	Wells 1 and 2	04/19/79	250				Fish Culture
			
		Total	23, 813	4, 982	7, 630	6, 284	
Willamette							
S- 7188	Salmon Creek	06/27/24	11, 221	29, 623	37, 028	29, 623	Fish Culture
S- 19208	Salmon Creek	11/07/49	6, 732				Fish Culture
S- 20019	Salmon Creek	11/27/50	5, 610				Fish Culture
s- 8600	Salmon Creek	01/23/23	4, 488				Fish Culture
S- 19208	Salmon Creek	10/26/49	8, 977				Fish Culture
			
		Total	37, 028	29, 623	37, 028	29, 623	

Summary Table 5. Summary Of Uater Used By Hatcheries Operated By The Oregon Department Of Fish And Wildlife Which Rear Anadromous Fish In The Columbia River Basin. Flow Is Listed In Gallons Per Minute (GPM) And Temperature Is Listed In Degrees Fahrenheit.

Hatchery	Delivery	Average	High Flow	Lou Flow	Highest Uater	Lowest Uater
Uater Source	Method	Flow Temp.	Volume Mnth	Volume Mnth	Temp. Mnth	Temp. Mnth
Aumsville						
N. Santiam Uat. Dist.	Gravity	3,468 44	4,488	2,244	49	34
Big Canyon Pond						
Deer Creek	Gravity	1,800	3,000 March	800 February	74	32
Big Creek						
Big Creek	Gravity	48	21,000 Mar-April	7,350 September	64 July	32 December
Mill Creek	Gravity	48			64 July	32 December
Unnamed Spring	Gravity	48		125 September	48	47
Upper Spring	Gravity	48		100 September	48	47
Bonneville						
4 Wells	Pumped	17,370 49	18,303	14,407	53 Jan. - March	47 Varies
Tanner Creek	Gravity	12,791 46	15,709	0 Dec. - Jan.	56 June- July	32 Dec. - Jan.
Cascade						
Eagle Creek	Gravity	7,117 47	10,608 March	4,920 October	67 August	32 Winter
Clackamas						
Clackamas River	Pumped	15,000 49	15,000 Constant	15,000 Constant	66 July-Aug.	33 Dec. - Jan.
Well	Pumped	200 53	200	200	53 Constant	53 Constant
Dexter Rearing Pond						
Dexter Reservoir	Gravity	30,071 49	30,071 Constant	30,071 Constant	58 Sept. - Oct.	38 Dec. - Jan.
Gnat Creek						
Gnat Creek	Gravity	4,850 46	15,700	1,200	57 July-Aug.	32 Nov. - Dec.
Hernan Creek Ponds						
Hernan Creek	Gravity	46		4,800 July-Sept.	61 June	32 Nov. - Jan.
Innaha Pond						
Innaha River	Gravity	4,039	May- June	Sept. - Oct.	65 July	Dec. - Jan.

Summary Table 5. Continued

Hatchery Water Source	Delivery Method	Average Flow	Temp.	High Flow Volume	Flow Mnth	Low Flow Volume	Flow Mnth	Highest Water Temp.	Water Mnth	Lowest Water Temp.	Water Mnth
Irrigon											
Well #1 and #2	Pumped	21,000	55	21,000		21,000		62	Sept. - &t.	50	Feb-March
Klaskanine											
Klaskanine River	Gravity	5,666	50	11,000	Dec. - March	1,000	July- Sept.	64	July	34	Nov. - Feb.
Leaburg											
McKenzie River	Gravity	26,930	47	26,930		26,930		58	September	35	Dec. - Jan.
McKenzie River	Gravity	17,953	47	17,953		17,953		58	September	35	Dec. - Jan.
Little Sheep Cr. Pond											
Little Sheep Creek	Gravity	2,000		3,000	March	1,000	February	62		39	
Lookingglass											
Lookingglass Creek	Gravity		43			22,442		68	July	32	Winter
Wells	Pumped										
Marion Forks											
Horn Creek	Gravity		45	7,400	Mar. - April	5,800	Winter	61		33	
Marion Creek	Gravity		45	12,890	Mar. - April	0	Winter	61		33	
McKenzie River											
Cogswell Creek	Gravity	3,142	48	6,732	Nov. - March	449	June- Sept.	60	June- Aug.	37	Dec. - Jan.
McKenzie River	Gravity	22,442	48	22,442		22,442		60	June- Aug.	37	Dec. - Jan.
Oak Springs											
Oak Spring	Gravity	9,425	54	9,425	Constant	9,425	Constant	54	Constant	54	Constant
Oak Spring	Gravity	224	54	224	Constant	224	Constant	54	Constant	54	Constant
Oak Spring #2	Gravity	2,693	54	2,693	Constant	2,693	Constant	54	Constant	54	Constant
Oak Spring #3	Gravity	10,772	54	10,772	Constant	10,772	Constant	54	Constant	54	Constant
oxbow											
Oxbow Springs			45			300	July- Ott	45	Constant	45	Constant
Pelton Ladder											
Lake Sintustis	Gravity	3,591		3,591	Constant	3,591	Constant				

Summary Table 5. Continued

Hatchery	Delivery	Average		High Flow	Low Flow		Highest Water		Lowest Water		
Water Source	Method	Flow	Temp.	Volume	Month	Volume	Month	Temp.	Month	Temp.	Month
Roaring River											
Roaring River	Gravity		46	10,099	Winter	3,366	October	56	June-Aug.	35	Nov.-Feb.
Round Butte											
East Spring	Gravity	200	52	200	Constant	200	Constant	52	Constant	52	Constant
West Spring	Gravity	8,977	50	8,977	Constant	8,977	Constant	50	Constant	50	Constant
Sandy											
Cedar Creek	Gravity	6,300	49	8,000	Feb.-March	1,800	August	66	July-Aug.	36	Dec.-Jan.
Unnamed Spring	Gravity		so					50		50	
South Santiam											
Foster Res. Deep		5,500	48	5,500	Constant	5,500	Constant		June-July	39	December
Foster Reservoir	Gravity	8,400	48	8,400	Constant	8,400	Constant	58	June-July	39	December
Stayton Pond											
North Santiam River	Gravity	22,442		22,442	Constant	22,442	Constant	75	July	39	February
Trojan Rearing Pond											
Columbia River		3,591	55	3,591	Constant	3,591	Constant	63	June	42	November
Uahkeena Pond											
Uahkeena Creek	Gravity					1,850	December	72	August	32	Nov.-Feb.
Wallowa *											
Spring Creek	Gravity	6,284	46	7,630	April	4,982	April	57	April	36	March
Willamette											
Salmon Creek	Gravity	29,623	49	37,028	October	29,623		67	July-Aug.	32	Dec.-Feb.

* Includes only water used in steelhead acclimation ponds.

Summary Table 6. Adult Return Information For Hatcheries Operated By The Oregon Department Of Fish And Wildlife Which Rear Anadromous Fish In The Columbia River Basin. Adult Holding Inflow Is Given In Gallon Per Minute (CPM).

Hatchery	Brood	Adult	Holding		Adult	Returns		# Femles	Adult	Adult
Species Stock	Year	Inflow	Period	Miles	Females	Jacks	Total	Spauned	Mrts.	Releases
Big Creek										
Coho										
13 Big Creek	1983	8,680	Oct. - Nov.	659	477	331	1,467	416	61	
13 Big Creek	1984	8,600	Oct. - Nov.	2,855	3,095	173	6,123	967		
13 Big Creek	1985	8,600	Oct. - Nov.	4,912	4,212	761	9,885	415		
Fall Chinook										
13 Big Creek	1984	8,680	Sept. - Oct.	3,710	2,458	368	6,536	2,246	212	
13 Big Creek	1985	8,600	Sept. - Oct.	6,510	4,080	316	10,906	3,460		
13 Big Creek	1986	8,600	Sept. - Oct.	2,932	3,154	3,554	9,640	2,795		
52 Rogue	1984	8,680		0	0	57	57	0		
52 Rogue	1985	8,600		218	117	12	347	83		
52 Rogue	1986	8,600		123	190	65	378	128		
Winter Steelhead										
13 Big Creek	1984	8,680	Dec. - Feb.	349	258	0	607	230		511
13 Big Creek	1985	8,600	Dec. - Feb.	37s	320	0	695	286		400
13 Big Creek	1986	8,600	Dec. - Feb.	262	292	0	554	238		243
Bonneville										
Coho										
14 Tanner Creek	1983			5,105	3,698	1,209	10,012	0		
14 Tanner Creek	1984			7,595	6,893	263	14,751	0		
14 Tanner Creek	1985			12,244	11,458	581	24,283			
Fall Chinook										
14 Tanner Creek	1984	30,296	Sept. - Oct.	2,954	2,280	244	5,478	1,684		
14 Tanner Creek	1985	30,296	Sept. - Oct.	5,163	3,570	102	8,835	3,001		
14 Tanner Creek	1986	30,296	Sept. - Oct.	4,732	4,222	6,907	15,861	2,407		
95 URB	1984	30,296	Sept. - Jan.	1,674	5,031	201	6,906	3,376		
95 URB	1985	30,296	Sept. - Jan.	1,537	3,672	253	5,462	2,439		
95 URB	1986	30,296	Sept. - Dec.	1,306	3,200	706	5,212	1,727		
Summer Chinook										
95 Col. Upriver	1986	30,296	July - Nov.					101		
Cascade										
Coho										
14 Tanner Creek	1983	8,000	Sept. - Nov.	249	170	33	452	2,940		
14 Tanner Creek	1984	8,000	Sept. - Nov.	192	303	133	628	3,028		
14 Tanner Creek	1985	8,000	Sept. - Nov.	408	607	192	1,207	2,214		
Fall Chinook										
14 Tanner Creek	1984	8,000	Sept. - &t.	55	102	4	161	96		
14 Tanner Creek	1985	8,000		57	39	81	177			
14 Tanner Creek	1986	8,000		89	65	23	177			
95 URB	1984	8,000		21	46	69	136	0		
95 URB	1985	8,000		41	56	27	124			
95 URB	1986	8,000		134	118	6	258			

