North Fork John Day River Habitat Improvement

1987 Annual Report

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ABSTRACT

In 1987, the Umatilla National Forest constructed fish habitat improvements on the North Fork of the John Day River and side channels, Desolation Creek, Wilson Creek, Little Wall Creek, Clear Creek, and North Hidaway Creek.

Work in the North Fork John Day River and side channels consisted of opening 1 side channel, building 4 side channel rock weirs, seven rock deflectors, and 4 mainstream rock sills. Cover was improved by placing 78 instream boulders, 8 instream logs, and 30 willow and cottonwood cuttings. Maintainance on preexisting side channels and main channel structures included: repairing 3 side channel-main channel breach flow areas, rebuilding 2 side channel weirs, rebuilding or retuning of 3 side channel point extensions, and retuning 1 side channel exit which was silting in during receding flows. This work occurred on 6 miles of the North Fork. Work is essentially complete pending sufficient high water to test the newest side channels.

Work on Clear Creek included the placement of 780 yards of spawning gravel, 117 boulder clusters, 6 rock sills to increase pool and back up spawning gravels and the planting of 23 alder and willow bushes for stream bank stability and shade. This work occurred within a 4 mile reach of stream improved from 1979 to 1984.

Work on Desolation Creek created an estimated 3,500 square meters of quality rearing pool habitat by constructing 86 rock and 7 log weirs and 20 rock deflectors in 0.8 miles of the stream. Two of the pools are of a size and depth used by adult chinook for resting and holding. In addition, 505 boulders and 89 large woody materials (LWMs) were placed in the stream to improve cover for rearing and 300 feet of side channel was constructed. Repairs were made on one side channel entrance and one debris jam was bypassed.

Work continued in 1987 along 1.2 miles of Wilson Creek. Forty new pool forming structures were built together with 23 stream stabilization structures. Riparian planting was increased with the establishment of 291 hardwoods. There was also some work done on previously built structures. Two rock weirs required reconstruction and eight "V" weirs were modified with the addition of deflector wings to improve their performance.

During 1986, 23 pool forming structures were built in Little Wall Creek. The The success of these structures was proven during the extremely dry summer of 1987. They increased summer time flows by intercepting underground water which was brought back to the surface. The 1987 project year included modification of previously constructed structures. Pools were made deeper and more woody material was added to increase habitat effectiveness. New structures were constructed in 0.1 mile of stream, the reworked structures were in 0.5 miles of stream.

During 1987, 17 pool-creating log and rock weirs were built in 0.5 miles of North Hidaway Creek. In each pool, cover logs with rootwads attached were installed and cover boulders were placed. Several of the pools were of sufficient size to function as adult holding pools. All disturbed areas adjacent to the project were seeded with an erosion mix.

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SUBPROJECT I -North Fork John Day River Mainstem and Side Channels

INTRODUCTION

The commercial and recreational values of Oregon's anadromous salmon and steelhead fisheries are well known. The John Day River and its tributaries are important areas for natural anadromous salmonid reproduction. The North Fork John Day River is a major contributor to this production.

The project area is located in northern Grant County on the North Fork John Day Ranger District, Umatilla National Forest in T.6S.. R.32E., and T.6. & 7s.. R.33E. (Figure 1)

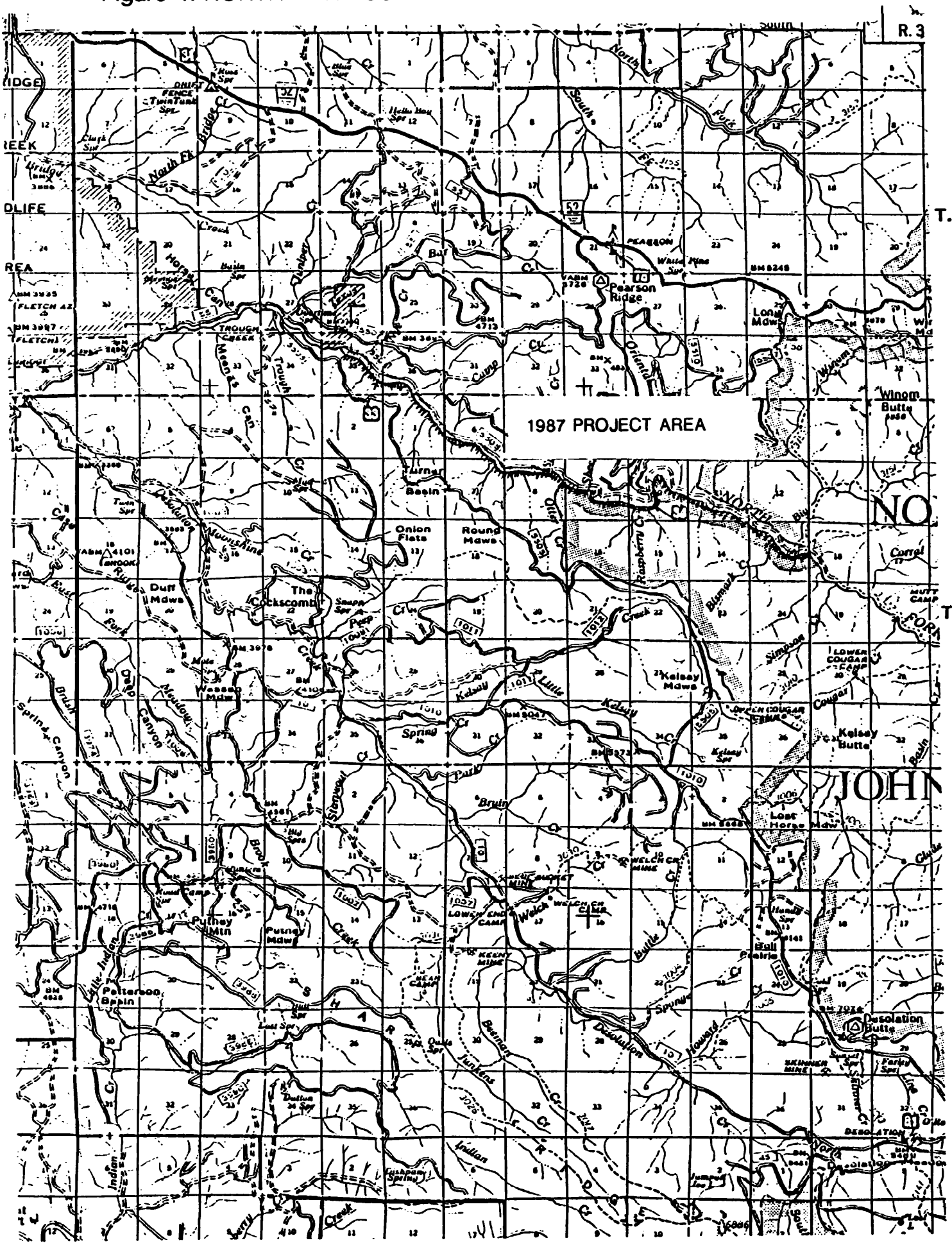
The 1984 estimate of spring chinook salmon (Oncorhynchus tshawytscha) production for the 14 miles of mainstem of the North Fork John Day River on the Umatilla National Forest outside of the North Fork John Day Wilderness (RM 61 to 76) was 108,000 smolt annually. There is an estimated potential of producing 190,500 smolt annually if habitat conditions are brought to optimum levels.

Beginning in 1939 and ending in 1950, gold dredging activities changed the natural course and hydrology of the North Fork John Day River. High flow channels were created which dried up during annual low flow periods and trapped and killed spring chinook parr or presmolts annually, resulting in an estimated loss to the system of 26,000 pre-smolt spring chinook salmon.

Fourteen miles of the North Fork John Day River offer the opportunity to significantly increase smolt production at relatively low cost. Twenty-six of thirty-two side channels trapped rearing chinook parr or pre-smolt annually. During August 1971, the Oregon Department of Fish and Wildlife (ODFW) in cooperation with the U.S.D.A. Forest Service increased the juvenile spring chinook rearing area by pushing dredge tailings into the river. This forced a portion of the streamflow down several secondary channels that were left dry by the dredging. From 1979-1986, the Umatilla National Forest rebuilt these two side channels and reopened 25 additional side channels from river mile 63 to river mile 76. The Forest also constructed numerous structures in the river and side channels to increase juvenile spring chinook rearing habitat.(Table 1)

The work has been a cooperative effort involving the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and ODFW in the planning stages. The Louisiana-Pacific Corporation made a source of boulders available for the project, and in 1986 a local mining claimant provided insight into the construction of an unplanned side channel on one of his mining claims. The Bonneville Power Administration has provided major financing since 1983 through the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program. The Umatilla National Forest has been responsible for the planning and administration of the project.

Figure 1. NORTH ⌒RK JOHN DAY RIVER 1987 ⌒OJECT AREA



The overall project goal has en to increase the production spring chinook salmon by meeting the following objectives:

1. Decrease the hazard of juvenile salmon being trapped in the side channels during low flow periods. This has been accomplished by constructing structures at the channel entrances to provide a year-round streamflow through the channels.

2. Increase juvenile salmon rearing habitat in the mainstem river and side channels. Constructed pools below weirs and boulder placements are contributing to meeting this objective.

3. Improve bank stabilization. Rock deflectors and riprap were used to control erosion from unstable banks.

4. Increase adult salmon resting areas. The constructed pools below the main stem sills are being used by adult salmon for resting prior to spawning.

5. Restore riparian vegetation. Shrub cuttings and the placement of entire shrubs are being used to establish riparian vegetation along the barren dredge tailings.

Due to the use of streams by steelhead and spring chinook salmon, the only period available for instream work is July 15 to August 31. Work remaining to be done on the project consists of additional weir construction, boulder placement, bank stabilization, shrub establishment and fertilization, and maintenance in approximately the lower five mile stretch of the project area.