Summary Table 6. Continued

Hatchery	Brood	Adult	Holding		Adult	Returns	# Females	Adult	Adult	
Species	Stock	Year	Inflow	Period	Males	Females	Total	Mrts.	Releases	
							Spawmed			
						Jacks				
Clackamas										
Spring Chinook										
19 Clack. R. Early	1984	2,800			1,324	1,159	38	2,521	327	995
19 Clack. R. Early	1985	2,800			412	484	48	944	357	81
19 Clack. R. Early	1986	2,800			401	354	21	776	262	21
Summer Steelhead										
19 Clack. R. Early	1984	2,800			3	202	0	205	0	
19 Clack. R. Early	1985	2,800			111	100	0	211	0	
Dexter Rearing Pond										
Spring Chinook										
22 M. Willamette	1983	17,950			3,704	3,585	100	7,389	20	407
22 M. Willamette	1984	17,950			4,381	4,764	428	9,573	0	355
22 M. Willamette	1985	17,950			1,492	1,523	30	3,045	0	
22 M. Willamette	1986	17,950			3,024	2,429	143	5,596	0	9
Klaskanine										
Coho										
15 Klaskanine	1983	4,039	Oct.-Nov.		755	734	1,701	3,190	768	
15 Klaskanine	1984	4,039	Oct.-Nov.		1,679	2,549	4,776	9,004	733	2,294
IS Klaskanine	1985	4,039	October		1,430	2,722	7,749	11,901	1,013	
Fall Chinook										
IS Klaskanine	1984	4,039	October		11	26	0	37	23	
15 Klaskanine	1985	4,039	October		IS	11	0	26	5	
15 Klaskanine	1986	4,039	October		7	24	3	34	18	
52 Rogue	1985	4,039			2	13	0	IS	11	
52 Rogue	1986	4,039				0	4	5	0	
Winter Steelhead										
15 Klaskanine	1984	4,039			312	162	0	474	0	327
IS Klaskanine	1985	4,039			377	158	0	535	72	463
15 Klaskanine	1986	4,039			413	288	0	701	0	533
Leaburg										
Summer Steelhead										
22 M. Willamette	1985	900	June-March						3	
22 M. Willamette	1986	900	June-March						38	
23 McKenzie	1984	900	June-March		3	19	0	22	51	23
23 McKenzie	1985	900	June-March						146	287
23 McKenzie	1986	900	June-March		0	1	0	1	138	

Summary Table 6. Continued

Hatchery	Brood	Adult	Holding		Adult	Returns		# Femles	Adult	Adult	
Species	Stock	Year	Inflow	Period	Males	Females	Jacks	Total	Spawmed	Mrts.	Releases
Lookingglass											
Spring Chinook											
29 Imnaha and Tribs		1983	4,937	June-Sept	29	35	0	64	31		16
29 Imnaha and Tribs		1984	4,937	June-Sept							
29 Imnaha and Tribs		1985	4,937	June-Sept	78	41	46	165	32		41
81 Lookingglass		1983	4,937	June-Oct.	7	13	0	20	4		
81 Lookingglass		1984	4,937	June-Sept	10	25	8	43	19		
81 Lookingglass		1985	4,937	June-Sept	177	270	5	452	251		
Marion Forks											
Spring Chinook											
21 North Santiam		1983	1,464	June-Sept.	59	33	0	92	0	92	
21 North Santiam		1984	1,464	July-Oct.	272	135	0	407	112		
21 North Santiam		1985	1,464	June-Sept.	1,184	688	24	1,896	263		177
25 Fall Creek		1983	1,464	June-Sept.	164	271	6	441	228		
75 Carson		1983	1,464	June-Sept.	6	66	0	72	58		
75 Carson		1984	1,464	June-Sept.	129	202	16	347	122		
75 Carson		1985	1,464	June-Sept.	156	127	10	293	3s		
Summer Steelhead											
21 North Santiam		1984	1,464		2	15	0	17	0		
Winter Steelhead											
21 North Santiam		1984	1,464		141	166	0	307	146		249
21 North Santiam		1985	1,464		96	164	2	262	148		262
21 North Santiam		1986	1,464		280	243	0	523	164		486
Mckenzie River											
Spring Chinook											
22 M. Willamette		1983	4,488	July-Sept.					927		
22 M. Willamette		1984	4,488	July-Sept.					890		
22 M. Uillanette		1985	4,488	July-Sept.					161		
23 McKenzie		1983	4,488	July-Sept.	480	269	86	835	229		
23 McKenzie		1984	4,488	July-Sept.	1,060	845	53	1,958	592		61
23 McKenzie		1985	4,488	July-Sept.	1,124	739	50	1,913	442		635
23 McKenzie		1986	4,488	July-Sept.	1,133	560	61	1,754	385		413
25 Fall Cr (Carson)		1984	4,488	July-Sept.	73	50	6	129	35		
26 Fall Cr (Willam)		1985	4,488	July-Sept.		281	293	3	577	184	
26 Fall Cr (Willam)		1986	4,488	July-Sept.	122	129	5	256	90		29
Summer Steelhead											
23 McKenzie		1984	4,488		66	35	0	101	0		101
23 McKenzie		1985	4,488		518	642	0	1,160	0		610
23 McKenzie		1986	4,488		184	209	0	393	0		68

Summary Table 6. Continued

Hatchery	Brood	Adult	Holding		Adult	Returns		# Females	Adult	Adult
Species	Year	Inflow	Period	Miles	Females	Jacks	Total	Spawmed	Mrts.	Releases
Oak Springs										
Summer Steelhead										
91 Umtilla River	1984			20	32	0	52	23		14
91 Umtilla River	1985			25	79	0	104	33		57
91 Umtilla River	1986			14	62	0	76	30		27
Round Butte										
Spring Chinook										
66 Deschutes River	1983	600		12s	489	42	656	266		
66 Deschutes River	1984	600		58	231	344	633	104		10
66 Deschutes River	1985	600		485	1,102	257	1,844	132		319
Summer Steelhead										
66 Deschutes River	1984	600		2,481	2,584	0	5,065	275		1,796
66 Deschutes River	1985	600		2,056	2,957	0	5,013	328		2,041
66 Deschutes River	1986	600		2,472	2,955	0	5,427	297		2,056
Sandy										
Coho										
11 Sandy	1983	2,500	Oct. - Dec.	2,873	1,883	705	5,461	1,842		
11 Sandy	1984	2,500	Oct. - Nov.	6,300	5,990	279	12,569	3,073		2,100
11 Sandy	1985	2,500	Oct. - Nov.	5,072	3,073	3,024	11,169	1,872		1,300
South Santiam										
Spring Chinook										
22 M. Willamette	1983	5,500						892		
22 M. Willamette	1984	5,500						38		297
24 South Santiam	1983	5,500		505	so3	535	1,543	434		424
24 South Santiam	1984	5,500		1,569	1,270	180	3,019	1,024		
24 South Santiam	1985	5,500		1,620	1,116	325	3,061	607		1,823
Summer Steelhead										
24 South Santiam	1984	5,500		443	600	167	1,210	41s		133
24 South Santiam	1985	5,500		4,138	3,761	90	7,989	376		6,850
24 South Santiam	1986	5,500		3,673	3,684	94	7,451	327		6,304
Winter Steelhead										
24 South Santiam	1984	5,500		31	24	0	55	24		55
24 South Santiam	1985	5,500		336	656	0	992	9		991
24 South Santiam	1986	5,500		360	482	0	842	0		802
Wallowa										
Summer Steelhead										
29 Imnaha and Tribs	1984			29	4s	0	74	3s		
29 Imnaha and Tribs	1985			70	142	0	212	95		34
29 Imnaha and Tribs	1986			21	51	0	72	42		2
56 Wallowa	1984			440	411	0	851	385		210
56 Wallowa	1985			181	326	0	507	218		
56 Wallowa	1986			953	957	0	1,910	812		401

Summary Table 6. Continued

Hatchery		Brood	Adult	Holding	Adult Returns			# Females	Adult	Adult	
Species	Stock	Year	Inflou	Period	Males	Females	Jacks	Total	Spauned	Mrts.	Releases
Willamette											
Spring Chinook											
22 M	Willamette	1984	2,800	June- Oct.					979		
22 M	Uillamette	1985	2,800	June- Oct.					961		
22 M	Willamette	1986	2,800	June- Oct.					1,133		

Summary Table 7. Total Egg Take And Fish Poned For Hatcheries Operated By The Oregon Department Of Fish And Wildlife Which Rear Anadromous Fish In The Columbia River Basin.

Hatchery Species	Stock	# Female Spawmed	Spawning Begin	Date End	Release Year	Egg Take	Egg Transfers In	out	Fingerlings Poned No.	Date	Transfers Of Fish In
Aumsville Ponds											
Fall Chinook											
13 Big Creek					1985						1,301,549
14 Tanner Creek					1985						4,225,195
14 Tanner Creek					1986						6,991,917
14 Tanner Creek					1987						7,000,199
Spring Chinook											
57 Willamette					1985						164,693
Big Creek											
Coho											
13 Big Creek		416	10/28/83	11/30/83	1985	797,067			719,574	Feb. 1984	
13 Big Creek		967	10/25/84	11/15/84	1986	3,053,461		1,660,231	810,511	Feb. 1985	
13 Big Creek		415	10/24/85	10/31/85	1987	1,353,441		336,978	791,144	Jan. 1986	
14 Tanner Creek					1985						862,765
14 Tanner Creek					1986						844,434
Fall Chinook											
13 Big Creek		2,246	09/17/84	10/16/84	1985	10,799,262			5,959,925	Jan. 1985	
13 Big Creek		3,460	09/16/85	10/10/85	1986	19,223,561	1,601,028	10,937,999	8,298,456	Jan. 1986	
13 Big Creek		2,795	09/16/86	10/20/86	1987	15,854,291	1,089,844	7,379,455	7,790,996	Jan. 1987	
14 Tanner Creek					1985					Jan. 1985	2,042,962
14 Tanner Creek					1987					Dec. 1985	911,260
52 Rogue		0			1985		210,641		184,641	Feb. 1985	
52 Rogue		a3	10/17/85	11/19/85	1986	232,019	249,054	231,394	152,837	Feb. 1986	
52 Rogue		128	10/07/86	11/13/86	1987	441,825	230,840	441,825	201,752	Feb. 1987	
Winter Steelhead											
13 Big Creek		230	01/12/84	02/09/84	1985	907,532		655,980	155,610	April 1984	
13 Big Creek		286	01/14/85	02/08/85	1986	1,233,864		1,009,100	137,863	April 1985	
13 Big Creek		238	01/17/86	01/31/86	1987	1,079,684		812,500	148,946	April 1986	
15 Klaskanine		129	01/12/84	01/30/84	1985	513,340		451,712	26,365	April 1984	
15 Klaskanine					1986		267,420	210,000	14,540	April 1985	
15 Klaskanine					1987		717,202	646,500			
Bonneville											
Coho											
11 Sandy River					1985		3,609,026		2,196,937	Jan. 1985	
14 Tanner Creek		0			1986		374,644		374,644	Feb. 1985	
14 Tanner Creek					1987						1,900,000
Fall Chinook											
13 Big Creek					1987		1,100,000	1,089,844			
14 Tanner Creek		1,684	09/17/84	10/11/84	1985	7,558,919	284,980	6,372,191	1,117,918	Dec. 1984	
14 Tanner Creek		3,001	09/16/85	10/14/85	1986	13,895,359	992,813	7,991,917	5,562,031	Dec. 1985	
14 Tanner Creek		2,407	09/18/86	10/14/86	1987	12,196,440		7,911,459	3,682,522	Dec. 1986	
45 Uashington URB					1987		2,438,212	1,564,101	0		
72 Wash. Tules					1986		1,000,000		933,245	Jan. 1986	
72 Wash. Tules					1987		6,408,863		6,269,706	Dec-Feb 87	

Summary Table 7. Continued

Hatchery Species	Stock	# Female Spawners	Spawning Begin	Date End	Release Year	Egg Take	Egg Transfers In	Transfers out	Fingerlings No.	Ponded Date	Transfers Of Fish In
Bonneville - Continued											
Fall Chinook - Continued											
95 URB		2,439	11/04/85	01/06/86	1986	12,297,493		8,059,665	2,112,729	March	1986
95 URB		1,727	10/31/86	12/17/86	1987	7,952,748		3,432,470	4,056,639	Feb-Mar	87
95 URB		3,376	11/06/84	01/09/85	1985	16,354,813		5,002,882	7,078,965	March	1985
Spring Chinook											
75 Carson					1986		1,075,500		925,766	Dec.	1984
75 Carson					1987		2,000,000		2,000,000	Jan.	1986
Summer Chinook											
95 Col. Upriver		101	10/22/86	11/25/86	1987	557,900			477,702	Feb.	1987
Cascade											
Coho											
14 Tanner Creek		2,940	10/25/83	12/12/83	1985	6,426,325		1,293,000	4,287,124	April	1984
14 Tanner Creek		3,028	10/29/84	11/16/84	1986	8,655,225		3,495,000	4,344,604	April	1985
14 Tanner Creek		2,214	10/25/85	11/15/85	1987	6,497,400		1,660,000	4,096,680	April	1986
98 Cowlitz					1985		1,816,000	1,779,973			
Fall Chinook											
14 Tanner Creek		96	09/19/84	10/12/84	1985	423,225		410,000			
Clackams											
Coho											
20 Clack. R. Late			01/15/85	03/04/85	1986	245,550			179,510	May	1985
Spring Chinook											
19 Clack. R. Early		327	09/21/84	10/15/84	1985	1,495,999		1,290,511			
19 Clack. R. Early		357	09/23/85	10/21/85	1986	1,786,808		1,510,000			
19 Clack. R. Early		262	09/23/86	10/20/86	1987	1,208,379	51,946	1,184,449			
Winter Steelhead											
20 Clack. R. Late					1986						81,487
20 Clack. R. Late					1987		96,731		87,373	May	1986
Gnat Creek											
Winter Steelhead											
13 Big Creek					1985		368,667		340,811	March	1985
13 Big Creek					1986		610,000		591,347	June	1986
13 Big Creek					1987		600,000		588,204	April	1987
15 Klaskanine					1985		299,208		285,279	March	1985
Irrigon											
Fall Chinook											
45 Wash. URB					1987						1,564,101
95 Col. R. URB					1986						2,592,415

Summary Table 7. Continued

Hatchery Species	Stock	# Female Spawned	Spawning Begin	Date End	Release Year	Egg Take	Egg Transfers In	Transfers out	Fingerlings No.	Ponded Date	Transfers Of Fish In
Irrigon - Continued											
Spring Chinook											
29 Imnaha & Tribs					1986		162,481		122,588	Dec. 1985	
75 Carson					1986						909,127
85 Idaho					1986		497,520		394,956	Dec. 1985	
85 Idaho					1987		628,619		536,528	Nov-Dec 86	
Summer Steelhead											
29 Imnaha & Tribs					1985		113,985		113,985	June 1984	
29 Imnaha & Tribs					1986		316,739		151,250	June 1985	
29 Imnaha & Tribs					1987		110,168		106,283	June 1986	
56 Wallowa					1985		625,144		625,144	June 1984	
56 Uallowa					1986		874,011		563,242	June 1985	
56 Uallowa					1987		1,719,648		1,658,592	May 1986	
Klaskanine											
Coho											
13 Big Creek					1985						1,384,531
15 Klaskanine		768	10/25/83	11/28/83	1985	1,400,006			1,205,889	Feb-March 84	
15 Klaskanine		733	10/22/84	10/31/84	1986	2,362,216			1,829,595	Feb. 1985	
15 Klaskanine		1,013	10/22/85	10/29/85	1987	3,174,785		1,111,700	1,802,353	Feb. 1986	
Fall Chinook											
13 Big Creek					1985		2,600,000	712,453	1,818,597	Jan. 1985	
13 Big Creek					1986		4,202,774		4,132,240	Dec-Jan a6	
15 Klaskanine		23			1985						
15 Klaskanine		5			1986						
15 Klaskanine		18			1987						
52 Rogue		11			1986						
Winter Steelhead											
15 Klaskanine		72			1986						
Leaburg											
Summer Steelhead											
22 M Willamette		38	02/11/86	03/06/86		171,769		149,495	0		
23 McKenzie		51	01/17/84	03/13/84	1985	190,214			165,116	April 1984	
23 McKenzie		146	02/12/85	04/01/85	1986	524,348		60,636	381, a74	Apr- Jun a5	
23 McKenzie		138	02/11/86	03/10/86	1987	602,623			462,711	May 1986	
Lookingglass											
Spring Chinook											
25 Fall Creek					1985		867,842		796,237	Jan-Feb 84	
25 Fall Creek					1986		163,284		161,429	Dec-Jan 58	
29 Imnaha & Tribs		31	08/16/83	08/29/83	1985	163,862			122,180	Dec. 1983	
29 Imnaha & Tribs			08/22/84	08/24/84	1986	51,800			37,314	Jan. 1985	
29 Imnaha & Tribs		32			1987	162,481			123,530		

Summary Table 7. Continued

Hatchery	# Female Spawning Date	Release	Egg	Egg Transfers	Fingerlings Poned	Transfers Of
Species Stock	Spawned Begin End Year	Year	Take	In out	No. Date	Fish In
Lookingglass - Continued						
Spring Chinook - Continued						
75 Carson		1985		778,925	763,321	Dec-Feb 84
75 Carson		1986		501,500	494,738	Dec-Jan a5
75 Carson		1987				84,295
81 Lookingglass	4 09/06/83 10/03/83	1985	14,863		3,428	Jan. 1984
81 Lookingglass	19 08/13/84 09/07/84	1986	62,396		52,781	Dec. 1984
al Lookingglass	251 08/20/85 09/16/85	1987	981,684		753,476	Feb. 1986
a5 Idaho		1987		398,265	129,132	252,739 Feb-Mar 86
Marion Forks						
Coho						
20 Clack. Late				119,352	119,352	May 1986
Spring Chinook						
19 Clack. Early				557,194	389,847	April 1987
21 North Santiam	112 09/17/84 10/04/84	1986	509,346		384,171	March 1985
21 North Santiam	263 09/11/85 09/19/85	1987	1,252,685	509,815	544,489	January a6
22 M. Willamette		1985		1,431,500	1,417,677	Feb-Mar a4
22 M. Willamette				550,000	506,161	March 1987
23 McKenzie		1985		404,500	397,760	Mar-Apr 84
23 McKenzie					110,000	108,611 Feb. 1987
24 South Santiam		1986		152,000	149,907	Feb. 1985
25 Fall Creek	228 08/23/83 09/12/83	1985	989,540		867,842	0
75 Carson	58 08/15/83 09/12/83	1985	311,734		282,838	0
75 Carson	122					
75 Carson	35 08/02/85 08/15/85		175,560			0
Summer Steelhead						
19 Clack. Early	30 01/17/84 02/07/84		103,896			0
Winter Steelhead						
21 North Santiam	146 04/26/84 05/02/84	1985	531,530	251,114	232,258	July 1984
21 North Santiam	04/17/85 04/29/85	1986	671,537	322,999	283,043	June 1985
21 North Santiam	164 04/10/86 04/29/86	1987	638,261	179,187	304,774	June 1986
24 South Santiam		1985		69,504	59,685	July 1984
24 South Santiam		1986		33,277	24,629	July 1985
Mckenzie River						
Spring Chinook						
22 M Uillanette	927 09/07/83 09/24/83	1985	3,733,368	2,016,000	1,429,439	Dec-Jan 84
22 M Uillanette	890 09/07/84 10/02/84	1986	3,752,220	2,333,000	0	
22 M Uillanette	161 09/05/85 10/02/85	1986	741,774		688,782	Dec-Feb a6
23 McKenzie	229 09/06/83 10/03/83	1985	913,804	593,199	307,069	Dec-Jan 84
23 McKenzie	592 09/04/84 10/02/84	1986	2,348,933	435,500	1,723,595	Dec-Jan 85
23 McKenzie	442 09/10/85 10/07/85	1987	1,905,925	60,000	1,748,545	Jan-Feb a6
23 McKenzie	385 09/09/86 09/30/86	1987	1,637,036	249,329	1,197,795	Dec-Feb 87
25 Fall Cr (Carson)	35 08/13/84 09/04/84	1986	165,684	163,294	0	
26 Fall Cr (Willam)	1a4 09/11/85 10/07/85	1986	771,278	59,500	630,455	Jan-Feb a6
26 Fall Cr (Willam)	90 09/17/86 09/30/86	1987	452,596		374,057	Jan-Feb a7

Summary Table 7. Continued

Hatchery Species	# Female Stock	Spawning Begin	Date End	Release Year	Egg Take	Egg Transfers In	Transfers out	Fingerlings No.	Ponded Date	Transfers Of Fish In
Oak Springs										
Summer Steelhead										
24 South Santiam				1985	1,243,080			1,210,000	Mar-Apr	a4
24 South Santiam				1986	1,052,500			1,002,000	April	1985
24 South Santiam				1987	1,037,750			1,016,000	April	1986
91 Umatilla River	23	04/10/84	05/09/84	1985	112,000			101,000	May-Jun	a4
91 Umatilla River	33	04/08/85	04/29/85	1986	158,000		14,440	118,000	May-Jun	a5
91 Umatilla River	30	04/07/86	05/05/86	1987	166,020			8,000	May	1986
oxbou										
Coho										
11 Sandy				1985	2,065,500			1,829,525	Feb-Mar	84
11 Sandy				1986	1,568,750			1,550,269	March	1985
11 Sandy				1987	3,016,181	1,683,750		1,180,805		
14 Tanner Creek				1985	3,494,701	374,644		2,962,998	March	1984
14 Tanner Creek				1986	1,660,000			1,643,149	March	1985
98 Cowlitz				1985	1,940,598			1,940,598	April	1984
Fall Chinook										
13 Big Creek					1,620,750	1,601,028		0		
14 Tanner Creek				1985	2,271,827	2,042,962		0		
14 Tanner Creek					1,000,000	992,813		0		
Spring Chinook										
19 Clack. Early				1985	1,202,511			1,193,313	Dec-Jan	85
19 Clack. Early				1986	1,400,000			1,381,254	Jan.	1986
19 Clack. Early				1987	950,625			933,733	Jan.	1987
75 Carson					1,250,000	1,229,127		0		
75 Carson				1987	1,008,000	240,000		759,916	Jan.	1987
Roaring River										
Winter Steelhead										
13 Big Creek				1986	126,000			111,400	April	1985
13 Big Creek					120,000			117,156	April	1986
15 Klaskanine				1985	144,200			121,300	April	1984
Round Butte										
Spring Chinook										
66 Deschutes River	266			1985	823,245		197,080	381,939		
66 Deschutes River	104			1986	481,087			344,304		
66 Deschutes River	132			1987	466,569		74,880	288,092		
Summer Steelhead										
66 Deschutes River	275			1985	1,351,105		173,700	659,725		
66 Deschutes River	328			1986	1,668,456		3,015	750,867		
66 Deschutes River	297			1987	1,501,000		11,144	779,000		