PROJECT DESCRIPTION

Project activities consisted of preparing and administering a contract to: reopen side channels to the North Fork John Day River; construct flow control deflectors at the entrances; place boulders, woody material, rock weirs, and rock deflectors in the side channels and in the main river; and plant hardwood cuttings to restore riparian vegetation along the barren dredge piles.

The contractor began work on July 14, 1987, and construction was completed on August 7, 1987. Boulders and riprap which were stockpiled during the 1986 project year were used in the construction of weirs, sills, and boulder clusters.

An excavator was used to build all structures and plant bushes and cuttings. Stream bank adjacent to one side channel was recontoured to minimize the risk of slumping during high flow events. Three side channel entrances were "retuned" to prevent sediments from building up and blocking low summer flows and one side channel exit was redesigned to prevent silting in. Many natural and previously placed boulders in the river were repositioned to increase their effectiveness and stockpiled boulders were placed in clusters to increase pool and hiding cover for juvenile salmon and steelhead. The logs, some with root wads attached, were placed in the larger excavated pools and in channel as digger/cover logs,

and either held down with la boulders or cabled in place. .e new side channel was excavated to grade and a flow control structure constructed at the entrance to divert between 20 and 30 percent of the main river flow into it. Riprap was used to protect unstable banks and 3 breached areas between side and main channels were repaired and stabilized. Seven rock deflectors were built to prevent bank erosion and increase pool area.

ACHIEVEMENTS

It is anticipated that the increased rearing area associated with the boulders, rock weirs, and side channels will result in increased anadromous fish survival from egg to smolt (see Appendix A). Assuming the increased rearing area equates to a proportional increase in fish production, this increase is estimated at 1033 spring chinook and 389 summer steelhead smolt annually and will require at least one generation of five years before results become readily apparent. Spring chinook returns to the Main, Middle, and North Fork of the John Day River during 1987 were the highest in recorded history with redd counts of 55 miles of index and 79 miles of extensive stream showing some 1500 redds. The estimated escapment of adults was placed at over 5000 by Errol Clair of ODFW. Appendix A contains an appendix from an Environmental Assessment for Fisheries Habitat Enhancement work in the North Fork John Day Sub-basin. The appendix describes the method used to estimate the number of structures needed to improve percent pool to the objective for anadromous fish; describes the assumptions and method used to estimate the number of chinook and steelhead smolts and spawners for the existing situation (1984) and as a result of enhancement; and a description of assumptions and the method of economic analysis used in the Environmental Assessment (E.A.). Using these assumptions, modified by the results of the Value Analysis conducted on Desolation Creek in 1986 which indicated an error in calculation due to the ommission of a pre-smolt to smolt mortality factor of 30%. a tabular summary of expected fish production per structure was generated and is also included in this appendix. These smolt would provide 15.5 additional escaping chinook and 6 additional escaping steelhead adults per year which would have an estimated annual net value of $10,607 (Table 2) using National Marine Fisheries Service Economic Values.

Table 1. Summary of the Nor Fork John Day River Side Chanr Project to Date

Structure	1979	1980	1981	1982	1983	1984	1985	1986	1987	TOTAL
Side Channels	1	8	1	1	6	3	6	1	1	28
Alcoves and Blind Channels							2	0	0	2
Boulders Placed	63	50	60	80	492	250	283	160	78	1516
Log Weirs						2		0	0	2
Rock Weirs			2		16	8	16	46	4	92
Main Stem Rock Sills							22	9	4	35
Rock Deflectors	14	3		1	4	7	23	50	7	109
Adult Holding Pools						1		0	0	1
Instream Logs Placed						1	35	26	8	70
Erosion Structures					4	1		2	0	7
Shrubs Planted							8	0	0	8
Cuttings Planted							182	672	30	882

Table 2. Increase in Smolt Production, North Fork Side Channels

	ChS	St
Estimated increase in numbers of smolts	1033	389
@ 1.5 percent spawning escapement 1/	x .015	x .015
Estimated increased numbers of adult spawners	15.5	5.8
Net value per escaping adult 2/	x$550	$359
Estimated annual value 1987 BPA project	$8,525	$2,082

1/ As per conversation with Errol Clair 1/8/88.
2/ Meyers 1982. "Net Economic Values for Salmon and Steelhead from The Columbia River System," U.S. Department of Commerce, June 1982.

SUBPROJECT II - North Fork-John Day Tributaries Fish Habi ; Improvement

Subproject IIa- Clear and Granite Creeks FishHabitat Improvement

INTRODUCTION

Dredging operations on Granite and Clear Creeks in the North Fork John Day Drainage began in the 1920's and had intermittent activity until 1954. This activity completely altered the natural hydrology of these streams. The anadromous fish habitat in the area has not naturally recovered from this dredging activity to date.

The project area is located in the northeast corner of Grant County on the extreme southeast corner of the North Fork John Day Ranger District, Umatilla N.F. in T.8S., R,35E., and T.9S., R.35E. (Figure 2)

Due to the major contribution these streams make to the anadromous fish runs in the John Day River System, it has long been recognized that rehabilitation work was needed to restore the dredged area..

Rehabilitation work has been varied. From 1959 to 1961, the ODFW pushed 13,160 cubic yards of tailing piles into the stream in a total of 48 sites to provide spawning areas. This work was sucessful in that a very high percentage of the spawning took place on these sites. Prior to 1983, a number of attempts were made to establish willows by hand planting cuttings. These plantings had approximately five percent survival due to stream fluctations and a limited amount of fertile soil along the stream.

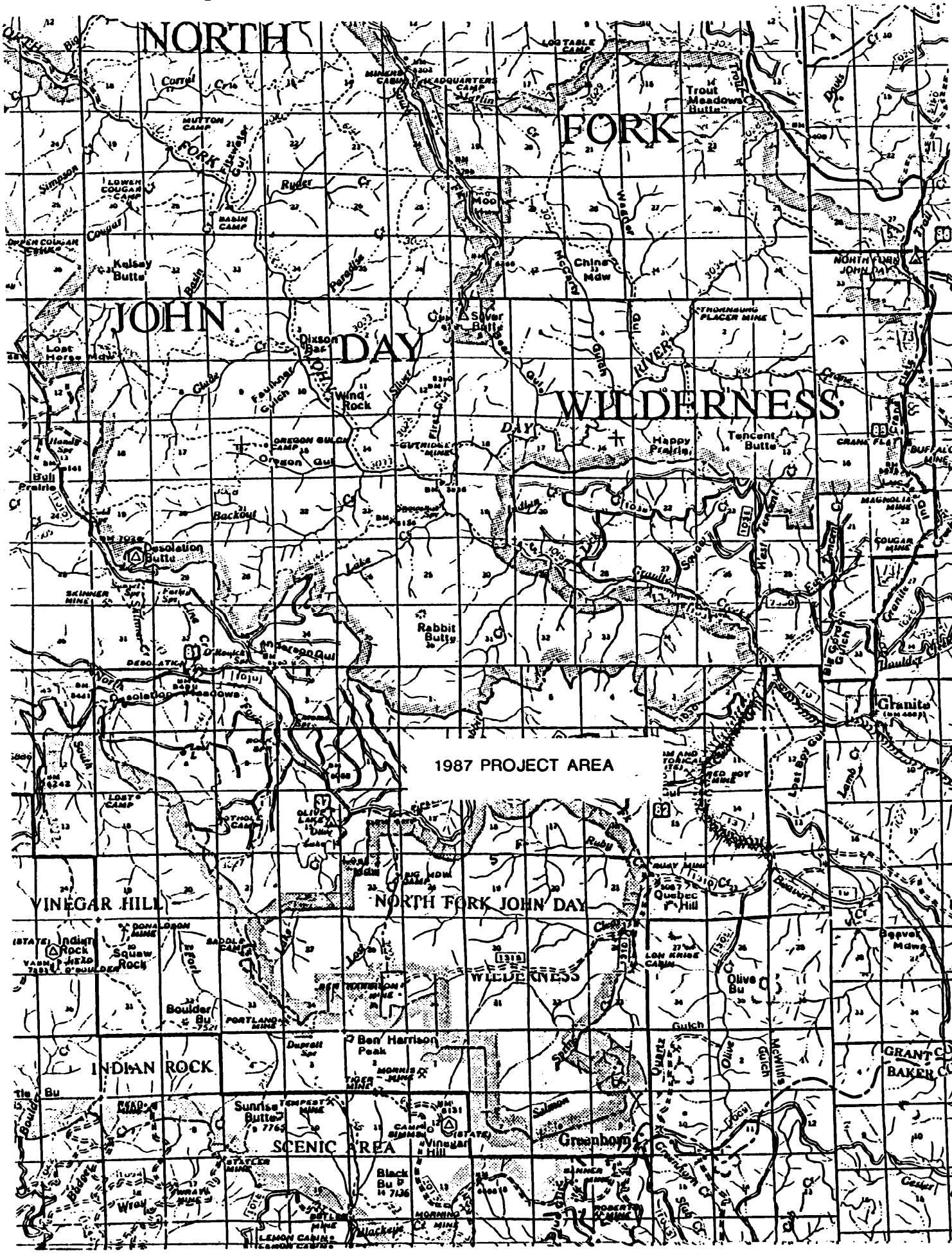
The major fisheries rehabilation work in the area has been on four miles of Clear Creek in 1979, 1981, 1982, 1983. and 1984. This has been a cooperative venture. ODFW has been heavily involved in the planning stages. Bonneville Power Administration has provided major financing since 1982 through the Columbia River Basin Fish and Wildlife Program. The USFS has been responsible for the planning and administration as well as assisting in financing of the project. Due to the use of streams by steelhead and chinook salmon, the only period available for instream work is July 15 to August 31.