Summary Table 7. Continued

Hatchery Species	Stock	# Female Spawned	Spawning Date Begin	Date End	Release Year	Egg Take	Egg Transfers In	Transfers out	Fingerlings No.	Ponded Date	Transfers Of Fish In
Sandy											
Coho											
11 Sandy		1,842	10/25/83	12/19/83	1985	3,203,138		1,876,250	981,796	March	1984
11 Sandy		3,073	10/22/84	11/14/84	1986	9,010,080		7,225,526	1,295,577	Feb-Mar	85
11 Sandy		1,872	10/25/85	11/06/85	1987	5,211,772		3,187,750	1,260,144	March	1986
98 Cowlitz							1,505,000	1,503,025	0		
South Santiam											
Coho											
20 Clack. Late					1987		122,670	119,352			
Spring Chinook											
22 M. Willanette		a92			1985						
22 M Willanette		38	09/11/84	09/11/84	1986	196,552		196,552			
24 South Santiam		434	09/08/83	10/06/83	1985	1,918,377		1,840,676			
24 South Santiam		1,024	09/11/84	10/11/84	1986	4,552,270		3,912,712			
24 South Santiam		607	09/11/85	10/10/85	1987	2,704,390		2,528,000			
Summer Steelhead											
24 South Santiam		415	01/11/84	03/19/84	1985	1,552,090		1,369,146			
24 South Santiam		376	01/10/85	02/27/85	1986	1,471,108		1,168,500			
24 South Santiam		327	01/09/86	03/10/86	1987	1,336,050		1,203,075			
Wallowa											
Summer Steelhead											
29 Imaha 8 Tribs		35	04/11/84	05/14/84	1985	179,550		113,985			
29 Imaha & Tribs		95	04/11/85	05/20/85	1986	425,844		316,739			
29 Imaha & Tribs		42	04/24/86	06/11/86	1987	191,721		110,168			
56 Wallowa		385	03/14/84	05/16/84	1985	1,670,780		1,461,462			
56 Wallowa		218	04/03/85	05/20/85	1986	1,571,636		1,251,781			
56 Wallowa		812	03/27/86	05/20/86	1987	4,083,274		2,169,600			
Willanette											
Spring Chinook											
22 M Willanette		979	09/10/84	10/02/84	1985	4,641,961	1,299,552	31,000	5,519,943	Jan-Mar	84
22 M Willanette		961	09/09/85	10/02/85	1986	4,617,835			4,085,196	Feb-Mar	85
22 M Willanette		1,133	09/09/86	10/03/86	1987	4,950,013		695,000	3,811,106	Jan-Feb	86
24 South Santiam					1985		3,479,712		3,429,464	Jan-Feb	84
24 South Santiam					1986		2,384,000		2,350,177	Jan-Mar	85
24 South Santiam					1987		2,053,250		2,037,101	Jan-Feb	86

Summary Table 8. Releases And Production Goals For Each Hatchery Operated By The Oregon Department Of Fish And Wildlife Which Reared Anadromous Fish In The Columbia River Basin In 1985.

Hatchery	Smolt Releases	Fingerling Releases	Transfers	Smolt Production Goal	Nonsmolt Goal
Species Stock	No. Lbs.	No. Lbs.	No. Lbs.	No. Lbs.	No. Lbs.
Aumsville Ponds					
Fall Chinook					
14 Tanner Creek			5,831,000 10,395		
TOTAL	0 0	0 0	5,831,000 10,395	0 0	0 0
Big Creek					
Coho					
Big Creek	703,941 53,510		18,011 773	720,000 57,600	
Tanner Creek	862,765 64,869				
Fall Chinook					
13 Big Creek	5,898,411 68,586			5,700,000 71,250	
14 Tanner Creek			2,027,806 2,929		
52 Rogue	102,563 6,130		83,659 1,146	100,000 4,792	
Winter Steelhead					
13 Big Creek	62,912 12,741		84,658 a,435	60,000 10,000	
TOTAL	7,630,592 205,836	0 0	2,214,134 13,283	6,580,000 143,642	0 0
Bonneville					
Coho					
11 Sandy River		1,556,035 8,800			2,000,000 10,000
Tanner Creek	2,072,986 141,813	260,914 996		2,000,000 142,860	
Fall Chinook					
14 Tanner Creek	1,042,214 15,726			1,000,000 12,500	
95 Columbia URB	6,657,622 228,082		281,175 4,650	6,700,000 218,000	
TOTAL	9,772,822 385,621	1,816,949 9,796	281,175 4,650	9,700,000 373,360	2,000,000 10,000
Cascade					
Coho					
14 Tanner Creek	79,750 5,380		4,168,200 124,575	1,700,000 113,333	
TOTAL	79,750 5,380	0 0	4,168,200 124,575	1,700,000 113,333	0 0
Clackamas					
Spring Chinook					
19 Clack. R. Early	923,283 111,426			900,000 112,500	
TOTAL	923,283 111,426	0 0	0 0	900,000 112,500	0 0

Summary Table 8. Continued

Hatchery Species	Stock	Smolt Releases		Fingerling Releases		Transfers		Smolt Production Goal		Non-smolt Goal	
		No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Dexter Pond											
Spring Chinook											
22 M. Uillamette		883,476	122,294					650,000	81,250		
23 McKenzie River		284,915	30,397								
24 South Santiam		594,267	71,484					175,000	21,875		
TOTAL		1,762,658	224,175	0	0	0	0	825,000	103,125	0	0
Gnat Creek											
Summer Steelhead											
24 South Santiam		213,317	37,671	13,596	713			205,000	41,000		
Winter Steelhead											
13 Big Creek		438,819	87,068	25,426	1,205	100,220	5,030	440,000	88,000		
TOTAL		652,136	124,739	39,022	1,918	100,220	5,030	645,000	129,000	0	0
Imnaha Pond											
Spring Chinook											
29 Imnaha		59,578	3,424								
TOTAL		59,578	3,424	0	0	0	0	0	0	0	0
Irrigon											
Summer Steelhead											
29 Imnaha and Tribs		55,196	8,149					100,000	20,000		
56 Wallowa River						446,981	73,970	300,000	60,000		
TOTAL		55,196	8,149	0	0	446,981	73,970	400,000	80,000	0	0
Klaskanine											
Coho											
11 Sandy						403,392					
13 Big Creek				975,162	6,251					1,200,000	6,000
14 Tanner Creek		1,397,990	98,450					1,400,000	100,000		
15 Klaskanine		1,358,852	123,532					1,400,000	93,333		
Fall Chinook											
13 Big Creek				1,595,440	8,140			2,300,000	28,750		
Winter Steelhead											
13 Big Creek		61,241	11,777					65,000	13,000		
TOTAL		2,818,083	233,759	2,570,602	14,391	403,392	0	5,165,000	235,083	1,200,000	6,000

Summary Table 8. Continued

Hatchery		Smolt	Releases	Fingerling	Releases	Transfers	Smolt	Production	Goal	Nonsmolt	Goal
Species	Stock	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Leaburg											
Summer Steelhead											
23	McKenzie River	94,007	18,802	215,342	3,699	44,349	4,030	120,000	24,000		
24	South Santiam	26,961	6,128								
TOTAL		120,968	24,930	215,342	3,699	44,349	4,030	120,000	24,000	0	0
Lookingglass											
Spring Chinook											
25	Fall Cr Reservoir	225,554	9,598								
29	Imaha and Tribs					59,595	3,425	11a,000	6,740		
75	Carson	1,436,658	87,284	104,800	3,275			1,182,000			
TOTAL		1,662,212	96,882	104,800	3,275	59,595	3,425	1,300,000	6,740	0	0
Marion Forks											
Spring Chinook											
22	M. Uillanette	319,987	28,145	13,929	47			400,000	34,782		
23	McKenzie River			231,865	555	144,834	2,288				
24	South Santiam	41,390	4,891								
Winter Steelhead											
21	North Santiam	91,853	15,735	111,389	1,230			100,000	20,000	80,000	1,333
24	South Santiam			83,304	798						
TOTAL		453,230	48,771	440,487	2,630	144,834	2,288	500,000	54,782	80,000	1,333
Mckenzie											
Spring Chinook											
22	M Uillanette	122,140	12,139					685,000	85,625		
23	McKenzie River	635,681	83,217	826,565	8,770	800	85	650,000	75,690	400,000	1,140
Summer Steelhead											
23	McKenzie River	20,285	3,901								
24	South Santiam	104,418	19,700	4,918	175			130,000	26,000		
TOTAL		882,524	118,957	831,483	8,945	800	a5	1,465,000	187,315	400,000	1,140
Oak Springs											
S-r Steelhead											
24	South Santiam	162,554	37,629	66,250	1,250	701,465	10,081	160,000	32,000		
91	Unatilla	59,930	7,453	39,134	190			60,000	12,000		
TOTAL		222,484	45,082	105,384	1,440	701,465	10,081	220,000	44,000	0	0

Summary Table 8. Continued

Hatchery Species	Stock	Smolt Releases		Fingerling Releases		Transfers		Smolt Production		Coal	Nonsmolt	Goal
		No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.			
Oxbow												
Coho												
11	Sandy			799,369	4,369							
14	Tanner Creek			1,225,125	3,972							
14/11	Tanner/Sandy					4,932,760	104,838					
Spring Chinook												
19	Clackamas R Early			130,707	927	961,519	5,747					
TOTAL		0	0	2,155,201	9,268	5,894,279	110,585	0	0	0	0	0
Pelton Fish Ladder												
Spring Chinook												
66	Deschutes River	121,476	15,776					120,000	13,333			
TOTAL		121,476	15,776	0	0	0	0	120,000	13,333	0	0	0
Roaring River												
Summer Steelhead												
24	South Santiam	146,329	23,996	33,406	1,110			150,000	30,000			
Winter Steelhead												
15	Klaskanine River	70,498	11,750	8,504	170			75,000	12,500			
TOTAL		216,827	35,746	41,910	1,280	0	0	225,000	42,500	0	0	0
Round Butte												
Spring Chinook												
66	Deschutes River	57,743	10,002	41,070	1,110			60,000	10,000			
Summer Steelhead												
66	Deschutes River	176,006	43,849	17,113	631			162,000	36,000			
TOTAL		233,749	53,851	58,183	1,741	0	0	222,000	46,000	0	0	0
Sandy												
Coho												
11	Sandy	896,604	64,172	160,226	1,067	300,265	8,051	895,000	65,200			
TOTAL		896,604	64,172	160,226	1,067	300,265	8,051	895,000	65,200	0	0	0
South Santiam												
Spring Chinook												
24	South Santiam	279,363	34,038					250,000	31,250			
Summer Steelhead												
24	South Santiam	140,587	25,387					160,000	26,667			
TOTAL		419,950	59,425	0	0	0	0	410,000	57,917	0	0	0

Summary Table 8. Continued

Hatchery	Species	Stock	Smolt Releases No.	Releases Lbs.	Fingerling Releases No.	Releases Lbs.	Transfers No.	Lbs.	Smolt Production Goal No.	Lbs.	Nonsmolt Goal No.	Lbs.
Stayton Pond												
Fall Chinook												
	14 Tanner Creek		4,526,306	86,642					5,800,000	96,667		
Spring Chinook												
	22 M Willanette		66,688	7,497	2,964	38						
	TOTAL		4,592,994	94,139	2,964	38	0	0	5,800,000	96,667	0	0
Trojan Rearing Pond												
Winter Steelhead												
	13 Big Creek		82,482	17,549					100,000	20,000		
	TOTAL		82,482	17,549	0	0	0	0	100,000	20,000	0	0
Uahkeena Pond												
coho												
	14 Tanner Creek		2,111,085	110,528					2,000,000	160,000		
	TOTAL		2,111,085	110,528	0	0	0	0	2,000,000	160,000	0	0
Wallowa												
Summer Steelhead												
	29 Imnaha and Tribs		23,919	4,829					0			
	56 Wallowa		646,045	101,108								
	TOTAL		669,964	105,937	0	0	0	0	0	0	0	0
Willanette												
Spring Chinook												
	22 M Uillanette		31,690	4,529	3,375,887	11,011	788,530	41,669	250,000	31,250	3,200,000	8,000
	24 South Santiam		94,102	13,012	2,046,488	10,568	1,427,316	33,050	547,000	68,375	2,000,000	5,714
Winter Steelhead												
	43 Alsea R and Tribs				74,425	2,899	323,683	21,085				
	TOTAL		125,792	17,541	5,496,800	24,478	2,539,529	95,804	797,000	99,625	5,200,000	13,714

Summary Table 9. Releases And Production Goals For Each Hatchery Operated By The Oregon Department Of Fish And Wildlife Which Reared Anadromous Fish In The Columbia River Basin In 1986.

Hatchery		Smolt Releases		Fingerling Releases		Transfers		Smolt Production Goal		Non-smolt Goal	
Species	Stock	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Aumsville Ponds											
Fall Chinook											
14	Tanner Creek					5,914,692	18,073				
TOTAL		0	0	0	0	5,914,692	18,073	0	0	0	0
Big Creek											
Coho											
13	Big Creek	715,378	53,877					590,000	41,260		
14	Tanner Creek	844,434	62,551					160,000	11,430		
Fall Chinook											
13	Big Creek	6,642,398	82,989			1,588,964	2,275	5,700,000	71,250		
52	Rogue	146,018	8,709					150,000	8,960		
Winter Steelhead											
13	Big Creek	48,997	12,715	16,987	469	60,870	5,880	60,000	12,000		
TOTAL		8,397,225	220,841	16,987	469	1,649,834	8,155	6,660,000	144,900	0	0
Bonneville											
Coho											
14	Tanner Creek	1,740,942	131,165					2,000,000	142,860		
Fall Chinook											
14	Tanner Creek	4,941,169	64,171			450,186	1,250	5,500,000	68,750		
72	Washington Tule	184,249	4,527			699,500	2,798				
95	Columbia URB	1,829,097	133,556					2,025,000	177,200		
Spring Chinook											
75	Carson					81,532	4,280				
TOTAL		8,695,457	333,419	0	0	1,231,218	8,328	9,525,000	388,810	0	0
Cascade											
Coho											
14	Tanner Creek					4,079,103	141,075	1,890,000	128,460		
TOTAL		0	0	0	0	4,079,103	141,075	1,890,000	128,460	0	0
Clackamas											
Coho											
20	Clackamas R. Late			5,035	19	129,600	480				
Spring Chinook											
19	Clackamas R. Early	1,131,722	124,820					1,260,000	157,500		
Winter Steelhead											
20	Clackamas R. Late	81,487	14,199					60,000	10,000		
TOTAL		1,213,209	139,019	5,035	19	129,600	480	1,320,000	167,500	0	0

Summary Table 9. Continued

Hatchery		Smolt Releases		Fingerling Releases		Transfers		Smolt Production Goal		Nonmolt Goal	
Species	Stock	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Dexter Pond											
Spring Chinook											
22 M	Willamette	948,874	121,957					650,000	81,250		
24	South Santiam	515,854	52,647					175,000	21,875		
TOTAL		1,464,728	174,604	0	0	0	0	825,000	103,125	0	0
Gnat Creek											
Summer Steelhead											
24	South Santiam	196,052	38,873	45,120	2,210			205,000	41,000		
Winter Steelhead											
13	Big Creek	416,111	82,440			108,061	4,860	440,000	88,000		
TOTAL		612,163	121,313	45,120	2,210	108,061	4,860	645,000	129,000	0	0
Irrigon											
Fall Chinook											
95	Columbia URB	2,145,037	48,182					3,230,000	75,833		
95	URB (Mnthon)	255,813	22,225								
Spring Chinook											
29	Imaha and Tribs					118,608	706				
75	Carson	869,905	29,418					900,000	51,430		
85	Idaho					390,000	2,600				
Summer Steelhead											
29	Imaha and Tribs	59,956	9,558			166,300	31,440	129,000	25,800		
56	Wallowa River					88,154	20,220	210,000	42,000		
TOTAL		3,330,711	109,383			763,062	54,966	4,469,000	195,063	0	0
Klaskanine											
Coho											
14	Tanner Creek	832,043	60,293					1,460,000	104,285		
15	Klaskanine	1,098,125	87,850	51,830	355			1,400,000	93,333		
Fall Ctfinook											
13	Big Creek	3,634,736	30,544			449,908	821	4,000,000			
14	Tanner Creek	448,986	5,416								
Winter Steelhead											
13	Big Creek	66,600	13,320					65,000	13,000		
TOTAL		6,080,490	197,423	51,830	355	449,908	821	6,925,000	210,618	0	0

Summary Table 9. Continued

Hatchery Species	Stock	Smolt Releases		Fingerling Releases		Transfers		Smolt Production Goal		Nonsmolt Goal	
		No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Leaburg											
Spring Chinook											
23 McKenzie River						7,844	6				
Summer Steelhead											
23 McKenzie River		119,522	27,953	227,128	3,621	54,539	2,846	120,000	24,000		
TOTAL		119,522	27,953	227,128	3,621	62,383	2,852	120,000	24,000	0	0
Lookingglass											
Spring Chinook											
25 Fall Cr Reservoir						161,429					
29 Imnaha and Tribes		35,014	3,242					35,000	3,500		
75 Carson		773,917	62,748					1,030,000	81,330		
81 Lookingglass		375,869	16,687	126,303	2,380			211,000	11,050		
TOTAL		1,184,800	82,677	126,303	2,380	161,429	0	1,276,000	95,880	0	0
Marion Forks											
Spring Chinook											
21 North Santiam		366,879	33,657					500,000	50,000		
24 South Santiam		108,255	13,973								
Winter Steelhead											
21 North Santiam		103,599	19,112	82,481	1,472			100,000	20,000	80,000	1,333
24 South Santiam		14,175	158								
TOTAL		592,908	66,900	82,481	1,472	0	0	600,000	70,000	80,000	1,333
Mckenzie											
Spring Chinook											
22 M. Willamette R.				650,750	2,340						
23 McKenzie River		630,488	68,655	728,240	2,494	2,754	255	1,002,500	117,940	700,000	2,000
26 Fall Cr Reservoir				604,100	1,620					1,000,000	3,333
Summer Steelhead											
23 McKenzie River		43,718	9,108			600	120	40,000	8,000		
24 South Santlam		87,514	16,032					80,000	16,000		
TOTAL		761,720	93,795	1,983,090	6,454	3,354	375	1,122,500	141,940	1,700,000	5,333
Oak Springs											
Summer Steelhead											
24 South Santlam		158,630	37,265	30,400	950	768,825	12,685	160,000	32,000		
91 Umatilla		55,337	6,559					60,000	12,000		
TOTAL		213,967	43,824	30,400	950	768,825	12,685	220,000	44,000	0	0

Summary Table 9. Continued

Hatchery	Species	Stock	Smolt Releases No.	Lbs.	Fingerling Releases No.	Lbs.	Transfers No.	Lbs.	Smolt Production Goal No.	Lbs.	Non-smolt Goal No.	Lbs.
Gxbow												
Coho												
	11	Sandy			403,005	2,005						
	14/11	Tanner/Sandy					4,855,368	115,568				
Spring Chinook												
	19	Clackamas R					1,309,472	10,232				
	TOTAL		0	0	403,005	2,005	6,164,840	125,800	0	0	0	0
Pelton Fish Ladder												
Spring Chinook												
	66	Deschutes River	212,898	27,649					210,000	23,333		
	TOTAL		212,898	27,649	0	0	0	0	210,000	23,333	0	0
Roaring River												
Summer Steelhead												
	24	South Santiam	141,760	25,905	30,303	390	95,150	5,495	150,000	30,000		
Winter Steelhead												
	13	Big Creek					86,123	7,195				
	15	Klaskanine River	72,784	13,479					75,000	12,500		
	TOTAL		214,544	39,384	30,303	390	181,273	12,690	225,000	42,500	0	0
Round Butte												
Spring Chinook												
	66	Deschutes River	62,946	10,954					60,000	10,000		
Summer Steelhead												
	66	Deschutes River	174,493	37,402	24,092	814	396,317	5,215	162,000	36,000		
	TOTAL		237,439	48,356	24,092	814	396,317	5,215	222,000	46,000	0	0
Sandy												
Coho												
	11	Sandy	909,037	69,845	187,743	977	167,979	967	895,000	65,200		
	TOTAL		909,037	69,845	187,743	977	167,979	967	895,000	65,200	0	0
South Santiam												
Coho												
	11	Sandy River					246,402	16,015				
Spring Chinook												
	24	South Santiam	255,764	26,835					225,000	26,470		
Summer Steelhead												
	24	South Santiam	150,331	26,763	2,768	47			160,000	26,667		
	TOTAL		406,095	53,598	2,768	47	246,402	16,015	385,000	53,137	0	0

Summary Table 9. Continued

Hatchery Species	Stock	Smolt Releases		Fingerling Releases		Transfers		Smolt Production Goal		Nonsmolt Goal	
		No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Stayton Pond											
Fall Chinook											
14	Tanner Creek	4,926,517	72,850					5,500,000	91,667		
TOTAL		4,926,517	72,850	0	0	0	0	5,500,000	91,667	0	0
Trojan Rearing Pond											
Coho											
11	Sandy	248,464	15,926								
Winter Steelhead											
13	Big Creek	96,133	18,066					100,000	20,000		
TOTAL		344,599	33,992	0	0	0	0	100,000	20,000	0	0
Wahkeena Pond											
Coho											
14	Tanner Creek	2,260,518	154,830					2,000,000	133,333		
TOTAL		2,260,518	154,830	0	0	0	0	2,000,000	133,333	0	0
Wallowa											
Summer Steelhead											
29	Imnaha and Tribs	55,481	11,352					129,000	25,800		
56	Wallowa	194,553	46,322					210,000	42,000		
TOTAL		250,034	57,674	0	0	0	0	339,000	67,800	0	0
Willamette											
Spring Chinook											
22	M Willamette	170,259	16,550	2,497,695	9,078	1,314,818	61,066	655,000	72,778	1,550,000	3,575
24	South Santiam	104,494	16,673	1,278,911	7,228	435,137	21,142	500,000	58,820	500,000	
Winter Steelhead											
43	Alsea R and Trib					437,276	26,450				
TOTAL		274,753	33,223	3,776,606	16,306	2,187,231	108,658	1,155,000	131,598	2,050,000	3,875

Summary Table 10. Releases And Production Goals For Each Hatchery Operated By The Oregon Department Of Fish And Wildlife Which Reared Anadromous Fish In The Columbia River Basin In 1987.