GOALS

1. Restore and enhance the anadromous fish habitat lost during the gold dredging.

2. Improve water quality and channel stability.

Figure 2. C[illegible]AR CREEK 1987 PROJECT [illegible]EA



OBJECTIVE

1. Optimize the riffle:pool ratio - Prior to habitat improvement work the pool:riffle ratio was 12:88 with the optimum spring chinook juvenile rearing ratio being 60:40. The weirs and boulders installed bring the ratio closer to optimum.

2. Bank Stabilization - Rock deflectors as well as riprap are used to control erosion and stabilize streambanks.

3. Increase resting area - Constructed pools and pools below weirs are contributing to this objective.

4. Increase rearing habitat - Constructed pools below weirs and boulder placement have contributed to meeting this objective.

5. Increase spawning area - 7,800 cubic yards of gravel has been placed in 182 sites.

6. Reduction of heavy metal concentrations - Plugging of the Blackjack Mine and the diversion of it's seepage has reduced heavy metal toxicity in Clear Creek.

7. Retention of stream flow - Channel diversion and reworking of the stream bed has retained much of the water that previously disappeared under the dredge tailing piles at the upper end of the project. Anadromous fish now have year-round access to up to 20 additional miles of spawning and rearing habitat.

8. Restoration of riparian vegetation - Placement of large willow stems and entire shrubs with an excavator were used to establish riparian vegetation along the barren dredge tailings. More riparian work needs to be accomplised.

The work area to date has been on an four mile stretch of Clear Creek and a two mile stretch of Granite Creek. The cost for the project from 1979-1984 totals approximately $370,000. The life expectancy of the project is thirty years.

It is anticipated that the increased adult resting pools, adult spawning sites, and juvenile rearing areas will result in increased anadromous fish survival from egg to smolt and will increase the adult anadromous fish escapement to the upper North Fork John Day System.

PROJECT DESCRIPTION

The project started on July 13 with an excavator, three dump trucks, and a crawler-loader on Clear Creek. The first few days of the project were spent loading spawning gravel and moving it to the area adjacent to the stream for placement. Spawning gravel was placed above weirs and at the tail-out of pools in three miles of stream. Approximately 800 cubic yards of gravel was placed. Boulders that were set too high in the stream channel in previous years were moved into boulder clusters and dug into the channel to create better pool. Rock sills were constructed to create more pool habitat. Alder and willow shrubs were planted along Clear Creek in areas where there is virtually no riparian vegetation established. The crawler-loader dug up the alder and willow shrubs and the excavator dug the hole for placement and planted the bushes. The excavator reworked a portion of Beaver Creek, a tributary to Clear Creek, where it was subbing under the dredge piles. The area was lined with bentonite, gravel and boulders to create a better seal and prevent further subbing. There were at least three adult chinook that died before spawning in this area possibly due to the subbing of Beaver Creek.

Excavator time was shortened on boulder placement and spawning gravel placement in order to prevent mine waste water from draining into the project area. The Black Jack Mine was plugged in 1983 and a small settling pond built, however, some effluent was going back into Clear Creek. The Forest Service ran a closed pipeline from the mine to an old channel out of the Clear Creek high water zone where a larger settling area for effluents that would not drain into Clear Creek was available. A settling pond for the Blue Bird Mine effluent was also constructed away from the creek.

ACHIEVEMENTS:

Spawning gravel placed this summer was used by adult chinook in September. Errol Claire, ODFW Fish Biologist, stated that seventy-five percent of the spawning that occurred in Clear Creek in 1987 occurred on placed spawning gravels. As many as 40 adult chinook at a time were seen by USFS personnel in the major holding pool. It is anticipated that the increased rearing area and spawning gravels associated with this project will result in continued increased anadromous fish production from egg to smolt. The following method was used to derive fish production from spawning gravel placement. Personal communications with Errol Clair (ODFW Fish Biologist) l/8/88, indicates that 30 of 56 redds in Clear Creek were on gravels placed in 1987. At 4,000 eggs/redd, 4000 x 30 results in 120,000 eggs and an egg to smelt survival of 5.6% gives 6,720 smolts potentially produced. This number is added to the estimated 168 smolts that can be produced from additional rearing habitat to total 6,888 smolts produced annually (Table 4). The elimination of mine waste water into the stream is expected to result in further increase production potential. Several previously placed boulders were reset in the stream to provide more effective pool habitat. No further increase in smolt production was calculated for resetting the boulders since production had been calculated for the initial placement work. Table 3 summarizes the Clear Creek project to date.

Table 3. Summary of the Work to Date on Clear Creek and Granite Creek.

ITEM	1979	1981	1982	1983	1984	1987	TOTAL
Boulders Placed 1/		2	100	600	74		776
Log Weirs	21	34	27				82
Log Deflectors		2	4				6
Rock Weirs/Sills			1		7	6	14
Rock Deflectors		4	3		17		24
Adult Holding Pools	3	1	6		1		11
Mine Plug		1					1
Mine Diversion			1			1	2
Spawning Gravel Beds	5		138	25	14	48	230
Cu. Yd. Spawning Gravel Placed	100		6,500	500	700	780	8,580
Erosion Structures			2	50	71		123
Hardwood Plantings		3		80	800	23	906
Total Costs (M $)	31	77	170	37	55	15	385

1/ One hundred seventeen previously placed boulders were reset in 1987 to improve pool effectiveness.

Table 4: Increase in Smolt Production in Clear Creek Project Area

	ChS
Estimated increase in numbers of smolts	6,888
@ 1.5 percent spawning escapement 1/	x .015
Estimated increase in numbers of adult spawners	103.3
Net value per escaping adult 2/	x$550
Estimated annual value 1987 BPA project	$56,815

1/ As per conversation with Errol Claire, 1/8/88.
2/ Meyers 1982. "Net Economic Values for Salmon and Steelhead from The Columbia River System," U.S. Department of Commerce, June 1982.

subproject IIb - Desolation Creek

INTRODUCTION

The project area is located in the northern edge of Grant County in the North Fork John Day Ranger District, Umatilla National Forest in T.8S.. R.33E. and T.9S., R.33E.(Figure 3). Desolation Creek is tributary to the North Fork John Day River from the south, 0.5 miles upstream from the Highway 395 bridge.

Forest Service employees that were in the area in the 1930's observed spring chinook salmon spawning in Desolation Creek. Several barriers in the lower portions of the stream apparently had blocked salmon passage since that time. Louisiana-Pacific Corporation, landowner in the blockage area, removed the barriers in the 1970's.

Presently, spring chinook salmon, summer steelhead, and resident trout use Desolation Creek. The spring chinook spawning population is at a low level; ODFW estimated that 20 adults or less spawned in the stream annually. Steelhead were estimated at 140 spawners annually.

Each spring, trout anglers report catching late migrating spring chinook smolts in lower portions of the stream. An August 1982 pre-work stream inventory of Desolation Creek fish habitat conditions tallied one spring chinook adult at stream mile 20.5. In September 1986 three spring chinook salmon redds and four live adult spring chinook were observed in the project area by CTUIR biologists during a cooperative spawning survey coordinated by ODFW. In July and August 1987 five adult spring chinook were seen in or above the 1987 project area by Forest Service personel.

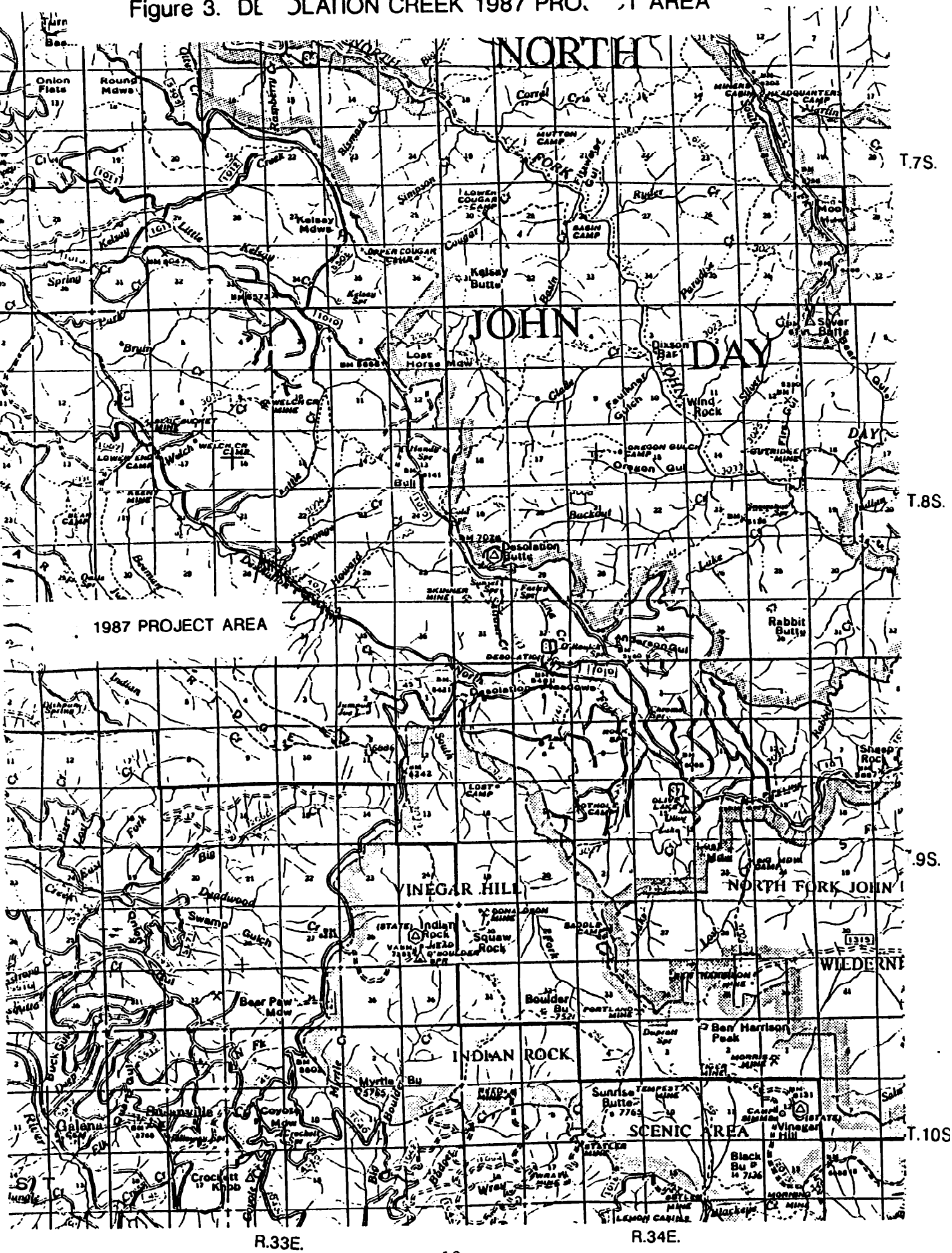
An evaluation of the 1982 stream inventory data indicated that existing pool habitat for both adult holding and juvenile rearing was naturally limiting anadromous fish production. Presently the pool/riffle ratio in unworked areas averages 11% percent pool and 89 percent riffle as opposed to the 60:40 pool/riffle ratio which is considered optimum for rearing juvenile salmon and steelhead. The opportunity exists to increase the pool percentage from 11% toward 60%. All of the pools will be designed to increase juvenile rearing while several pools will be designed to provide the depth and size required for adult holding. The opportunity also exists to add gravel catching structures to Desolation Creek to increase anadromous fish spawning areas.

The overall project objective is to increase the production potential of spring chinook salmon by:

1. Changing the pool/riffle ratio from the present 11:89 towards the optimum 60:40 and improving the quality of the existing pools by adding cover and increasing depth.

2. Contructing at least one adult anadromous fish resting pool per mile.

Figure 3. DESOLATION CREEK 1987 PROJECT AREA



3. Increasing the amount of ody material in the stream to rove instream cover and the diversity and complexity of the stream.

4. Increasing anadromous fish spawning areas in both size and quality by constructing rock weirs that will retain bedload gravels.

5. Designing and installing fish habitat structures that control bank erosion.

PROJECT DESCRIPTION

Project activities consisted of preparing and administering a contract to place rock structures, boulders,LWDs, and riprap in Desolation Creek. The contractor began work on June 1, 1987 by hauling rock and construction was completed on September 9, 1987.

In 1987 the Forest constructed one new side channel, 52 rock weirs, 34 rock sills, 7 log weirs, 93 pools (2 of which were designed as adult holding pools),installed 91 large woody placements (including 2 digger logs), placed 360 boulders in pools for cover and 145 boulders in the stream outside created pool areas for cover, built 20 rock deflectors, built 8 lengths of bank armor and 950 sq feet of meadow extension, created 300 feet of new side channel with associated point extension and control sill, and spread 110 lbs of stream bank seed mix to increase stream bank stability.

Instream work began with the modification of a side channel entrance and its associated entrance sill and adjacent mainstem control weir. Within the side channel, 2 new sills were placed to control high water flow. One debris jam bypass was required in the 1986 project area to allow for low water passage of adult chinook above a large adult holding pool and prevent the build-up of gravels into a side channel entrance and a rock weir maintained pool.

Work then progressed downstream from stream mile 18.75 at Howard Creek to approximately 0.5 miles downstream of Sponge Creek at stream mile 17.5 for a total of 1.25 miles of stream worked. The new side channel provided 300 feet of high quality year round rearing habitat with a minimum of disturbance and cost. In-pool cover, including both substrate boulders, and large wood in the form of root wads, was used to a greater extent than in any previous years projects. This year's project area included several adjacent meadows where the stream had widened. In these areas, spoil from the adjacent pools was used to build up a "meadow extension" which was covered with soil and seeded or covered with sod. These extensions narrowed the stream bed by an average of 5 feet. Table 5 summarizes the work to date completed in Desolation Creek.

Table 5: Summary of the Desolation Creek Project to Date

structure	1985	1986	1987	Total
Rock Weirs	52	68	50	170
Rock Sills	0	0	34	34
Log Weirs	0	4	7	11
Deflectors	0	7	0	7
Adult Holding Pools	1	4	2	7
Boulders Placed	97	191	505	793
Instream Logs Placed	11	40	91	142
Side Channels	2	3	1	6
Side Channel Length (ft.)	1,584	3.167	500	5251
Alcoves and Blind Channels	5	0	0	5
Alcoves and Blind Channel Length (ft.)	550	0	0	550
Debris Jam Bypass	1	0	0	1
Cuttings Planted	18	68	0	86

ACHIEVEMENTS

The increase in total anadromous fish habitat capability from the project is estimated to be 5,317 spring chinook smolt and 2,057 summer steelhead smolt giving an estimated value of 854,928 annually (Table 5).

Table 6. Increase in Smolt Production in Desolation Creek

	Chs	Sts
Estimated increase in numbers of smolts	5 x 7	2,057
@ 1.5 percent spawning escapement l/	x0.015	x0.015
Estimated increase in numbers of adult spawners	79-7	30-9
Net value per escaping adult 2/	x8550	x8359
Estimated annual value 1987 BPA project	843,835	$11,093

A Forest Value Analysis (a technique to review benefit:cost and suggest alternatives to improve cost effectiveness) was conducted in 1986 for the Desolation Creek Project and evaluated work proposed for 1987. The result of the analysis indicated a benefit cost ratio of 1.6 : 1 by continuing as in the past. Many recommendations made by the Value Analysis Team, such as increasing woody material, have been implemented and will be evaluated during the 1988 project year.

Subproject IIc - Lower North Fork John Day Tributaries

Wilson creek

INTRODUCTION

Wilson Creek is located on the Umatilla National Forest in T.6S,R.27E.,(Figure 4). It is within the Wall Creek watershed which is tributary to the North Fork John Day River. The stream produces summer steelhead and resident trout but a lack of adequate pool has limited the stream's production potential. The sub-project objective is to improve rearing habitat for juvenile summer steelhead in Wilson Creek.

An evaluation of the 1985 stream inventory data indicated that the quantity and quality of pool habitat was limiting production. The reaches within the project area averaged only 27% pool which is considerably less than the 50% pool which is considered optimum for rearing juvenile summer steelhead. Compounding the problem, the average pool depth was only 0.9 feet, too shallow to be effective as thermal refuges in summer. In addition to the need for good pool habitat, there are opportunities to increase the amount of spawning gravel, add more cover, and correct some unstable streambank conditions.

Nearly ten years ago, several small enhancement projects were completed in the stream. Pool-creating structures installed during these projects are still some of the best steelhead rearing habitat in the stream. The current program builds upon this experience.

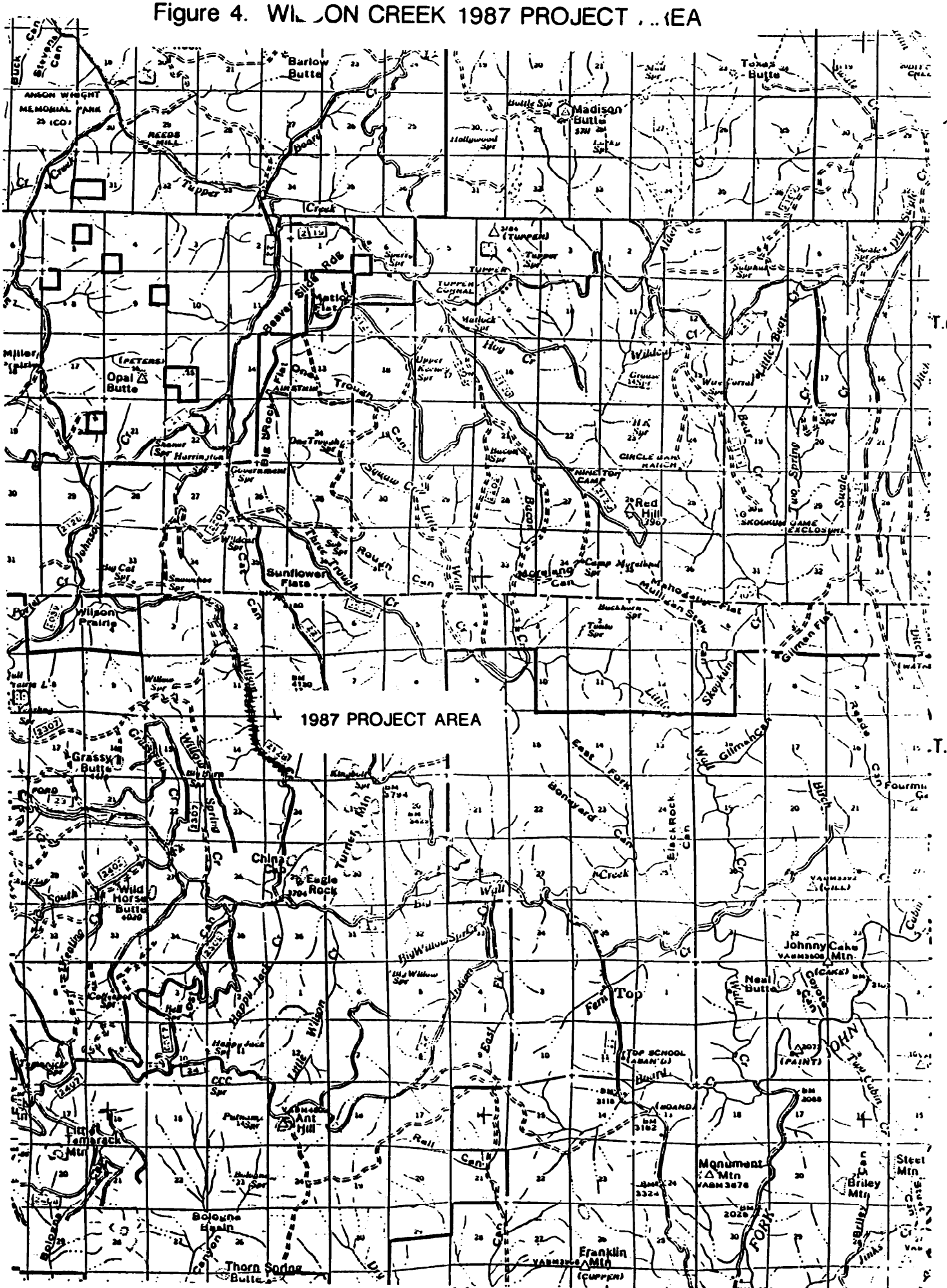
The overall project objective is to increase the production potential of summer steelhead by:

1. Increasing the pool:riffle ratio from the present 27:73 toward 50:50 considered optimum for steelhead rearing, and improving the quality of the existing pools by adding cover and increasing depth.

2. Constructing at least one adult steelhead resting pool per mile.

3. Increasing both size and quality of anadromous fish spawning area by constructing the rock weirs so that they will retain bedload gravels.

Figure 4. WILSON CREEK 1987 PROJECT AREA



4. Designing and **insta ng** fish habitat structures the ontrol bank erosion.

5. Planting willow cuttings and entire shrubs along barren streambanks to increase the amount of riparian vegetation for cover and bank stability.

PROJECT DESCRIPTION

Project activities in Wilson Creek consisted of preparing and administering a contract to place rock structures and boulders. After analysis of the stream survey data, work priorities were set and the scope of the Wilson Creek project was defined. District personnel along with the Forest Fish Biologist and the Forest Hydrologist evaluated the portion of the creek to be included in the 1987 project. Deficiencies and opportunities were studied before habitat enhancing structures were designed. Pre-work documentation of stream conditions was completed and project plans were finalized before the contract was prepared.

The main emphasis was to increase the number and depth of pools and stabilize streambanks and improve previously built structures. Twelve rock weirs were constructed to create pools and 2 rock weirs were reconstructed. Thirteen log weirs ("K"-type with double wings) were constructed and 8 log weirs ("V"-type) were modified by adding deflectors and digging out pools. Nine root wads were placed in a manner as to create scour pools and 6 pocket pools were dug. Streambank stabilization structures that were constructed include 5 rock single wing deflectors, 13 log single wing deflectors, one double deflector to narrow the stream width, two placements of rock riprap on 120 feet of streambank, and two placements of juniper riprap on 200 feet of streambank. Twenty-nine root wads and 50 boulders were placed in the stream to create scour pool. On hundred eighty-six willow clumps (1086 stems), 88 rooted poplars, 14 alder and 3 aspen clumps were planted. A summary of work completed in Wilson Creek can be found in Table 7.

The weir structures were designed to use the streams scouring effect to maintain the pool depth and to retain bedload gravels for spawning habitat.

ACHIEVEMENTS

It is anticipated that the increased rearing areas associated with the boulders, rock weirs and large woody material will result in increased steelhead survival from egg to smolt. Assuming the increased rearing area equates to a proportional increase in fish production (see Appendix A), this increase is estimated at 998 smolt annually and will require at least one generation (3 to 5 years) before results become apparent (Table 8).

Table 7. Summary of the Wilson Creek Project to Date.

structure	1986	1987	Total
Rock Weirs 1/	39	12	51
Log Weirs	9	13	22
Sills & Berms	63	0	63
Deflectors	24	19	43
Boulders Placed	183	64	247
Instream Logs Placed	18	0	18
Root Wads Placed	53	38	91
Fish Passage Improvement 2/	1	0	1
Bank Armored (Ft. Rock and Juniper)	0	320	320
Hardwood Cuttings or Clumps Planted	192	291	483
Sedge Clumps Planted l/	4	0	4

1/ Fourteen natural weirs were enhanced in 1987.
2/ Fifteen side channels were closed in 1987 to prevent juvenile stranding.
3/ Sedge clumps were planted to establish an upstream sedge seed source.

Table 8. Increase in Smolt Production in Wilson Creek.

	St
Estimated increase in numbers of smolt	998
@ 0.625 percent spawning escapement 1/	x 0.015
Estimated increase in numbers of adult spawners	15.0
Net value per escaping adult 2/	x$359
Estimated annual value 1987 BPA project	$ 5,374

1/ As per conversation with Errol Claire, 1/8/88.
2/ Meyers 1982. "Net Economic Values for Salmon and Steelhead from The Columbia River System," U.S. Department of Commerce, June 1982.

Little Wall Creek

INTRODUCTION

Little Wall Creek is a headwater stream of Wall Creek which is tributary to the North Fork John Day River, four miles above Monument, Oregon. The stream is located on the Heppner Ranger District in TS., R.27E., and T.7S.. R.27E.. (Figure 5).

An evaluation of 1985 stream inventory data indicated that both the quantity and quality of pool habitat and the lack of spawning gravel are limiting summer steelhead production. Pool habitat is only 24%. much lower than the 50% pool considered to be optimum for summer steelhead. Stream enhancement work was first planned as a timber sale area improvement project to be funded by Forest Service KV funds. These plans were later expanded into a joint BPA-Forest Service project to increase summer steelhead production.

The overall project objective is to increase the production potential of summer steelhead by:

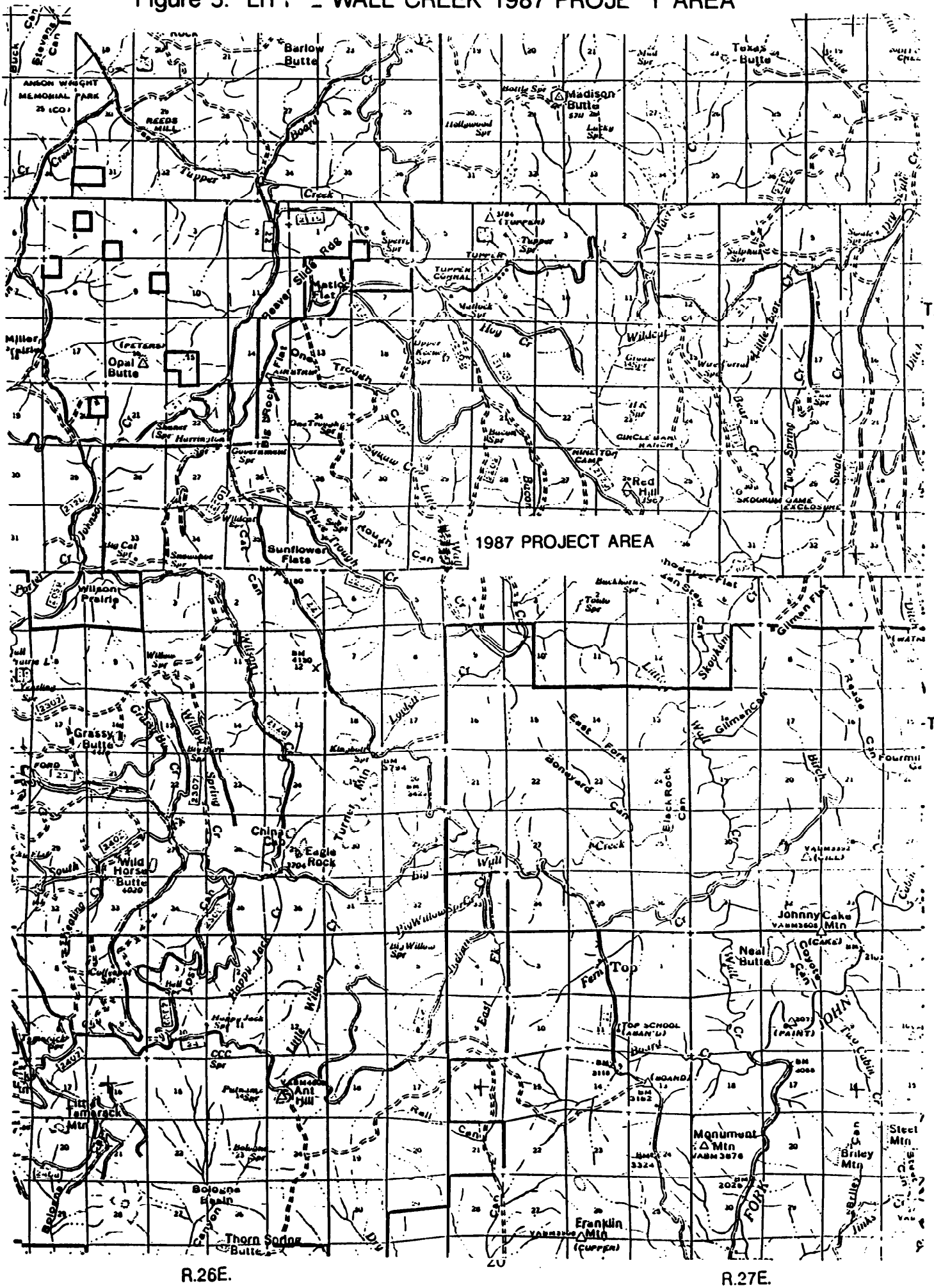
1. Increasing the pool:riffle ratio to approach 50:50 considered optimal for stealhead rearing.

2. Constructing at least one adult steelhead resting pool per mile.

3. Increasing both size and quality of anadromous fish spawning area by constructing the rock weirs so that they will retain bedload gravels.

4. Controlling bank erosion.

Figure 5. LITTLE WALL CREEK 1987 PROJECT AREA



PROJECT DESCRIPTION

Project activities consisted of preparing and administering a contract to place rock structures, log structures, boulders, large woody material, and hardwood plantings in Little Wall Creek.

During 1987, 22 of the structures constructed in 1986 were modified by increasing constriction, increased armoring of streambanks, deepening pools, and improving in-pool cover with the addition of 22 root wads. One additional rock weir and 2 log weirs were constructed and root wads placed in the pools below the weirs. A summary of work done to date in Little Wall Creek can be found in Table 9.

This project was done in late summer when water levels were lowest to minimize siltation of spawning gravels downstream. During this low flow period the log weirs intercepted underground flows and brought them to the surface. This increased the amount of water in the stream at a critical time.

Rock was hauled to proposed sites for 1988 and some streambanks were built up with top soil to facilitate the establishment of riparian vegetation.

ACHIEVEMENTS

It is anticipated that the increased rearing areas associated with the boulders, rock weirs and large woody material will result in increased steelhead survival from egg to smolt. Assuming the increased rearing area equates to a proportional increase in fish production (see Appendix B), this increase is estimated at 99 summer steelhead smolt annually and will require at least one generation (3 to 5 years) before results become apparent (Table 10).

Table 9. Summary of the Little Wall Creek Project to Date.

structure	1986	1987	Total
Rock Weirs	1	1	2
Log Weirs	22	2	24
Sills & Berms	1	0	1
Deflectors	3	0	3
Boulders Placed	0	0	0
Instream Logs Placed	0	0	0
Root Wads Placed	5	25	30
Hardwood Cuttings Planted	0	0	0

Table 10. Increase in Smolt duction in Little Wall Creek.

	Sts
Estimated increase in numbers of smolt	198
@ 1.5 percent spawning escapement 1/	x0.015
Estimated increase in numbers of adult spawners	2.97
Net value per escaping adults 2/	x%359
Estimated annual value 1986 BPA project	$ 1,066

1/ As per conversation with Errol Claire, l/8/88.
2/ Meyers 1982. "Net Economic Values for Salmon and Steelhead from The Columbia River System," U.S. Department of Commerce, June 1982.

Subproject IId - Fivemile Creek System

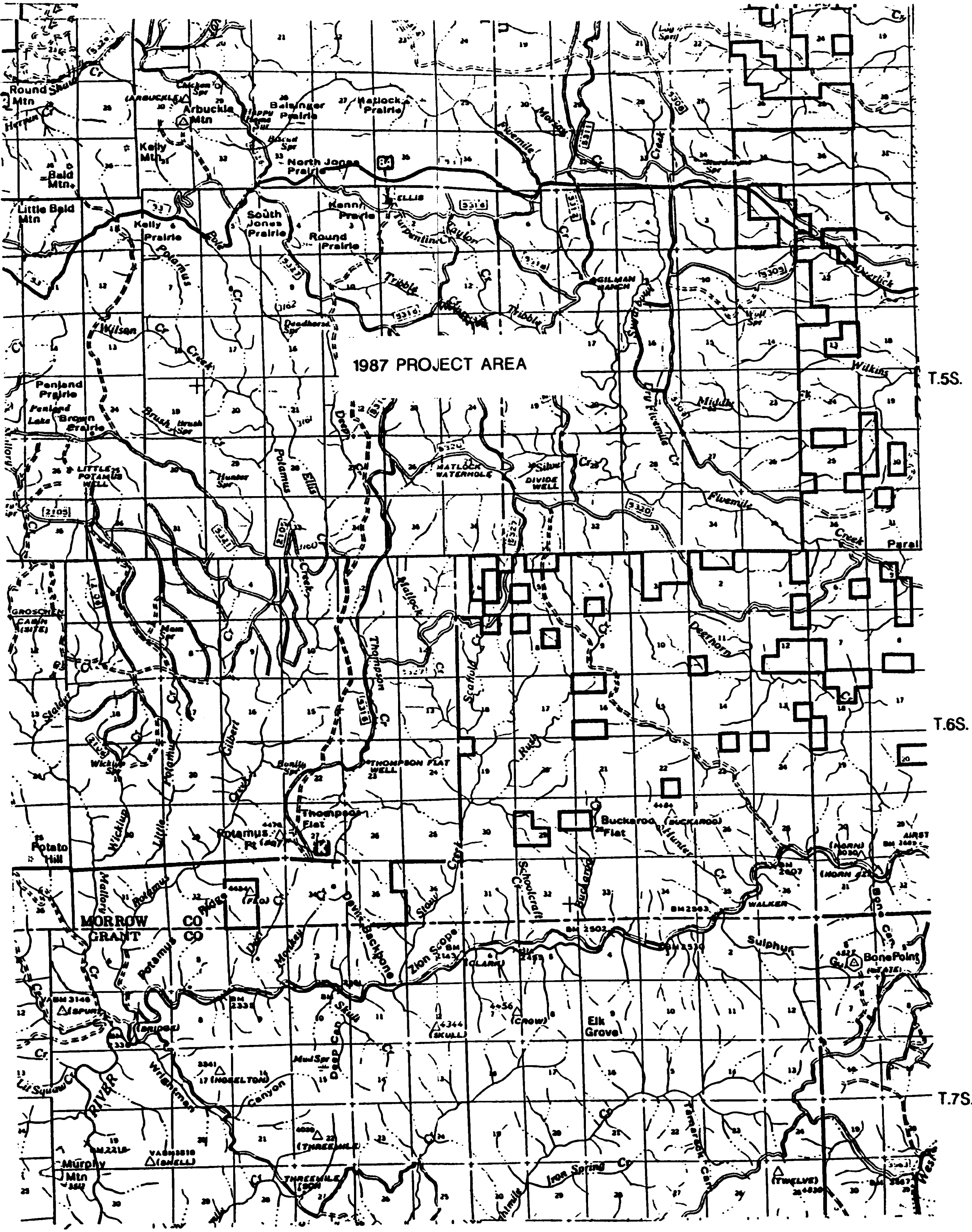
INTRODUCTION

The Fivemile Creek System is located on the Umatilla National Forest in T.4 & 5.s., 9 R.29 & 30.E. and is tributary to Camas Creek which is tributary to the North Fork of the John Day River (Figure 6). Fivemile Creek and its tributaries have historically been used for spawning and rearing by summer steelhead. Within the last twenty years a falls has formed one mile from the mouth of the creek. This falls, which is on private land, has become a partial barrier to steelhead adult migration. The Oregon Department of Fish and Wildlife improved passage in the fall of 1987. No instream work had been done in the Fivemile system prior to 1987.

In 1986 a physical stream survey was conducted of Fivemile Creek and its tributaries. An evaluation of survey data indicates that the quantity of pool sufficient to provide adequate rearing is very low, approximately eleven percent of the surface area. The survey also indicated heavy past grazing impacts on the streams and some subsurface flow. The past year was one of the driest recorded and several streams in the Fivemile Creek system that always had flow were dry. Spawning gravel and riparian vegetation were also limited along some reaches of the stream.

Past grazing has adversely impacted the riparian resources in portions of the system. In 1985, an allotment management plan for the F.G. Whitney Livestock Allotment was planned and approved. A major objective of the allotment management plan was to improve the riparian area and associated fisheries resource. Implementation of the plan occurred in 1986 with the completion of a riparian pasture which encompasses approximately 4000 acres around Fivemile Creek. The pasture fence is out of the riparian area so that the pasture includes upland areas. The pasture is being rested in 1986, 1987, and 1988 with grazing to begin in 1989. The grazing objective is to use the pasture for

Figure 6. FIVEMILE CREEK 1987 PROJECT AREA



no more than 10 days by the cow/calf pairs on the allotme to achieve the Forest standard of approximately 40% utilization. The pasture will be grazed in different seasons in different years and will be rested every third year thereafter. The occurance of fisheries habitat projects within the system is recognized in the plan and associated Environmental Assessment. Forest dollars funded the construction of the pasture fence.

From the survey evaluation the overall project objective will be to increase the production potential of summer steelhead by:

1. Increasing the pool:riffle ratio from 11:89 to approaching 50:50 considered optimal for steelhead rearing.

2. Constructing at least one large pool per mile of stream.

3. Increasing both amount and quantity of spawning gravel by constructing weirs to retain bedload gravels.

4. Controlling bank erosion.

5. Increasing and protecting vegetation in the riparian area.

PROJECT DESCRIPTION

Project activities in 1987 consisted of preparing and administering a contract to place large woody material in the stream bed to increase instream cover and help improve pool/riffle ratio; rehabilitate adjacent meadows by placing structures on the flood plain to trap sediments and rechannel ungulate damaged stream beds; and to build structures to improve and maintain pools for juvenile rearing. A summary of the project to date can be found in Table 11. The riparian improvements were funded out of Forest Service KV funds.

ACHIEVEMENTS

A total of 2.5 miles of stream were worked with approximately 0.2 mile of this being intensive meadow rehabilitation and stream rechanneling. Six pools were created with one being a large sediment trap. Structures were placed throughout the project area to help retain sediments and re-establish riparian vegitation. Estimates of increases in smolt output resulting from the 1987 project can be found in Table 12.

Table 11. Summary of the Fivemile Creek Project to Date.

structures	1987
Stream/riparian rehabilitation (miles)	0.2
Instream logs	8
Weirs/pools	6
Sediment traps	100
Deflectors	4
Sills	1
Adult holding pool	1

Table 12. Increased Smolt Production in Fivemile System

	sts
Estimated increase in numbers of smolt	218
@ 1.5 percent spawning escapement 1/	x0.015
Estimated increase in numbers of adult spawners	3.3
Net value per escaping adults 2/	x$359
Estimated annual value 1987 BPA project	$1,174

1/ As per conversation with Errol Claire, l/8/88.
2/ Meyers 1982. "Net Economic Values for Salmon and Steelhead from The Columbia River System," U.S. Department of Commerce, June 1982.

Subproject IIe - Camas Creek stem

North Hidaway Creek

INTRODUCTION

North Hidaway Creek is tributary to Camas Creek which is tributary to the North Fork John Day River. The location of the project is T.5S.. R.33E. and R.3301/2E. (Figure 7).

Summer steelhead and resident trout habitat improvement in North Hidaway Creek was initially proposed as a KV project associated with timber sale improvement. These plans were expanded into a joint BPA-Forest Service project to increase summer steelhead production. Surveys of the stream indicated that quality pool habitat is naturally limiting steelhead production.

PROJECT DESCRIPTION

In North Hidaway Creek in 1987 the Forest constructed 17 pool-creating log and rock weirs, placing woody material and cover boulders in each. Several of the pools created are of sufficient size to function as adult holding pools.

The overall project objective is to increase the production potential of summer steelhead by:

1. Increasing the pool:riffle ratio to approach 50:50 considered optimal for stealhead rearing.

2. Constructing at least one adult steelhead resting pool per mile.

3. Increasing both size and quality of anadromous fish spawning area by constructing the rock weirs that will retain bedload gravels.

4. Controlling bank erosion.

ACHIEVEMENTS

It is anticipated that the increased rearing areas associated with the boulders, rock weirs and large woody material will result in increased steelhead survival from egg to smolt. Assuming the increased rearing area equates to a proportional increase in fish production (see Appendix A), this increase is estimated at 454 smolts annually and will require at least one generation (3 to 5 years) before results become apparent (Table 14).

Figure 7. MIDAWAY CREEK 1987 PROJECT AREA

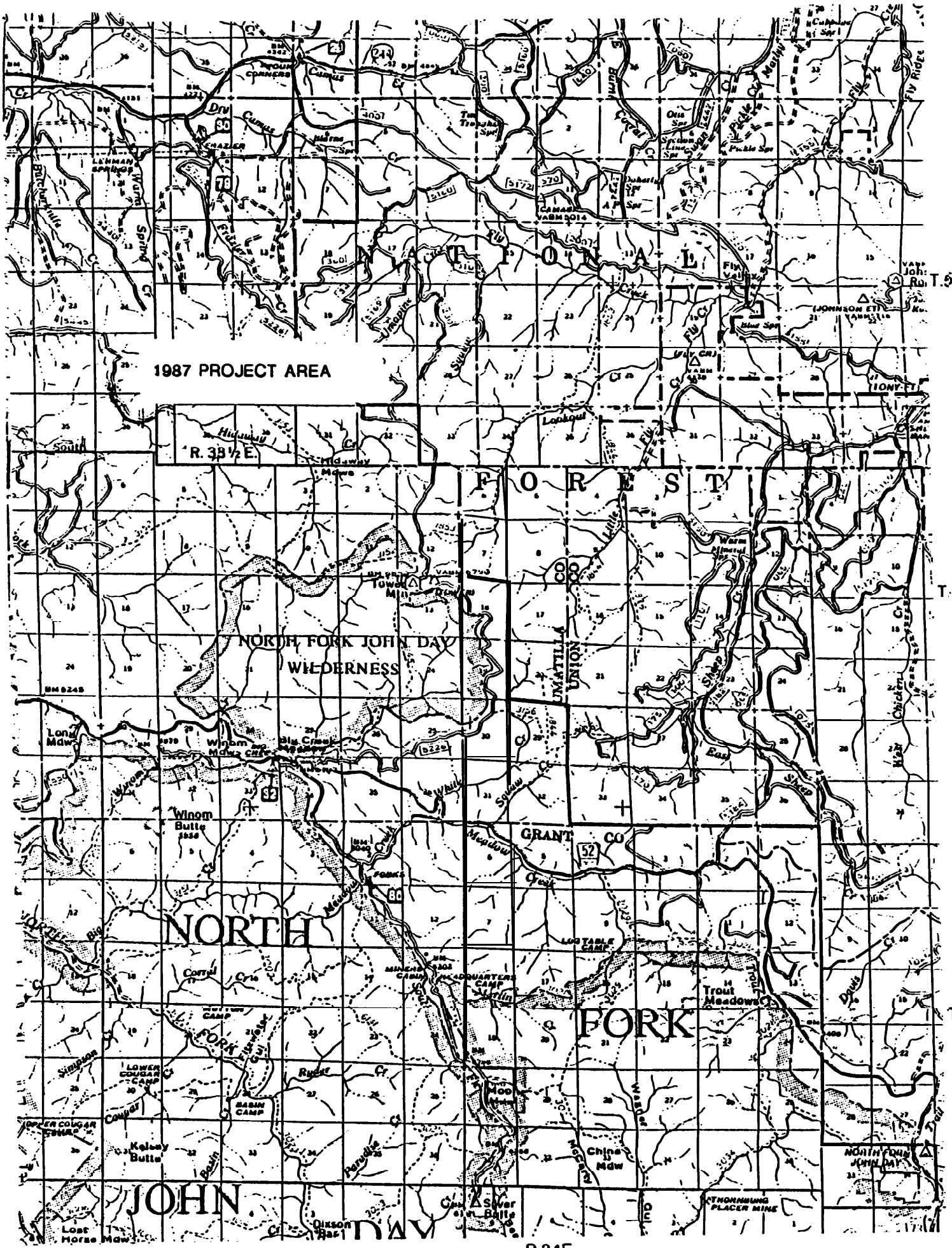


Table 13. Summary of the North Hidaway Creek Project to Date.

structure	1986	1987	Total
Weirs	20	17	37
Boulders Placed	20	20	40
Instream Logs Placed	20	17	37

Table 14. Increase in Smolt Production in North Hidaway Creek.

	Sts
Estimated increase in numbers of smolt	454
@ 1.5 percent spawning escapement 1/	x 0.015
Estimated increase in numbers of adult spawners	6.8
Net value per escaping adults 2/	x$359
Estimated annual value 1987 BPA project	82,445

1/ As per conversation with Errol Claire, l/8/88.
2/ Meyers 1982. "Net Economic Values for Salmon and Steelhead from The Columbia River System," U.S. Department of Commerce, June 1982.

PROJECT MONITORING

Monitoring of the project results in the North Fork John Day Subbasin has been coordinated with the ODFW; however, no on-the-ground smolt monitoring occurred in 1985. 1986 or 1987. ODFW conducted spawning ground counts on the North Fork John Day River, Clear and Granite Creeks, and Desolation Creek. A physical stream survey for project streams was conducted in 1986 to monitor the physical habitat changes that have occurred since the inititation of project work in 1984 and for pre-work purposes on streams proposed for 1987 project work. Prework surveys of structures in the streams indicated the need for adjustments of flow into some side channels in the North Fork John Day River, resetting boulders in Clear Creek, and modifying structure construction in Wilson and Little Wall Creeks. Structures in Desolation Creek and Hidaway Creek required no maintenance.

PROJECT COSTS

Table 15. Project Costs, April 1, 1987 to March 30, 1988

Bonneville Power Administration Funds:			
a.	Salaries		$ 74.123.29
b.	Transportation and travel		$ 8.515.28
c.	Materials and supplies		
	Expendable		$ 18,493.67
	Nonexpendable		$ 5,648.04
d.	Equipment rental contracts		$140,329.38
e.	Overhead @ 10.7%		$ 26,440.73
		Total	$273.550.39
Umatilla Forest Appropriated Funds:			
a.	Salaries		$ 9,075.00
b.	Transportation and travel		$ 3,715.00
c.	Materials and supplies		
	Expendable		$ 13,224.00
	Nonexpendable		$ 4,045.00
d.	Equipment rental contracts		$ 28,579.00
	Overhead @ 10.7%		$ 6.274.00
		Total	$ 64,912.00

REFERENCES

Claire, Errol, 1988. Personal communication on January 8, 1988.

Meyers, Philip A., 1982. "Net Economic Values for Salmon and Steelhead from the Columbia River System," U.S. Department of Commerce, 23 pages, June 1982.

Oregon State Game Commission, 1959. "Fishery Division 1958 Annual Report", June 1959, page 182.

Appendix A: Smolt Production and Cost Derivation Procedure

Summary of Pool/Riffle Ratio and Spawning Gravel from the 1986 Stream Survey

stream	Total Area (sq.ft.)	Pool Area* (sq.ft.)	Riffle Area (sq.ft.)	P/R x	Spawning Gravel (sq.ft.)
Clear Cr.	644,325	430,655	303,165	53147	77,500
Desolation 1985					
Side channels	11,540	4,966	6,574	43/57	1,220
Main channel	65.763	23.739	42,024	36/64	1,780
Desolation 1986					
Side channels	33.075	10,748	22,327	33167	1,074
Main channel	2229573	59,451	163,122	27/73	4.334
Fivemile & Trib.	972,832	111,050	861,782	11/89	147,500
Hidaway & Trib.	743.113	140,863	602,250	19/81	146,010
Wilson Cr.	343,300	93,060	250,240	27/73	5,020
NFJD River					
Side channels	**1.057.398**	815,424			242,700
Main channel	**5,674, 5**	**3,240,294**	**2,433,851**	**43/57**	761,750

* Pool area was calculated based on pools of 0.7 foot depth or greater. All other pools were added to the riffle area because they were considered to be less than adequate for successful juvenile rearing.

Estimated Production by Stru .re.

structure	Annual Smolt Output
Side channel	**448Chs - 140Sts**
Boulders placed	**4Chs - 2Sts**
Log or Rock Weirs	**28Chs - 8Sts**
Alcove	**28Chs - 8Sts**
Rock Sills	**14Chs - 4Sts**
Log in pool	**7Chs - 3Sts**
Deflectors	**7Chs - 3Sts**
Adult Holding Pools	**70Chs - 21Sts**
Instream Logs	**7Chs - 3 Sts**

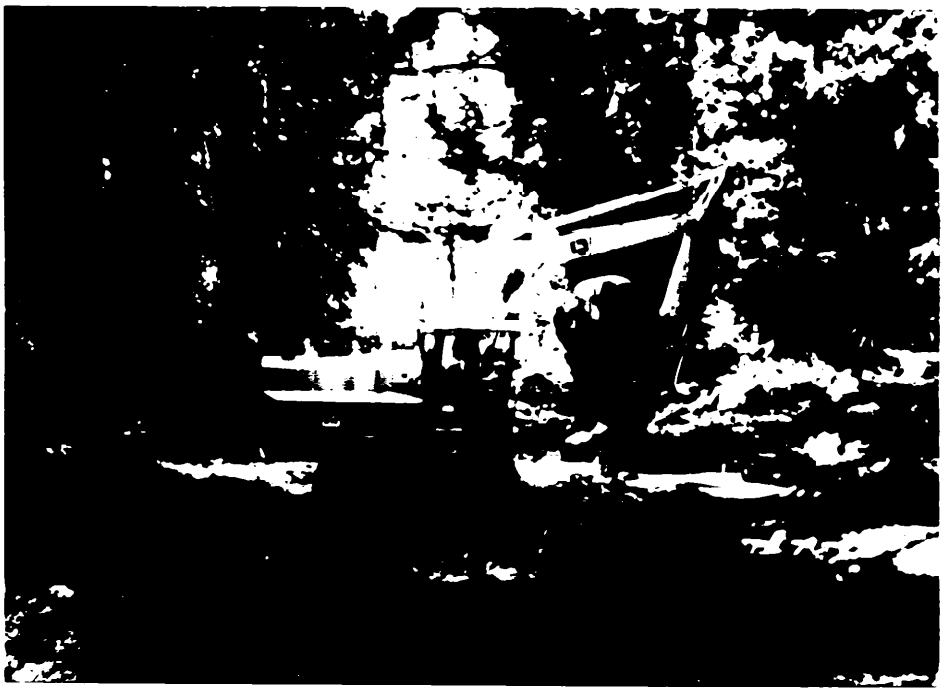
Assumptions

1. If one is not planning from spring chinook, then steelhead smolt output doubles.

2. One large adult holding pool per mile is necessary to gain full benefit from the rest of the project.

3. Output numbers derived by Andrews and ODFW representatives and account for an assumed 30% presmolt mortality.

Appendix B: Photographs



Desolation Cr. Excavator lifting large natural boulder for placement at weir site.

Desolation Cr. Rock Deflector

Desolation Cr. Use of gas Hilti Fastening System to anchor rock deflector together

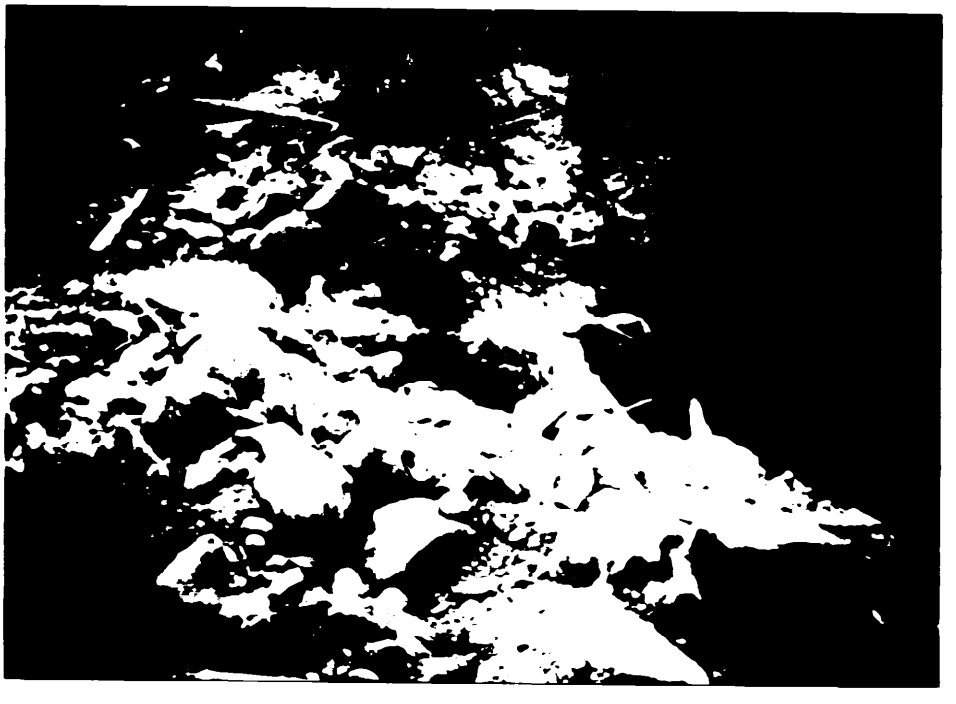
Desolation Cr. Boulder for balasting apex of "V" weir during back filling is suspended by a loop of cable attached using Hilti Fastening System.

Desolation Cr. Excavator placing log for straight log weir.

Desolation Cr. Modification of debris jam to allow passage.

Desolation Cr. Site of rock weir #184

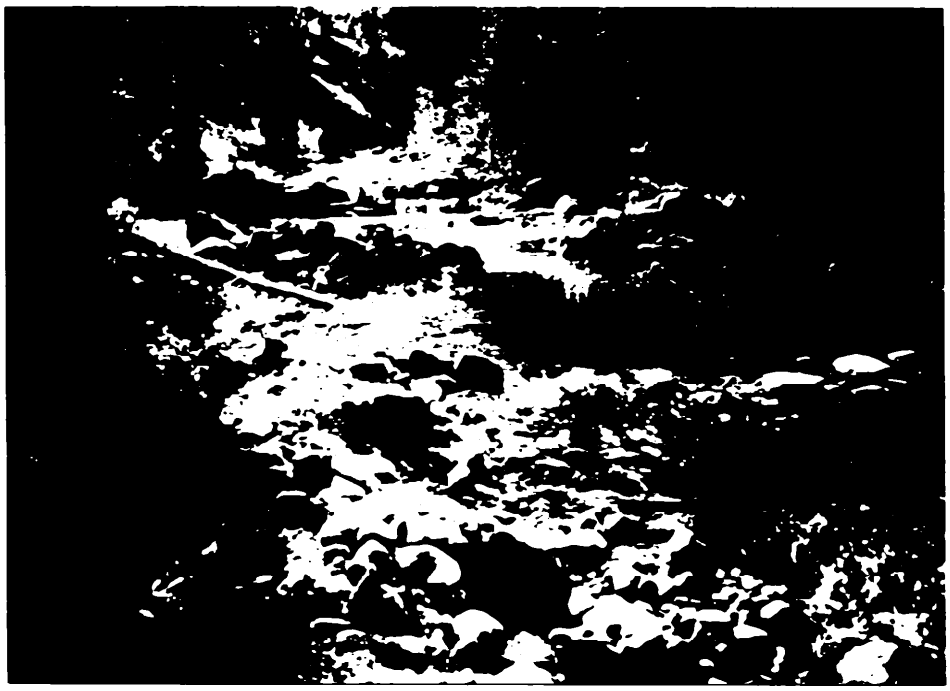
(Before)



(After)

Desolation Cr. View up stream through sites #l43 -140.

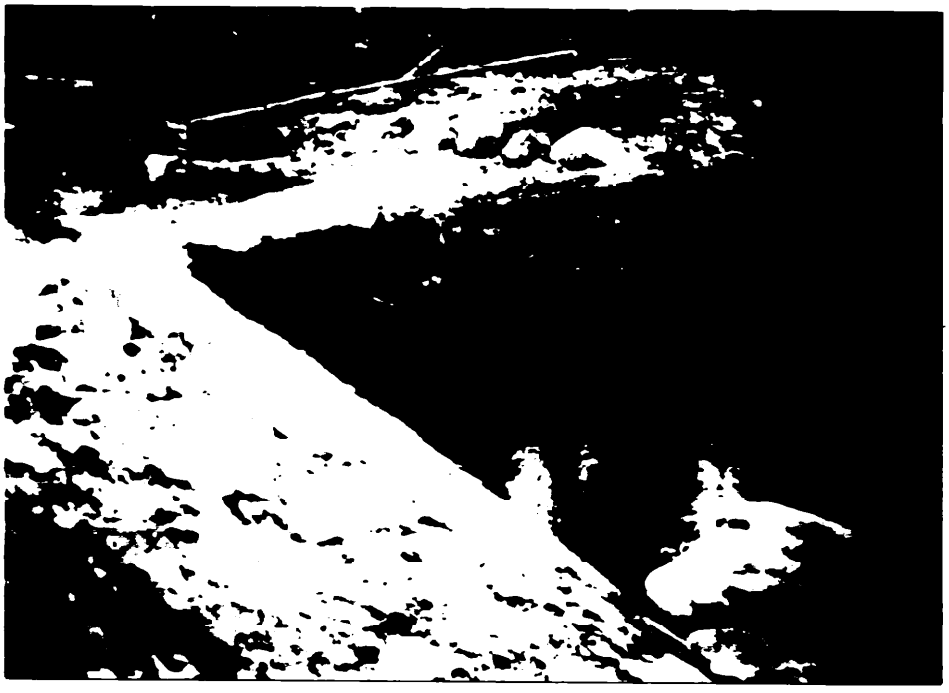
(Before)



(After)

Desolation Cr. "V" logweir site

(Before)



(After)

Wilson Cr. "K" log weirs with root wads in pool.

Wilson Cr. Rock weir at low flow. Note complete lack of pool in unworked upstream reach.

Wilson Cr. Rock weir key-way at low flow.