Hatchery		Smolt Releases		Fingerling Releases		Transfers		Smolt Production Goal		Nonsmolt Goal	
Species	Stock	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Aumsville Ponds											
Fall Chinook											
	14 Tanner Creek					6,347,965	19,650				
	TOTAL	0	0	0	0	6,347,965	19,650	0	0	0	0
Big Creek											
Coho											
	gig Creek	682,899	48,296	9,936	54			710,000	51,825		
Fall Chinook											
	13 Big Creek	5,475,759	70,504	2,131,645	14,063			5,700,000	71,250	2,000,000	11,111
	14 Tanner Creek	876,250	8,267								
	52 Rogue	158,374	9,936			36,373	242	150,000	8,960		
Winter Steelhead											
	13 gig Creek	58,034	11,607			72,514	8,355	60,000	12,000		
	TOTAL	7,251,316	148,610	2,141,581	14,117	108,887	8,597	6,620,000	144,035	2,000,000	11,111
Bonneville											
Coho											
	Tanner Creek	1,825,479	124,247	3,063,009	14,522	408,698	3,620	2,000,000	142,860	3,000,000	15,000
Fall Chinook											
	14 Tanner Creek	9,884,235	86,171					10,400,000	83,200		
	95 Columbia URB	3,762,598	149,343			211,380	25,485	2,975,000	134,315		
Spring Chinook											
	34 Trask River	631	54								
	75 Carson	88,667	8,169								
Summer Chinook											
	95 Columbia URB	431,218	34,165					350,000	29,167		
	TOTAL	15,992,828	402,149	3,063,009	14,522	620,078	29,105	15,725,000	389,542	3,000,000	15,000
Cascade											
Coho											
	1b Tanner Creek					3,184,344	74,451	1,700,000	113,333		
	TOTAL	0	0	0	0	3,184,344	74,451	1,700,000	113,333	0	0

Summary Table 10. Continued

Hatchery	Smolt	Releases	Fingerling	Releases	Transfers	Smolt	Production	Goal	Nonsmolt	Goal	
Species	Stock	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Clackamas											
Spring Chinook											
19 Clack. R. Early		938,390	99,401					800,000	88,890		
Winter Steelhead											
20 Clack. R. Late		69,512	11,210					60,000	10,000		
TOTAL		1,007,902	110,611	0	0	0	0	860,000	98,890	0	0
Dexter Pond											
Spring Chinook											
22 M Willamette		1,134,567	157,239					635,000	79,375		
24 South Santiam		356,476	45,257					175,000	21,875		
TOTAL		1,491,043	202,496	0	0	0	0	810,000	101,250	0	0
Gnat Creek											
Summer Steelhead											
24 South Santiam		198,776	39,943			35,280	2,240	205,000	41,000		
Winter Steelhead											
13 Big Creek		424,915	79,541			107,858	7,345	440,000	88,000		
TOTAL		623,691	119,484	0	0	143,138	9,585	645,000	129,000	0	0
Irrigon											
Fall Chinook											
45 Washington URB		1,475,190	24,441			126,949	343				
Spring Chinook											
85 Idaho						468,611	6,791				
Summer Steelhead											
29 Imnaha and Tribs		93,716	18,776	37,939	611			102,000	20,400		
56 Wallowa River		695,098	142,532	300,585	7,246	825,855	171,981	1,350,000	270,000		
TOTAL		2,264,004	185,749	338,524	7,857	1,421,415	179,115	1,452,000	290,400	0	0
Klaskanine											
Coho											
11 Sandy		73,925	5,914								
14 Tanner Creek		452,426	36,194					825,000	55,000		
15 Klaskanine		1,143,652	97,748					1,400,000	93,333		
Fall Chinook											
13 Big Creek		3,760,600	40,515					4,000,000			
Winter Steelhead											
13 Big Creek		59,520	11,446					65,000	13,000		
TOTAL		5,490,123	191,817	0	0	0	0	6,290,000	161,333	0	0

Summary Table 10. Continued

Hatchery		Smolt Releases		Fingerling Releases		Transfers		Smolt Production Goal		Non-smolt Goal	
Species	Stock	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Leaburg											
Spring Chinook											
23	McKenzie River					19,456	29				
Summer Steelhead											
23	McKenzie River	116,622	22,947			72,310	6,379	120,000	24,000		
TOTAL		116,622	22,947	0	0	91,766	6,408	120,000	24,000	0	0
Lookingglass											
Spring Chinook											
29	Imnaha and Tribes	123,530	15,010					124,000	12,400		
75	Carson	84,295	7,330			84,495	6,735	150,000	15,000		
81	Lookingglass	276,229	15,523	100,917	1,731			274,000	15,660	100,000	1,540
85	Idaho	557,986	48,385	173,971	4,887			546,000	49,600		
TOTAL		1,042,040	86,248	274,888	6,618	84,495	6,735	1,094,000	92,660	100,000	1,540
Marion Forks											
Coho											
20	Clackamas R. Lates					110,610	559				
Spring Chinook											
19	Clackamas Early					362,743	3,964				
21	North Santiam	497,745	55,204					300,000	25,000		
22	M Willamette					513,156	3,699				
23	McKenzie River					107,778	142				
Winter Steelhead											
21	North Santiam	110,634	22,438	116,156	3,396	1,107	187	120,000	24,000	80,000	1,333
TOTAL		608,379	77,642	116,156	3,396	1,095,394	8,551	420,000	49,000	80,000	1,333
McKenzie											
Spring Chinook											
23	McKenzie River	899,400	99,776	262,072	1,040	28,703	299	778,500	91,530	200,000	571
26	Fall Cr Reservoir			365,500	1,075					330,000	1,100
Summer Steelhead											
23	McKenzie River	40,281	3,305					40,000	8,000		
24	South Santiam	78,533	15,174			6,075	250	80,000	16,000		
TOTAL		1,018,214	123,255	627,572	2,115	34,778	549	898,500	115,530	530,000	1,671
Oak Springs											
Summer Steelhead											
24	South Santiam	170,341	40,879			670,490	4,165	160,000	32,000		
	911matilla	1,485	270					60,000	12,000		
TOTAL		171,826	41,149	0	0	670,490	4,165	220,000	44,000	3	3

Summary Table 10. Continued

Hatchery Species	Stock	Smolt Releases		Fingerling Releases		Transfers		Smolt Production Goal		Nonsmolt Goal	
		No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
Cxbou											
Coho											
11 Sandy				199,920	1,360						
14/11 Tanner/Sandy						4,496,168	112,825				
Spring Chinook											
19 Clackamas R Early						864,730	8,825				
75 Carson				169,100	1,250	520,115	2,635			200,000	2,000
TOTAL		0	0	369,020	2,210	5,881,013	124,285	0	0	200,000	2,000
Pelton Fish Ladder											
Spring Chinook											
66 Oeschutes River		210,998	28,133					210,000	23,333		
TOTAL		210,998	28,133	0	0	0	0	210,000	23,333	0	0
Roaring River											
Summer Steelhead											
24 South Santiam		71,540	14,395			27,240	591	150,000	30,000		
Winter Steelhead											
15 Klaskanine River						16,491	717	75,000	12,500		
TOTAL		71,540	14,395	0	0	43,731	1,308	225,000	42,500	0	0
Round Butte											
Spring Chinook											
66 Oeschutes River		75,906	10,812								
Summer Steelhead											
66 Oeschutes River		157,236	33,795			407,345	4,410	162,000	36,000		
TOTAL		233,142	44,607	0	0	407,345	4,410	162,000	36,000	0	0
Sandy											
Coho											
11 Sandy		889,686	67,725	140,890	965	7,316	29	895,000	65,200	300,000	1,500
TOTAL		889,686	67,725	140,890	965	7,316	29	895,000	65,200	300,000	1,500
South Santiam											
Coho											
11 Sandy River		90,354	6,258			73,929	4,765	150,000	10,000		
20 Clackamas R Late		107,690	7,779	14,998	285			100,000	10,000		

Summary Table 10. Continued

Hatchery		Smolt Releases		Fingerling Releases		Transfers		Smolt Production Goal		Non-smolt Coal	
Species	Stock	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
South Santiam - Continued											
Spring Chinook											
22 M Willamette						292,942	20,410				
24 South Santiam		208,213	24,968					207,000	24,350		
Summer Steelhead											
24 South Santiam		177,088	34,591	8,840	170			200,000	40,000		
TOTAL		583,345	73,596	23,838	455	366,871	25,175	657,000	84,350	0	0
Stayton Pond											
Fall Chinook											
14 Tanner Creek		5,767,582	95,712					5,500,000	91,667		
TOTAL		5,767,582	95,712	0	0	0	0	5,500,000	91,667	0	0
Trojan Rearing Pond											
Winter Steelhead											
13 Big Creek		93,433	20,521					100,000	20,000		
TOTAL		93,433	20,521	0	0	0	0	100,000	20,000	0	0
Wahkeena Pond											
Coho											
14 Tanner Creek		98,532	2,898					2,000,000	133,333		
TOTAL		98,532	2,898	0	0	0	0	2,000,000	133,333	0	0
Wallowa											
Summer Steelhead											
56 Uallowa		825,946	195,454					1,000,000	200,000		
TOTAL		825,946	195,454	0	0	0	0	1,000,000	200,000	0	0
Willamette											
Spring Chinook											
22 M Willamette		175,738	20,120	2,416,064	6,636	1,041,092	59,473	650,000	72,222	2,220,000	5,730
24 South Santiam		398,831	49,021	870,603	4,334	668,422	26,189	500,000	58,820	500,000	6,667
Summer Steelhead											
24 South Santiam		83,048	14,062								
Winter Steelhead											
13 Big Creek		82,211	12,162								
43 Alsea R. and Tribs		1,404	117			388,803	29,062				
TOTAL		741,232	95,482	3,286,667	10,970	2,098,317	114,724	1,150,000	131,042	2,720,000	12,397

Summary Table 11. Production In Pounds During The Three Year Period 1985-1987 For Hatcheries Operated By The Oregon Department Of Fish And Wildlife Which Reared Anadrcxnous Fish In The Columbia River Basin. Smolts Include Pounds Of Smolts Released, Fingerling Includes Pounds Of Non-molting Fish Released, And Trans. Includes The Pounds Of Fish Transferred to Other Rearing Facilities.

Hatchery Species Stock	1985			1986			1987			3 Year Average
	Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	
Aumsville Ponds										
Fall Chinook										
14 Tanner Creek			10,395			18,073			19,650	
	0	0	10,395	0	0	18,073	0	0	19,650	16,039
Big Creek										
Coho										
13 Big Creek	53,510		773	53,877			48,296	54		
14 Tanner Creek	64,869			62,551						
Fall Chinook										
13 Big Creek	68,586			82,989		2,275	70,504	14,063		
14 Tanner Creek			2,929				8,267			
52 Rogue	6,130		1,146	8,709			9,936		242	
Uinter Steelhead										
13 Big Creek	12,741		8,435	12,715	469	5,880	11,607		8,355	
	205,836	0	13,283	220,841	469	8,155	148,610	14,117	8,597	206,636
Bonneville										
Coho										
11 Sandy River		8,800								
14 Tanner Creek	141,813	996		131,165			124,247	14,522	3,620	
Fall Chinook										
14 Tanner Creek	15,726			64,171		1,250	86,171			
72 Washington Tules				4,527		2,798				
95 Columbia URB	228,082		4,650	133,556			149,343		25,485	
Spring Chinook										
34 Trask River							54			
75 Carson						4,280	8,169			
Summer Chinook										
95 Columbia Upriver							34,165			
	385,621	9,796	4,650	333,419	0	8,328	402,149	14,522	29,105	395,863
Cascade										
Coho										
14 Tanner Creek	5,380		124,575			141,075			74,451	
	5,380	0	124,575	0	0	141,075	0	0	74,451	115,160

Summary Table 11. Continued

Hatchery Species	Stock	1985			1986			1987			3 Year Average
		Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	
Clackamas											
Coho											
20 Clackamas R.	Late				19	480					
Spring Chinook											
19 Clackamas R.	Early	111,426			124,820			99,401			
Winter Steelhead											
20 Clack. R.	Late				14,199			11,210			
		111,426	0	0	139,019	19	480	110,611	0	0	120,518
Dexter Pond											
Spring Chinook											
22 M W!Lanette		122,294			121,957			157,239			
23 McKenzie River		30,397									
24 South Santiam		71,484			52,647			45,257			
		224,175	0	0	174,604	0	0	202,496	0	0	200,425
Gnat Creek											
Summer Steelhead											
24 South Santiam		37,671	713		38,873	2,210		39,943		2,240	
Winter Steelhead											
13 Big Creek		87,068	1,205	5,030	82,440		4,860	79,541		7,345	
		124,739	1,918	5,030	121,313	2,210	4,860	119,484	0	9,585	129,713
Imaha Pond											
Spring Chinook											
29 Imaha		3,424									
		3,424	0	0	0	0	0	0	0	0	1,141
Irrigon											
Fall Chinook											
45 Washington	URB							24,441		343	
95 Columbia	URB				48,182						
95 URB	(Mnthorn)				22,225						
Spring Chinook											
29 Imaha and Iribs							706				
75 Carson					29,418						
85 Idaho							2,600			6,791	
Summer Steelhead											
29 Imaha and Iribs		8,149			9,558	31,440		18,776	611		
56 Wallowa River				73,970		20,220		142,532	7,246	171,981	
		8,149	0	-73,970	109,383	54,966		185,749	7,857	179,115	207,548

Summary Table 11. Continued

Hatchery	Species	Stock	1985			1986			1987			3 Year Average
			Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	
Klaskanine												
Coho												
	11	Sandy							5,914			
	13	Big Creek		6,251								
	14	Tanner Creek	98,450			60,293		34,194				
	15	Klaskanine	123,532			87,850	355	97,748				
Fall Chinook												
	13	Big Creek		8,140		30,544		821	40,515			
	14	Tanner Creek				5,416						
Winter Steelhead												
	13	Big Creek	11,777			13,320		11,446				
			233,759	14,391	0	197,423	355	821	191,817	0	0	212,855
Leaburg												
Spring Chinook												
	23	McKenzie River						6			29	
Summer Steelhead												
	23	McKenzie River	18,802	3,699	4,030	27,953	3,621	2,846	22,947		6,379	
	24	South Santiam	6,128									
			24,930	3,699	4,030	27,953	3,621	2,852	22,947	0	6,408	32,147
Lookingglass												
Spring Chinook												
	25	Fall Cr Reservoir	9,598									
	29	Imnaha and Tribs			3,425	3,242			15,010			
	75	Carson	87,284	3,275		62,748			7,330		6,735	
	81	Lookingglass				16,687	2,380		15,523	1,731		
	85	Idaho							48,385	4,887		
			94,882	3,275	3,425	82,677	2,380	0	84,248	6,618	6,735	96,080
Marion Forks												
Coho												
	20	Clackamas R. Late									559	
Spring Chinook												
	19	Clackamas Early									3,964	
	21	North Santiam				33,657			55,204			
	22	M. Willamette R.	28,145	47							3,699	
	23	McKenzie River		555	2,288						142	
	24	South Santiam	4,891			13,973						
Winter Steelhead												
	21	North Santiam	15,735	1,230		19,112	1,472		22,438	3,396	187	
	24	South Santiam		798		158						
			48,771	2,630	2,288	66,900	1,472	0	77,642	3,396	8,551	70,550

Summary Table 11. Continued

Hatchery	Species	Stock	1985			1986			1987			3 Year Average
			Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	
Mckenzie												
Spring Chinook												
	22 M Willamette R.		12,139			2,340						
	23 McKenzie River		83,217	8,770	85	68,655	2,494	255	99,776	1,040	299	
	26 Fall Cr Reservoir					1,620			1,075			
Summer Steelhead												
	23 McKenzie River		3,901			9,108		120	8,305			
	24 South Santiam		19,700	175		16,032			15,174		250	
			118,957	8,945	85	93,795	4,454	375	123,255	2,115	549	118,177
Oak Springs												
Summer Steelhead												
	24 South Santiam		37,629	1,250	10,081	37,265	950	12,685	40,879		4,165	
	91 Umatilla		7,453	190		6,559			270			
			45,082	1,440	10,081	43,824	950	12,685	41,149	0	4,165	53,125
Oxbow												
Coho												
	11 Sandy			4,369		2,005			1,360			
	14 Tanner Creek			3,972								
	14/11 Tanner/Sandy				104,838		115,568				112,825	
Spring Chinook												
	19 Clackamas R Early			927	5,747		10,232				8,825	
	75 Carson								850	2,635		
			0	9,268	110,585	0	2,005	125,800	0	2,210	124,285	124,718
Pelton Fish Ladder												
Spring Chinook												
	66 Deschutes River		15,776			27,649			28,133			
			15,776	0	0	27,649	0	0	28,133	0	0	23,853
Roaring River												
Summer Steelhead												
	24 South Santiam		23,996	1,110		25,905	390	5,495	14,395		591	
Winter Steelhead												
	13 Big Creek						7,195					
	15 Klaskanine River		11,750	170		13,479					717	
			35,746	1,280	0	39,384	390	12,690	14,395	0	1,308	35,064

Summary Table 11. Continued

Hatchery Species	Stock	1985			1986			1987			3 Year Average
		Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	
Round Butte											
Spring Chinook											
66 Deschutes River		10,002	1,110		10,954			10,812			
Summer Steelhead											
66 Deschutes River		43,849	631		37,402	814	5,215	33,795		4,410	

		53,851	1,741	0	48,356	814	5,215	44,607	0	4,410	52,998
Sandy											
Coho											
11 Sandy		64,172	1,067	8,051	69,845	977	967	67,725	965	29	

		64,172	1,067	8,051	69,845	977	967	67,725	965	29	71,266
South Santiam											
Coho											
11 Sandy River							16,015	6,258		4,765	
20 Clackamas R. Late								7,779	285		
Spring Chinook											
22 M Willanette										20,410	
24 South Santiam		34,038			26,835			24,968			
Summer Steelhead											
24 South Santiam		25,387			26,763	47		34,591	170		

		59,425	0	0	53,598	47	16,015	73,596	455	25,175	76,104
Stayton Pond											
Fall Chinook											
14 Tanner Creek		86,642			72,850			95,712			
Spring Chinook											
22 M. Willanette		7,497	38								

		94,139	38	0	72,850	0	0	95,712	0	0	87,580
Trojan Rearing Pond											
Coho											
11 Sandy					15,926						
Winter Steelhead											
13 Big Creek		17,549			18,066			20,521			

		17,549	0	0	33,992	0	0	20,521	0	0	24,021

Summary Table 11. Continued

Hatchery	Species	Stock	1985			1986			1987			3 Year Average
			Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	
Wahkeena Pond												
Coho												
	14	Tanner Creek	110,528			154,830			2,898			
			110,528	0	0	154,830	0	0	2,898	0	0	89,419
Wallowa												
Summer Steelhead												
	29	Imnaha and Tribs	4,829			11,352						
	56	Wallowa	101,108			46,322			195,454			
			105,937	0	0	57,674	0	0	195,454	0	0	119,688
Willamette												
Spring Chinook												
	22	M. Willamette	4,529	11,011	41,669	16,550	9,078	61,066	20,120	6,636	59,473	
	24	South Santiam	13,012	10,568	33,050	16,673	7,228	21,142	49,021	4,334	26,189	
Summer Steelhead												
	24	South Santiam							14,062			
Winter Steelhead												
	13	Big Creek							12,162			
	43	Alsea R and Tribs		2,899	21,085			26,450	117		29,062	
			17,541	24,478	95,804	33,223	16,306	108,658	95,482	10,970	114,724	172,395

Summary Table 12. Total Anadromous Fish Production In Pounds (Includes Smolt And Fingerling Releases And Transfers), Theoretical Production In Pounds Calculated For Flow And Density Methods, And 1987 Agency Production Goals (Smolts Plus Fingerlings) For Hatcheries Operated By The Oregon Department Of Fish And Wildlife in The Columbia River Basin.

Hatchery	Total Hatchery Production in Pounds				Theoretical Productions in Lbs		1987 Agency Goal in Lbs
	1985	1986	1987	Average	Flow Method	Density Method	
Aumsville Ponds	10,395	18,073	19,650	16,039	18,322	34,992	0
Big Canyon Ponds	0	0	0	0	32,578	71,536	
Big Creek	219,119	229,465	171,324	206,636	145,218	170,044	155,146
Bonneville	400,067	341,747	445,776	395,863	218,121	336,031	404,542
Cascade	129,955	141,075	74,451	115,160	72,172	161,460	113,333
clackamas	111,426	139,518	110,611	120,518	170,020	248,668	98,890
Dexter Pond	224,175	174,604	202,496	200,425	487,956	211,657	101,250
Gnat Creek	131,687	128,383	129,069	129,713	32,455	145,012	129,000
Herman Creek Ponds	0	0	0	0	36,375	163,775	
Imaha Pond	3,424	0	0	1,141	65,497	21,942	
Irrigon	82,119	164,359	372,721	206,395	286,113	553,899	290,400
Klaskanine	248,150	198,599	191,817	212,855	60,925	105,781	161,333
Leaburg	32,659	34,426	29,355	32,147	54,054	61,653	24,000
Little Sheep Creek Pond	0	0	0	0	21,746	70,809	50,000**
Lookingglass	103,582	85,057	99,601	96,080	98,010	74,250	94,200
Marion Forks	53,689	68,372	89,589	70,550	130,488	128,547	50,333
Mckenzie	127,987	100,624	125,919	118,177	189,782	149,348	117,201
Oak Springs	56,603	57,459	45,314	53,125	51,558	98,770	44,000
Oxbou	119,853	127,805	126,495	124,718 *	14,803	54,602	2,000
Pelton Fish Ladder	15,776	27,649	28,133	23,853	33,423	137,866	23,333
Roaring River	37,026	52,464	15,703	35,064	56,860	112,030	42,500
Round Butte	55,592	54,385	49,017	52,998	101,970	73,609	36,000
Sandy	73,290	71,789	68,719	71,266	63,242	173,880	66,700
South Santiam	59,425	69,660	99,226	76,104	113,858	118,859	84,350
Stayton Pond	94,177	72,850	95,712	87,580	108,018	449,232	91,667
Trojan Rearing Pond	17,549	33,992	20,521	24,021	37,350	169,935	20,000
Uahkeena Pond	110,528	154,830	2,898	89,419	15,742	1,352,400	133,333
Wallowa	105,937	57,674	195,454	119,688	51,875	183,015	200,000
Willamette	137,823	158,187	221,176	172,395	278,506	310,253	143,439
TOTAL	2,762,013	2,763,036	3,030,747	2,851,932	3,047,037	5,943,855	2,676,950

* Includes fish reared at Herman Creek Ponds

** Production goal for 1987 was not provide. Pounds listed are the present agency goat.

Summary Table 13. Anadromous Species Which Can Be Reared at Individual Hatcheries Operated By The Oregon Department Of Fish And Wildlife In The Columbia River Basin. An "O" Indicates Species Currently Being Reared And A "X" Designates Species Which Potentially Could Be Reared.

Hatchery	Fall Chinook	Spring Chinook	Summer Chinook	Coho	Steelhead	Searun Cutthroat	Sockeye	Chum
Aumsville	0							X
Big Canyon Pond	X	0	X		0			
Big Creek	0	X	X	0	0	0		0
Bonneville	0	0	X	0	X	X	X	X
Cascade	X			0	X	X	X	X
Clackamas	X	0	X	X	0	X	X	X
Dexter	X	0	X	X	X	X	X	X
Gnat Creek	X			X	0	0	X	X
Irnaha Pond	X	0	X	X	X			
Irrigon	0	0	X	X	0	X	X	
Klaskanine	0			0	0	X		X
Leaburg	X	0	X	X	0	X		X
Little Sheep Creek Pond		X	X		0			
Lookingglass	X	0	X	X	X		X	
Marion Forks	X	0	X	0	0	X	X	X
McKenzie River	X	0	X	X	0	X	X	X
Oak Springs	X	X	X	X	0		X	
Oxbow	X	X	X	0	X	X	X	X
Pelton Ladder	X	0	X	X	X	X	X	
Roaring River	X	X	X	X	0	X	X	X
Round Butte	X	0	X	X	0	X	X	
Sandy	X			0	X	X	X	X
South Santiam	X	0	X	0	0	X	X	X

Summary Table 13. Continued

Hatchery	Fall	Spring	Summer	Coho	Steelhead	Searun		Chum
	Chinook	Chinook	Chinook			Cutthroat	Sockeye	
Stayton Pond	0	X	X	X	X			
Trojan Rearing Pond	X			0	0	0		X
Wahkeena Pond	X	X	X	0	X			
Wallowa	X	X	X	X	0		X	
Willamette	X	0	X	X	0	X	X	X

APPENDIX A
ADDRESSES AND PHONE NUMBERS
FOR AGENCIES WHICH PROVIDED DATA

Appendix A. Addresses And Phone Numbers Of Agencies Which Operate
Anadromous Fish Hatcheries In The Columbia River Basin.

Idaho Department Of Fish and Game (206) 334-3791
PO Box 25
Boise, Idaho 93707

Oregon Department Of Fish And Wildlife (503) 229-5400
PO Box 59
Portland, Oregon 97207

U.S. Fish And Wildlife Service (503) 231-6119
911 NE 11th Ave.
Portland, Oregon 97232-4181

Washington Department Of Fisheries (206) 234-6600
115 General Admin. Building
Olympia, Washington 98501

Washington Department Of Wildlife (206) 753-5710
600 N. Capital Way
Olympia, Washington 98504

APPENDIX B

DATA COLLECTION FORMS

HATCHERY SUMMARY

Hatchery Name: _____ Hatchery Code: _____

Operating Agency: _____

Funding Agency/Agencies: _____

Initial Year of Operation: _____ Current Date: _____

Address: _____ Phone Number: _____

_____ Hatchery Manager: _____

Facility and Operating Synopsis (Use continuation sheet if necessary):

SITE DATA

Hatchery Name: _____ Hatchery Code: _____

Location of Hatchery/:

Basin Subregion: _____ River: _____
Tributary System to Mainstream: _____
Elevation of Hatchery in Feet: _____
Nearest Town: _____

Legal Covenants and Conditions:

Land Owner: _____
Land Area: _____ Percent in use: _____
Terms of Lease (if any): _____
Easements / Rights of Way (if any): _____
Special Operation or Construction Permits: _____
Pollution Control Requirements / Permits: _____

Water Rights:

	Permit/ Certificate Number	Source	Purpose of Use	Priority Date	Amount
1.	_____	_____	_____	_____	_____
2.	_____	_____	_____	_____	_____
3.	_____	_____	_____	_____	_____
4.	_____	_____	_____	_____	_____
5.	_____	_____	_____	_____	_____

NOTE: Provide the above information for each Satellite location on a separate form and attach to corresponding hatchery. Include a brief description of each satellite's function in relation to the parent hatchery.

WATER SUPPLY SUMMARY

Hatchery: _____ Location Code: _____

	Source #1	Source #2	Source #3
Delivery (P/G)*	_____	_____	_____
Use	_____	_____	_____
Average Flow	_____	_____	_____
Average Temp.	_____	_____	_____
High Flow/Month	_____	_____	_____
Low Flow/Month	_____	_____	_____
High Temp./Month	_____	_____	_____
Low Temp./Month	_____	_____	_____

* Pumped or gravity

Comments:

Reuse System (Description):

NOTE : Attach a separate form for each satellite location.

FACILITY INVENTORY

Hatchery: _____ **Hatchery Code:** _____

Type/ Dimensions	Usable Volume	Number	Age	Material	Condition	Comments
---------------------	------------------	--------	-----	----------	-----------	----------

COMPONENT 1/:

Incubation: _____

Start Tanks: _____

Raceways: _____

Ponds: _____

1/Correct for irregular shapes.

LAYOUT: Attach a layout drawing of the hatchery showing major features such as buildings, raceways, ponds, etc.

STAFFING SUMMARY

Hatchery: _____ Hatchery Code: _____

(Description of normal facility staffing practices. Include breakdown of full time, part time, and temporary staff by type of position/title.)

ADULT CAPTURING/HANDLING

Hatchery: _____

Hatchery Code: _____

Species: _____

Spawning:

Method of Adult Return to Site:

Adult Holding Pond:

Ladder:
off-site capture:
Other:

Flow:
Volume:
Holding Density:

Method of Adult Holding:

Description of holding ponds:

Method of separating males and females:

Method of holding/handling with mixed species/stock returns:

Typical time of adult holding:

Spawning procedure:

Method of fertilization:

Hatchery Return Information

	# Returned	# Spawned	# Released *	# Other
Males	_____	_____	_____	_____
Females	_____	_____	_____	_____
Jacks	_____	_____	_____	_____
Total	_____	_____	_____	_____

*Note: Describe release strategy/goal:

HATCHERY PRODUCTION SUMMARY
FOR FISCAL YEARS 1985 TO 1987

Hatchery Name: _____ Hatchery Code: _____

Fiscal Year: _____

A. Total Releases For Hatchery By Species:

Species	Stock	# of Fish	Lbs of Fish
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Total For The Year (All Species) _____

B. Total Interim Production For Hatchery By Species:

(Fish reared for a period of time and transferred to other stations, increase in pounds during the period fish were on station)

Species	Stock	# of Fish	Lbs of Fish
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Total For The Year (All Species) _____

HATCHERY PRODUCTION SUMMARY
FOR FISCAL YEARS 1985 TO 1987

Hatchery Name: _____ Hatchery Code: _____

Fiscal Year: _____

C. Total Production For Hatchery By Species:
(Part "A" plus part "B")

Species	Stock	# of Fish	Lbs of Fish
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Total For The Year (All Species)			_____

D. Total Operating Cost For Hatchery
cost : _____

PRODUCTION CONSTRAINTS

Hatchery: _____

Hatchery Code: _____

Describe Current Restraints to Production relating to:

Physical Hatchery Layout:

Water Sources/Supplies/Delivery System/Quality/Water Rights:

Adult Holding/Spawning Capabilities:

Egg Related Constraints:

Fish Rearing Constraints:

Administrative Constraints (ie. mixed species hatchery):

HATCHERY PRODUCTION SMOLT CAPACITY

Hatchery Name: _____

Hatchery Code: _____

Species	Actual Hatchery Production		Smolt Production Goal	
	Number	Pounds	Number	Pounds
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Theoretical Production:

Piper's 1982 **Flow** Method:

Piper's 1982 Density Method:

HATCHERY EXPANSION CAPABILITY

Hatchery Name: _____

Hatchery Code: _____

Land:

Describe Land Available:

Land Ownership:

Water:

Quantity:

Amount Available (Actual or Potential):

Type: Ground: _____ Surface: _____

Description/Method of Acquisition:

Quality:

Temperature Range:

Possible Chemical Limitations:

Potential Disease Problems:

Feasibility:

Distance from Hatchery:

Availability of Water Right:

Type Delivery: Pump: _____ Gravity: _____

Type of Construction:

Estimate of Cost (use conceptual design information):

	Description	cost
Land Acquisition:		

construction:

Water Related:

O&M:

Potential Smolt Production: