

CAMAS CREEK (MEYERS COVE)  
ANADROMOUS SPECIES HABITAT IMPROVEMENT PLAN

Final Report

by

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## Introduction

This report represents an analysis of potential enhancement and management options designed to improve instream and riparian zone conditions in the Meyers Cove area of Camas Creek. The efforts expended will contribute to improvement of anadromous species spawning, incubation and rearing habitat. Potential production increases would provide some compensation for hydropower effects in other areas of the Columbia River basin.

The overall project has been divided into two separate but interrelated phases. This first phase was designed to provide an assessment of enhancement options, potential schedules, and costs associated with the enhancement options. The second phase will involve implementation of actual enhancement measures and associated monitoring to verify fish response. The combined phases are intended to meet the stated project goal.

Goal: To improve riparian and instream conditions of Camas Creek in the Meyers Cove area to increase spring chinook and steelhead trout spawning and rearing production potential.

To assist in achieving the above goal, this feasibility and design phase was funded, in part, by the Bonneville Power Administration (BPA). The authority for BPA funding is associated with Section 700 [specifically Sec. 704(d)(1) (Table 2)] of the Columbia River Basin Fish and Wildlife Program adopted by the Northwest Power Planning Council in accordance with the Northwest Electric Planning and Coordination Act of 1980. The project is a cooperative effort involving the U.S. Forest Service (USFS), Idaho Department of Fish and Game (IDFG), and the BPA.

## Project Area Description

In order to have an adequate understanding of the importance of the Camas Creek (Meyers Cove area) drainage, it is important to highlight the significance of the Middle Fork of the Salmon River as a producer of chinook salmon and steelhead trout. The Middle Fork is the largest major tributary in the Salmon River drainage; it is also the most significant producer of wild anadromous fish. The basin drains 2,830 square miles and has 685 miles of habitat accessible to anadromous species. For most of its length, the drainage flows through the Frank Church--River of No Return Wilderness, and the aquatic habitat conditions have remained in a relatively pristine state (Fig.1). The few perturbations that have resulted from man's activities are generally small, in relation to drainage size, and are located in specific areas. Most disturbances have resulted from past mining activity (Marble and Big Creeks) and from development of road access.

The topography within the Middle Fork drainage is very rugged and steep. Road access is available to the headwaters of the main stream and additional entry

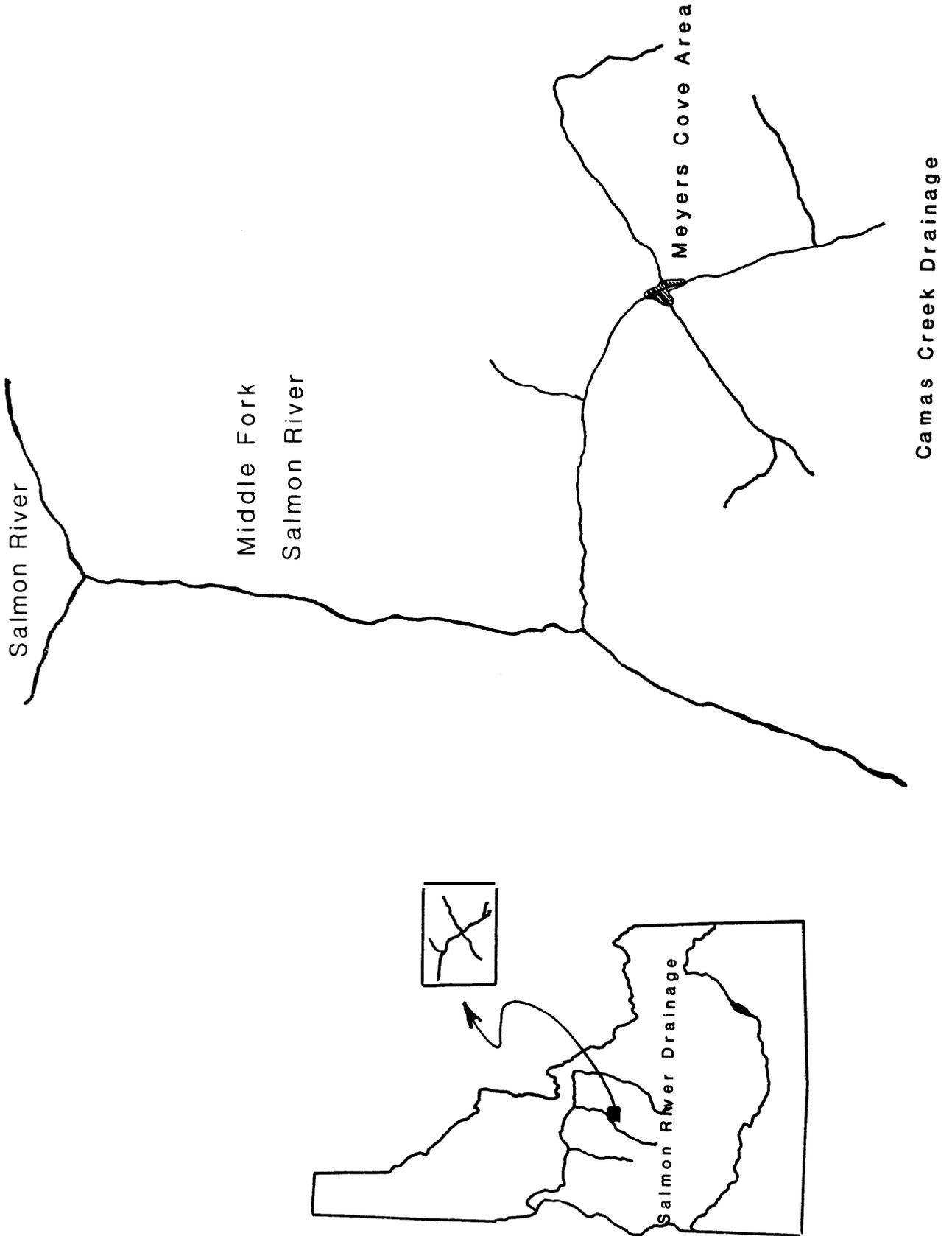


Figure 1. Map of study location in Central Idaho.

points exist to the headwaters of most major tributaries. A detailed description of the geology and vegetation can be found in Minshall et al, 1981.

**Climate** varies considerably by elevation with temperatures ranging from below freezing to above 90°F. and precipitation amounts ranging from 15 to 39 inches. Most of the precipitation occurs as snow and stream flow characteristics reflect this influence. Peak discharge occurs during a 2-6 week period in early May to mid-June, followed by flows decreases throughout summer and winter months. Mean annual discharge for a five-year period equaled approximately 1,549 cfs, with values ranging from 567 to 9,010 cfs (Thurow, 1982).

Stream habitat features within the Middle Fork drainage are consistent with the rugged topography. Most streams have moderate to high gradients and are confined in drainage basins with steep side slopes. Pool type habitats within the Middle Fork range from large deep slow water areas to small pocket water areas. These pool habitats provide a significant amount of rearing habitat, particularly for chinook salmon and cutthroat trout, and, to a lesser extent, steelhead trout. The faster water areas, with large substrate materials, form pocket water holding areas and provide rearing habitat for steelhead trout. Water quality is characterized by low concentrations of dissolved ions (Minshall, 1981).

In general, the Middle Fork of the Salmon River is in a relatively pristine **state** with all aspects of the anadromous habitat in generally excellent condition.

The production potential of chinook salmon (both spring and summer) and steelhead trout within the Middle Fork drainage is high. Idaho Department of Fish and Game management objectives for 1985 to 1990 call for the following production values:

	<u>Spawning Escapement</u>	<u>Adult Production</u>	<u>Smolt Production</u>
Steelhead Trout	6,000	15,000	750,000
Spring Chinook	9,000	22,500	1,406,000
Summer Chinook	2,000	5,000	312,000

The values expressed in the State's Management Plan **may** vary somewhat with production **estimates** developed as part of other research (i.e., Thurow, 1985), but all estimates serve to show a relatively high production potential. Thurow (1985) discussed options available for estimation of production potential; his analysis placed steelhead smolt production at 350,000 based on anticipated density levels in the tributaries and the main stem of the Middle Fork.

In addition to the values associated with high production potential, the Middle Fork drainage contains anadromous stocks that are wild and indigenous to the

area. The State's species management plan for the coming years recommends that the drainage be managed for production and preservation of wild, indigenous anadromous stocks. The advantages of this management direction have been identified and reviewed (Horrall, 1981; Richer, 1972; Stock Concept International Symposium, 1981; Wagner, 1979). It is anticipated that recovery of the depressed nature of anadromous populations in the Middle Fork will be a slow, deliberate, and unspectacular process tied with harvest regulation, improvement in downstream passage, and habitat restoration and maintenance (Loftus, 1981; Thurow, 1985).

### Camas Creek

The Camas Creek drainage (Fig. 2), including the Meyers Cove area, was in an essentially natural undeveloped condition prior to 1900. A minor amount of mining and mineral prospecting had occurred in Yellowjacket and Silver Creeks, but no significant development occurred in areas immediately adjacent to Camas Creek. The lower Camas Creek corridor provided a popular route for early travel into the interior regions of Idaho.

In 1901, a Mr. Andrew Lee settled on the land where Camas Creek and Silver Creek converge. Over a 16 year period, from 1901 to 1917, Mr. Lee cleared 120 acres and established a small ranch. The majority of this area was used for hay production and grazing (late fall and winter). The Meyers Cove area remained in agricultural use from the early 1900's until the late 1960's. Land ownership changed several times during this period but basic land use remained essentially the same. The final private owner was Mr. James Strickler who established Hidden Valley Ranches, Incorporated. The corporation used the land as a base for outfitting in the Idaho Primitive Area. Hay production and some grazing continued to be the primary land uses.

Removal of the riparian vegetation and the subsequent agricultural use of the land immediately adjacent to Camas Creek initiated influences to the stream channel which are in effect today. The natural revetment and channel control provided by large woody vegetation was altered and substantial changes occurred as stream energies began to exert influences on the stream's bed and banks. In 1970, the United States Government purchased 463 acres of private land in the Meyers Cove area under the authority of the Land and Water Conservation Fund Act of 1964. Benefits attributed to acquisition of the property included maintaining access to a vast area of Forest Service administered land (100,000 acres), opportunity to develop a recreational site, and to provide management control for protection of fishery resources.

Domestic livestock use of the Camas Creek drainage has been ongoing since 1918, with early use being very heavy. Through the years changes in grazing have occurred and livestock numbers have been reduced. At present, the area is managed as one allotment with a permitted use of 655 animal unit months. This use level represents approximately 11 percent of the original levels that

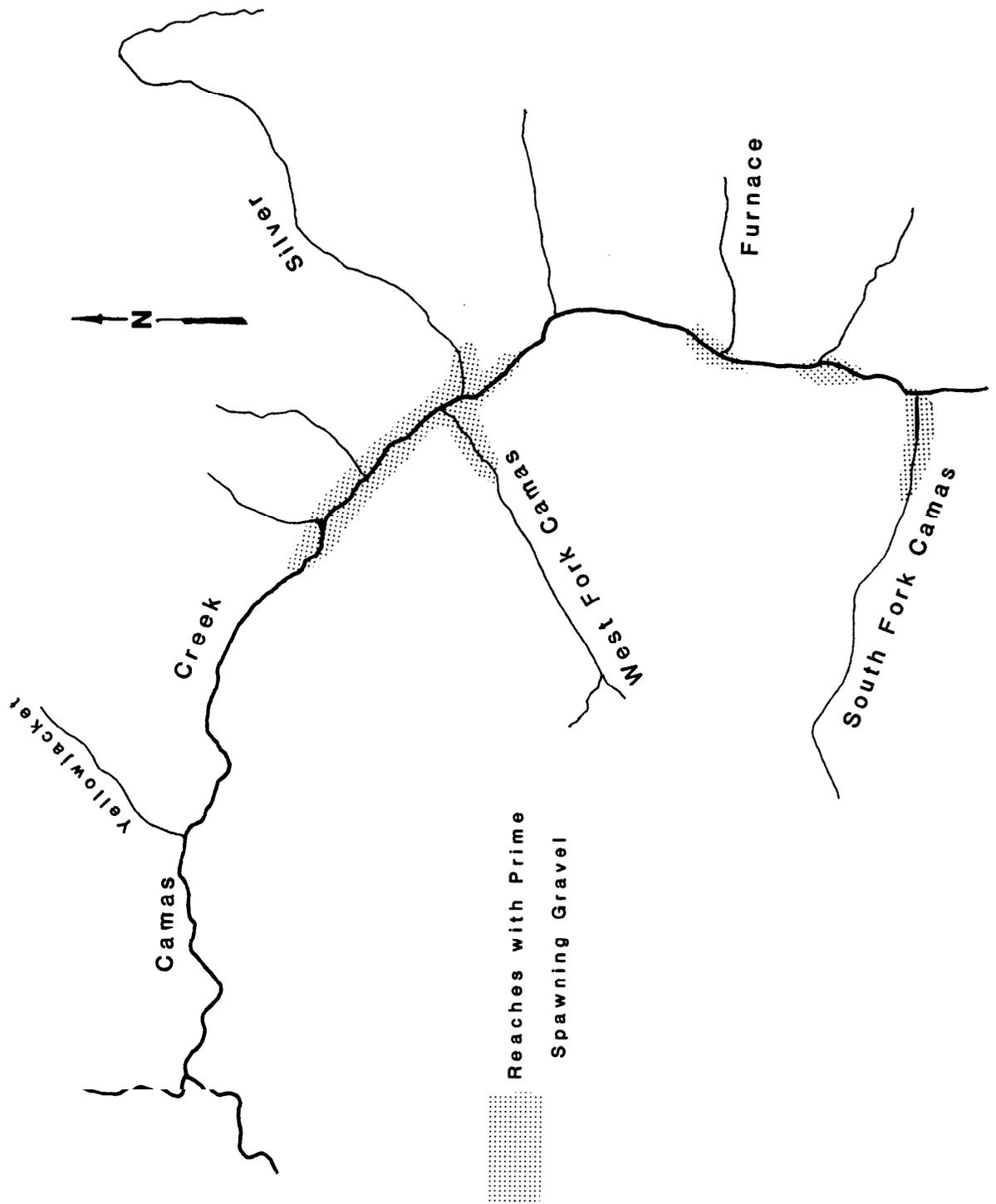


Figure 2. Camas Creek drainage with areas of primary spawning significance.

occurred during the early 1920's. Range condition varies greatly over the **allotment**. The preferred grazing areas **have** been utilized in excess of their potential. These areas for the most part are the old irrigated hay meadows and the riparian areas along Camas Creek at Meyers Cove. The remainder of the allotment is in fair to good condition. Future management direction for this **allotment** as contained in the Forest Plan emphasizes protection and enhancement of the anadromous fish habitat, reduction of riparian zone conflicts, and increased coordination of multiple uses.

Camas Creek is approximately 38 miles in length and enters the Middle Fork Salmon River near river **mile 35**. The Meyers Cove meadow area is located from Camas Creek river mile 11.5 to 15.5. A major tributary, the West Fork, is approximately five miles in length, and enters Camas Creek at Meyers Cove. Below Meyers Cove, Camas Creek delineates the boundary between the Salmon National Forest to the north and the Challis National Forest to the south. Due to improved access, administrative responsibilities for the Meyers Cove meadow area, including the lower reach of the West Fork of Camas Creek, have been assigned to the Salmon National Forest.

The project area (Meyers Cove) (T. 17 N., R. 17 E., Sections 6 and 7) lies at approximately 5,100 feet elevation in low gradient, wide, flat-floored bottomland bordered by steep volcanic and quartzite canyonlands rising to over 9,000 feet. Dominant vegetation includes Idaho fescue (*Festuca idahoensis*) and other grasses in bottomlands, with black cottonwood (*Populus trichocarpa*), willow (*Salix* sp.), and occasional Douglas-fir (*Pseudotsuga menziesii*) comprising the riparian woody species. Stands of Douglas-fir and lodgepole pine (*Pinus contorta*) occupy suitable sites of upper elevation sideslopes.

#### Fisheries Resource and Aquatic Habitat

The Meyers Cove area of Camas Creek contains abundant spawning gravels (Fig. 2) with sufficient associated rearing habitat to support a relatively large number of anadromous fish, as well as resident populations of westslope cutthroat trout (*Salmo clarkii*), rainbow trout (*Salmo gairdneri*), bull trout (*Salvelinus confluentus*), and mountain whitefish (*Prosopium williamsoni*). Several non-game species (*Catostomus* sp., *Cottus* sp.) are also found in the stream.

The Idaho Department of Fish and Game has conducted annual chinook salmon redd counts since 1972, and has compiled five year average counts since 1951 (Table 1). Steelhead redd counts are not generally feasible due to turbidities during spring runoff.

**Thurow** (1982, 1983, 1985) made a concerted effort to delineate steelhead spawning within **Camas** Creek using both ground and aerial observation techniques. This effort met with some success as several redds and spawners were located and observed. Mr. Mel Reingold observed five spawning steelhead

Table 1. Annual (1960-1985) and Five-Year Average 1, 2,  
Chinook Salmon Redd Counts in Camas Creek- -

Annual Redd		Average Redd			
<u>Year</u>	<u>Count</u>	<u>Year</u>	<u>Count</u>	<u>Years</u>	<u>Count</u>
1960	112	1972	211	1951-55	127
1961	142	1973	358	1956-60	119
1962	124	1974	172	1961-65	170
1963	252	1975	128	1966-70	180
1964	279	1976	61	1971-75	198
1965	51	1977	84	1976-80	65
1966	212	1978	148	1981-85	33
1967	256	1979	15		
1968	251	1980	17		
1969	94	1981	65		
1970	86	1982	33		
1971	120	1983	38		
		1984	11		
		1985	21		

and counted eight redds in the Meyers Cove area during April 1985. Population surveys, using snorkling techniques, have also been conducted within the Meyers Cove area. Results of these efforts have indicated a light to moderate use by juvenile salmon and steelhead.

Aquatic habitat assessments of Camas Creek and tributaries in the Meyers Cove area have been made periodically in an effort to describe condition and identify land use coordination needs. An initial review of habitat conditions occurred in 1979; this evaluation was tied to an allotment management appraisal and development of an updated allotment management plan. The information collected at that time reflected less than optimum aquatic/riparian habitat conditions. Pool habitats were limited in both quantity and quality. Streamside cover provided by vegetation was limited to less than 25% and streambank instability was evident at many locations. All streams reflected conflicts resulting from livestock use of riparian areas. Stream conditions also reflected the influence of a high intensity runoff that occurred in 1974 and resulted in major channel alterations.

A second major assessment was conducted in 1981 by the U.S. Fish and Wildlife Service for <sup>37</sup>The Army Corps of Engineers as part of the lower Snake River enhancement effort. The Fish and Wildlife Service's study also focused on habitat conditions in the Meyers Cove area. Their approach was to assess habitat quality using a Habitat Quality Index (HQI) model (Binns and Eiserman, 1979). Habitat Quality Index values and measurements indicated that instream cover, eroding streambanks, water velocity and stream width factors were all rated very low. Riffle areas with large adjacent barren gravel bars were the dominant instream habitat condition. Streambanks were rated as generally unstable and sparsely vegetated with the erodible materials being deposited within the stream channel. Aggregation and channel instability had caused Camas Creek to widen, velocities to increase and instream cover to be scarce. Riparian shading was estimated to provide only 6 percent of the cover along the streambanks. Both studies indicated that substrate conditions were less than optimum as a result of moderate to high levels of fine material being incorporated in the desirable spawning gravels.

In general, both habitat evaluations reflected similar findings. Current habitat conditions of the streams and riparian zones within the Meyers Cove area were due, in part, to land use activities that occurred prior to government purchase in 1970, the 1974 runoff event, and recent land use management associated with the current cattle allotment. To supplement information gained in 1979 and 1981, this present study was initiated to further define significant habitat deficiencies and to describe suitable options necessary to effect enhancement of stream conditions.

## Methods and Materials

Inasmuch as the previous studies described general aquatic habitat conditions in the Meyers Cove area, efforts associated with project 84-23 were limited to a more thorough analysis of habitat characteristics in most need of improvement. Field sampling efforts conducted during 1984 and 1985 were limited to analysis of streambank and channel conditions in sufficient detail to develop an enhancement plan. To accomplish this the entire length of stream channel within Meyers Cove was inventoried. Lengths of unstable bank were measured and corrective measures identified. Enlargements of aerial photographs, with a 1:24,000 scale, were used to map and display channel characteristics.

Allotment administration and management was also closely scrutinized to determine solutions to multiple use resource conflicts that are presently occurring. Field work associated with this effort included a review of present allotment facilities (i.e., fences, stream crossing, salting areas, etc.) and identification of additional facilities and management changes necessary to eliminate or minimize use conflicts.

Time was also spent in reviewing improvement options applicable to the problems encountered at Meyers Cove. Literature was reviewed, personal contacts made and actual experience evaluated. Cost estimates were also initiated and evaluated.

## Findings and Discussion

In order to adequately describe existing stream channel and riparian conditions and to identify appropriate management remedies, stream channels within the Meyers Cove area were subdivided into reaches. Each reach was walked and the amount of unstable channel measured and general riparian conditions noted.

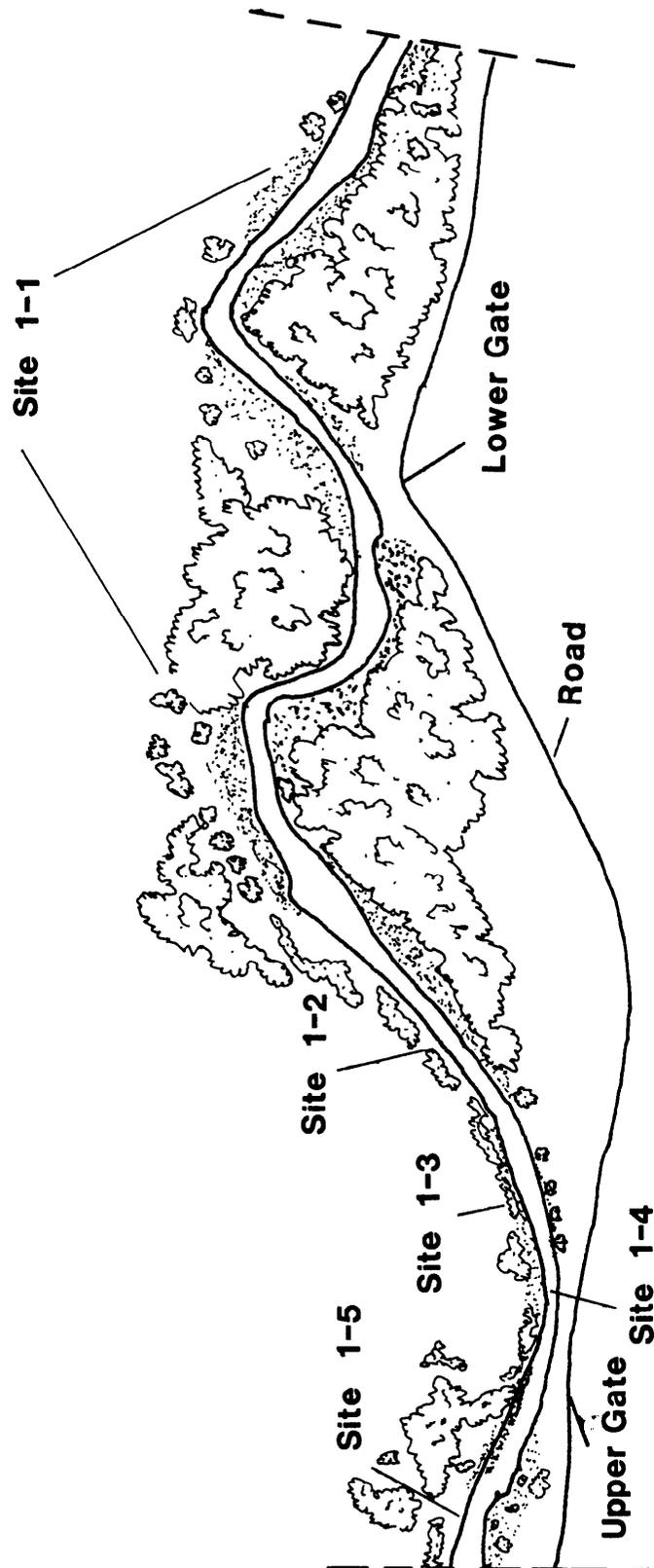
Allotment areas within the Meyers Cove were also inventoried to assess potential changes in livestock management and allotment administration that would expedite riparian and streamside recovery.

### Camas Creek

The lower reach on Camas Creek comprised approximately 3,437 feet of stream channel. This reach originated in the area near a lower gate and proceeded upstream to a point just above an upper gate (Fig. 3). The lower portion (site 1-1) of this reach was characterized by relatively heavy willow and cottonwood stands. Channel conditions reflected the influence of high bedload movement from past runoff periods. Point bars and channel bars predominated through the 2,417 feet of this lower section of the reach. Above this section there were four sites with obvious streambank cutting and/or sloughing attributable to stream energies and land management influences (Table 2). Livestock influences were most noticeable on the right banks in areas where willow and grass species were the dominant vegetation.

The middle reach inventoried on Camas Creek was approximately 2,790 feet in length (Fig. 4). This area included the junctions of both Silver Creek and the West Fork of **Camas** Creek with main Camas Creek and contained a large remnant meander of the main drainage. Several channel and point bars were observed and channel conditions reflected the influence of runoff from the West Fork. Revegetation of the old meander was proceeding at a very slow rate; livestock use and limited soil were primarily responsible for the slow recovery. Older cottonwoods dominated as the larger woody riparian vegetation and younger cottonwoods were noticeably absent. Channel conditions reflected the influence of runoff conditions and livestock use of the streamside areas (Table 3). A portion of the stream side area from sites 2-5 through 2-10 had been fenced to exclude cattle use and provide protection to riparian vegetation and streambanks.

The upper reach on **Camas** Creek in the Meyers Cove area (Fig. 5) extended from just above the confluence of Silver Creek upstream to a point where the jeep trail crossed Camas Creek. The length of this reach was approximately 2,792 feet and the stream channel was characterized by braided sections, wide shallow sections, and an area where the channel had divided forming a vegetated island. The immediate streamside zone is presently protected by a fence installed during 1984 and 1985. This reach of stream also has an old bridge designed to convey animals and equipment across Camas Creek during periods of high water. At present the bridge structure is in a state of disrepair and



### Camas Creek Lower Reach

Figure 3. Location of major instability identified in the lower reach of Camas Creek in Meyers Cove area.

Table 2. Camas Creek lower reach stream channel condition and riparian zone **inventory**. Bank location is referenced facing upstream. Reach length was approximately 3,437 feet.

Site	Location	Length (ft)	Height (ft)	Comments
1-1	<b>Extreme lower portion of reach - both banks</b>	<b>2,417</b>	<b>--</b>	point and channel bars predominate; riparian vegetation composed of willow, cottonwood with various grasses and forbs; livestock conflicts light to moderate in nature; low bank with minimal cutting
1-2	<b>Right bank</b>	<b>10</b>	<b>2-3</b>	small bank rock with sod vegetative cover, cutting likely being influenced by livestock use and past agriculture activity on adjacent meadow .
1-3	Right bank	6	3	conditions similar to section 1-2
1-4	Left bank	180	2-10	gravel bar with adjacent channel bank having small bank materials; limited vegetation on channel bank; would be influenced during high water
1-5	Right bank	492	--	This section reflects the influence of post cutting; present conditions have interspersed areas of cutting and gravel bars.

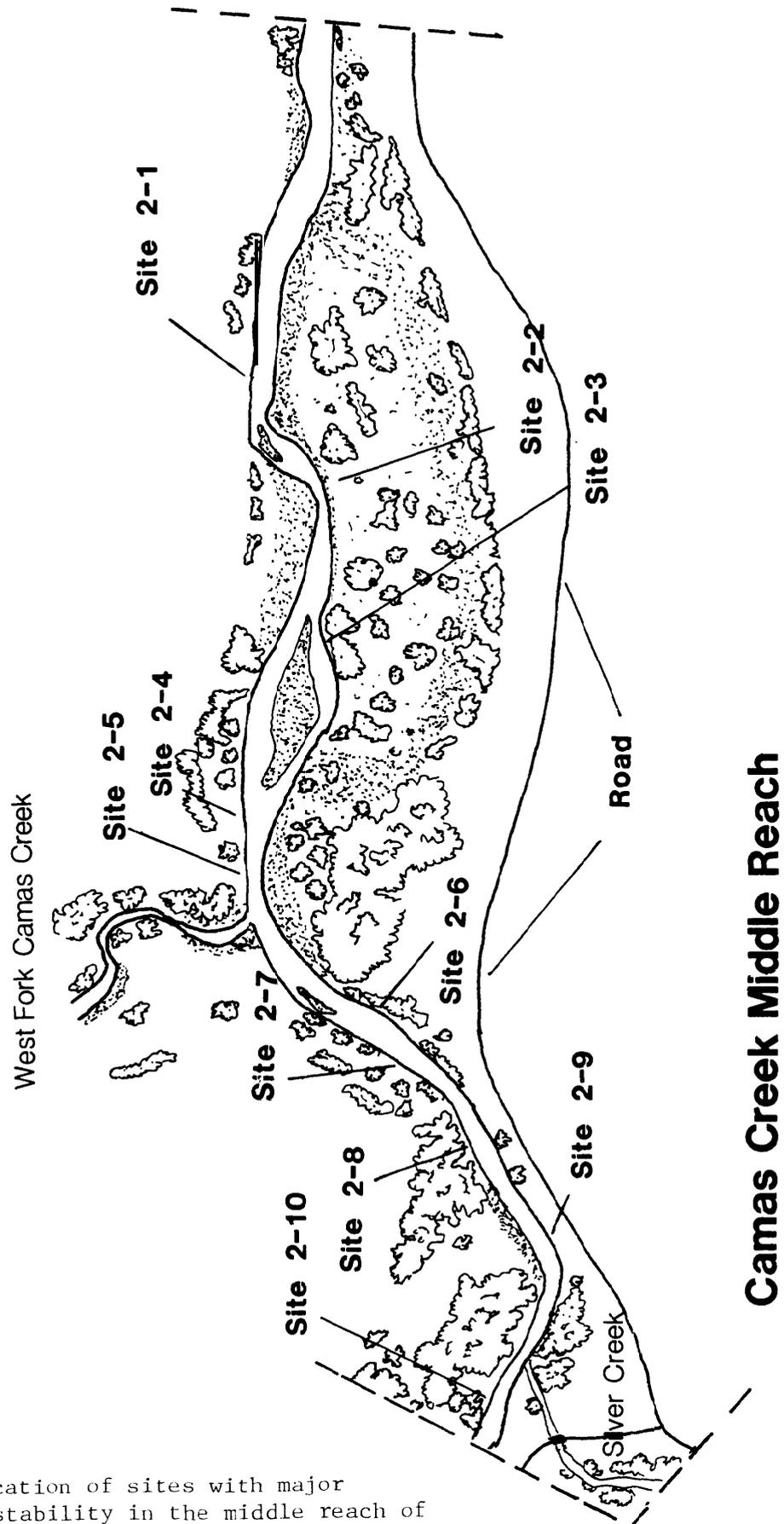


Figure 4. Location of sites with major instability in the middle reach of Camas Creek, Meyers Cove area.

Table 3. Camas Creek middle reach stream channel and riparian zone inventory. Reach length was approximately 2,792 feet. Bank location referenced facing upstream.

Site	Location	Length (ft)	Height (ft)	Comments
2-1	Right bank	190	2-3	streambank with cutting and sloughing; small bank materials; vegetation primarily bluegrass and forbs. Very limited amount of larger woody riparian vegetation; livestock influence evident.
2-2	Left bank	120	2-3	braided channel site; primarily a juvenile rearing area with low stream energies; old cutting that is naturally healing
2-3	Left bank	75	1	located just upstream of 2-2 on the braided side channel; old cutting evident that is naturally healing
2-4	Right bank	100	4	section of bank with cutting and sloughing evident; smaller bank rock materials present; vegetation dominated by occasional willow and other smaller materials
2-5	Right bank	27	6	just upstream of 2-4 and with similar streambank conditions; a fence has been installed to provide protection of this site.
2-6	Left bank	126	2-4	section of bank located on an outside bend; cutting is evident but site is stabilizing as a result of large bank materials and large cottonwood root masses; presently protected by fence
2-7	Right bank	--	--	minor area of sloughing and cutting; small forbs and a minor amount of willow provide some bank protection; presently protected by fence
2-8	Right bank	--	--	section with gravel bar with developing streambank; sparsely vegetated and with small to moderate bank rock materials; presently protected by fence

Table 3. (continued)

Site Location	Length (ft)	Height (ft)	Comments
2-9 Left bank	70	3	unstable streambank area associated with large pool with back eddy currents; old beaver activity on opposite bank may have been responsible for directing flows and causing instability; presently protected by fence
2-10 Right bank	180	2-5	This site has substantial length of bank that is unstable and exposed to stream energies at high flows; at low flows gravel bar is exposed; opposite bank has substantial amount of debris; also Silver Creek enters immediately downstream; presently protected by fence

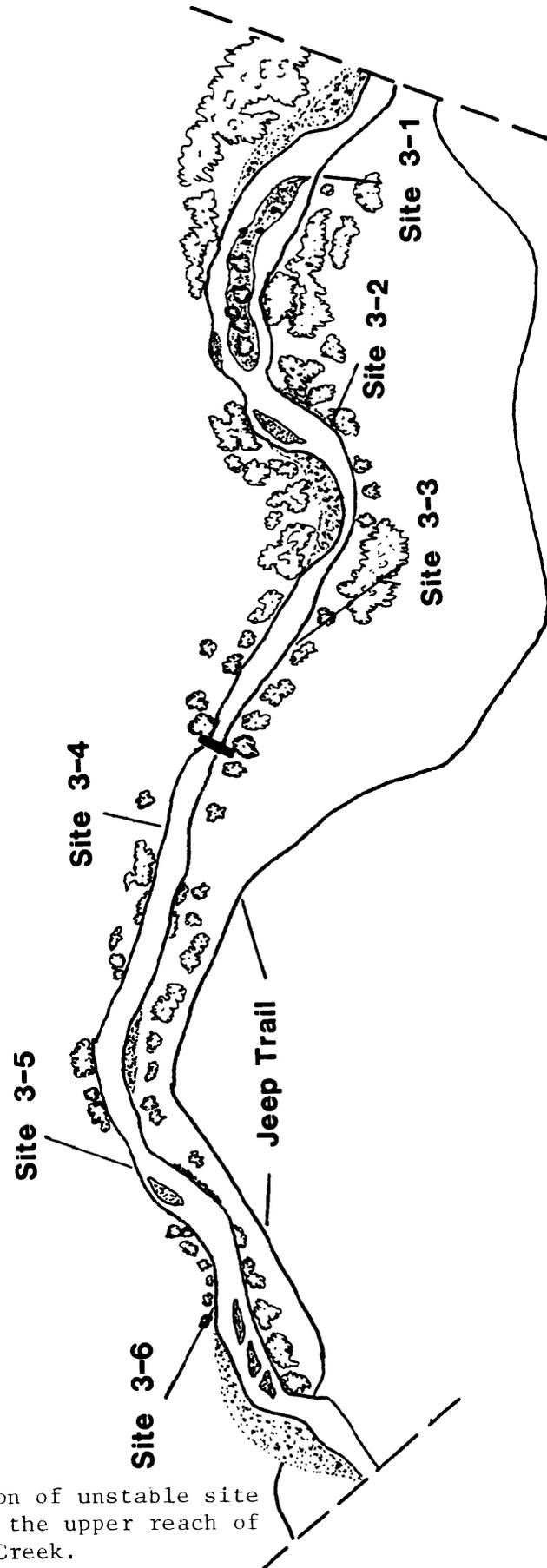


Figure Location of unstable site within the upper reach of Camas Creek.

## Camas Creek Upper Reach

will have to be removed. General stream side and channel conditions reflected heavy livestock use and the influence of high runoff stream energies (Table 4).

Camas Creek stream and channel banks within the Meyers Cove area were characterized as unstable along approximately 2,230 feet of the 9,021 feet of channel inventoried. This represented 24.7 percent of the channel length and was felt to be conservative because only major unstable sites were recorded. Numerous smaller sites (less than 3 feet in length) were observed. The vegetative condition of the riparian zone adjacent to **Camas** Creek reflected the influence of intense use both from past agriculture activity and from the more recent grazing use. Most larger woody types, such as willow and cottonwood, were present predominately as older mature clumps or stands. Few seedlings or saplings were observed throughout the reaches inventoried. Bluegrass dominated as the major sod forming grass type and forbs were present on the drier sites. Al.1 of the grass and forb areas were in poor condition and reflected the influence of heavy livestock use.

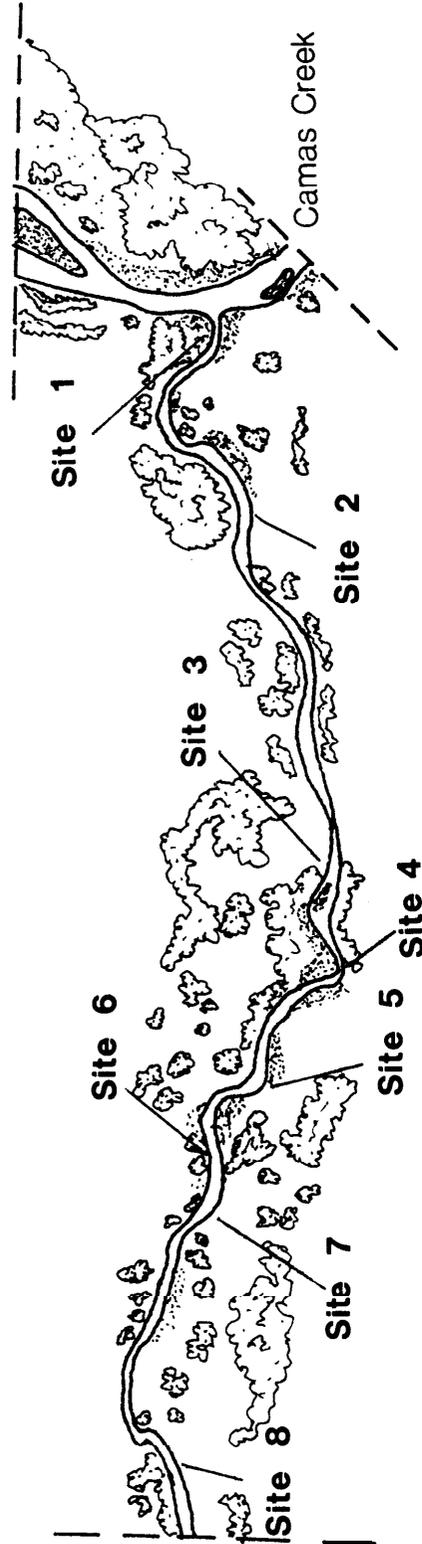
Channel and streambank conditions observed along **Camas** Creek can be attributed to several interrelated factors. Past agricultural activity in the Meyers Cove area has encroached upon the riparian zone adjacent to Camas Creek resulting in removal of much of the larger woody vegetation types (i.e., cottonwood, alder, and willow). This influence has been further compounded by heavy livestock use of the area **resulting** in lower vegetative vigor and reduced ground cover. The types of vegetation present and their abundance has been insufficient to provide adequate natural revetment to withstand influences occurring during high runoff periods. Stream cover was also limited by the lack of adequate riparian vegetation.

#### West Fork Camas Creek and Silver Creek

The West Fork was a major tributary that flowed into Camas Creek in Meyers Cove area. To aid in the inventory process, this stream was divided into two reaches; the lower being 2,900 feet in length (Fig. 6), and the upper reach extending an equal distance upstream (Fig. 7). Within these two reaches, 19 separate sites having unstable bank conditions were identified (Table 5). These areas of instability were basically similar to those encountered in Camas Creek, with the exception that channel conditions **along** the West Fork showed the influence of channel scour to a much greater degree. The high intensity runoff event of the early 1970's forced the West Fork channel into a condition of disequilibrium. The resulting condition was typified by areas of channel bank cutting and gravel aggregation. Riparian vegetation recovery has been retarded to a degree as a result of heavy livestock use. Present vegetative condition and abundance along the West Fork has been insufficient to provide adequate natural revetment of the stream channel. The cover component of **the** habitat in the West Fork was also being impacted by the lack of adequate riparian **vegetation**.

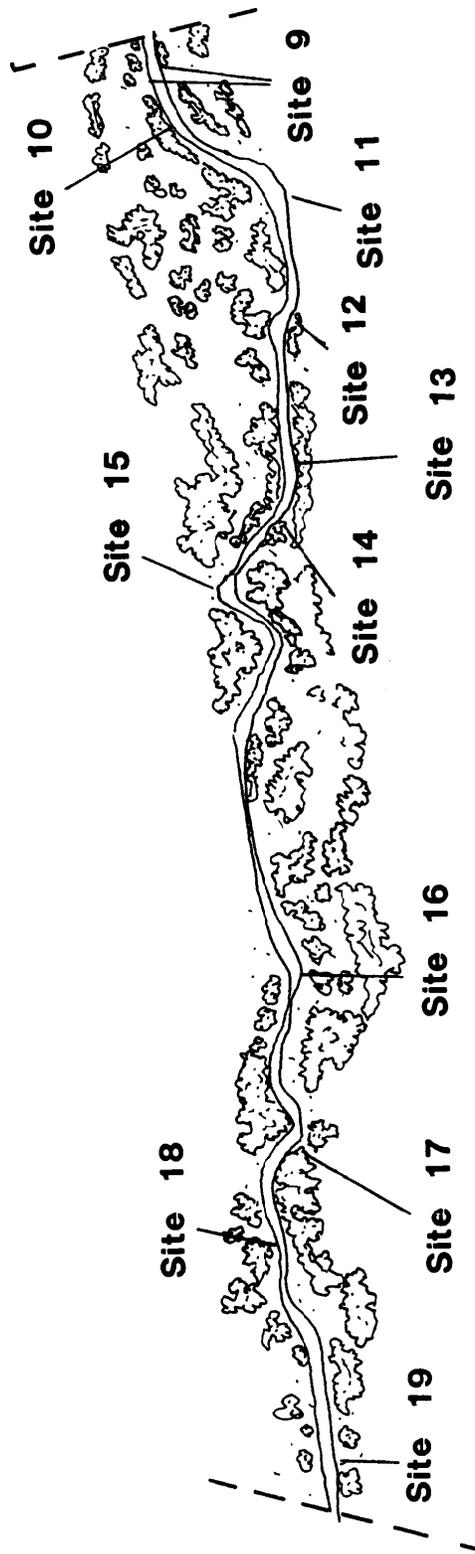
Table 4, Camas Creek upper reach stream channel and riparian zone inventory. Reach length was approximately 2,792 feet. Bank location referenced facing upstream.

Site	Location	Length (ft)	Height (ft)	Comments
3-1	Left bank	180	4	This area is below a diversion in the channel which forms a vegetated island; this site is an outside bend with active cutting and sloughing; stream bank materials are small and streamside vegetation is primarily sod forming grasses.
3-2	Left bank	75		This site is at a watering area associated with a corral area; the stream has recently uprooted several willows; there is silt being deposited in the slower water areas immediately below.
3-3	Right bank	95	4	active stream cutting below bridge; area has some vegetation in the form of willow and alder which may provide revetment in time.
3-4	Left bank	210	2-4	major section with active cutting; this is just above present bridge and the instability is threatening the bridge; larger bank rock materials
3-5	Right bank	48	2	small section of bank with intermittent sections of bank cutting; there is also some sloughing that has occurred
3-6	Right bank	46	5	This site has a section of bank that is cutting as a result of flows being deflected off of several channel bars; at present several large willows are providing some protection.



## West Fork Camas Creek Lower Reach

Figure 6. Lower reach of the West Fork Camas Creek with unstable sites.



## West Fork Camas Creek Upper Reach

Figure The upper inventoried reach of the West Fork of Camas Creek with 11 sites identified as unstable.

Table 5. West Fork Camas Creek stream channel and riparian zone inventory. Each reach was approximately 2,900 feet in length with the total inventoried area being 5,000 feet. Bank location referenced facing upstream.

Site Location	Length	Height	Comments
Lower Reach			
1-1 Mouth of the West Fork	204	9	left bank at mouth with substantial cutting; gravel deposition evident and resulting in 2-3 braided channels; bank materials generally small and easily eroded; limited riparian vegetation
1-2 Left bank	264	4-7	major unstable bank area on stream bend; area of cut is vertical in nature
1-3 Right bank	120	--	This site has an area of old channel cutting; recovery is in process and the bank is being influenced by a channel bar that is diverting the stream flow.
1-4 Left bank	27	10	cutting streambank at an approximate 45° angle; limited revetment being provided by old cottonwoods
1-5 Left bank	44	3	unstable area that is in the process of recovery; large fallen cottonwood is parallel to channel and is providing protection from livestock
1-6 Right bank	67	4	Bank is primarily gravel with very little vegetation.
1-7 Left bank	84	5	Banks are nearly vertical with minimal vegetation; stream is flow along toe of canyon slope.
1-8 Left bank	200	--	area of old cutting; stream flow is being diverted away from channel bank by gravel bar; area is slowly recovering.
1-9 Right bank	21	6	45° cut slope; channel braids through this area; some bedrock is present.
Left bank	58	--	

Table 5. (continued)

Site Location	Length (ft)		Height (ft)	Comments
1-10 Right bank	155	4-6		This site is comprised of both past and present cutting.
1-11 Left bank	12	5		This site is just upstream of 1-10 in a relatively straight section of stream; has been influenced by livestock crossing.
1-12 Left bank	18	--		Livestock and vehicle crossing area; very gentle slopes
1-13 Left bank	210	up to 25		significant section of unstable bank; 45-60° slope
1-14 Left bank	56	--		unstable site with much livestock use
1-15 Right bank	23	2-4		heavy livestock use area; much woody debris evident as a result of past beaver activity
1-16 Left bank	108	3		area of old channel cutting; bank is presently isolated away from stream flow; recovery taking place
1-17 Left bank	400-500	7		area of old channel cutting; only a portion of flow is influencing this area; some stability is returning
1-18 Right bank	300-500	5-7		site has isolated channel section that was cutting; recovery in progress; bedrock channel control evident
1-19 Right bank	8	8		small section with active cutting

Silver Creek also enters Camas Creek within the Meyers Cove area. The riparian zone associated with Silver Creek within this area is composed of dense willow stands and many areas of standing water resulting from beaver activity. Habitat conditions were considerably improved over those in main Camas Creek and the West Fork. Specific measurements were not taken as part of this assessment.

Enhancement Recommendations

Enhancement of instream and riparian zone conditions within the Meyers Cove area of Camas Creek will center on options and activities needed to increase riparian vegetation, increase streambank and channel stability, reduce recruitment of fine sediments, and to effect beneficial changes in instream rearing habitat. Three basic areas of enhancement will be addressed in detail and cost evaluations associated with the enhancement activities presented in Table 6. The three enhancement areas include (I) Multiple use resource coordination, (II) Riparian/streamside **zone** enhancement, and (III) Instream enhancement.

- I. Enhancement of multiple use resource coordination -- A major influence on existing riparian/streamside conditions within the Meyers Cove area has been past agricultural activity and present livestock grazing. Influences associated with recreational use of the area were also evident and include the effects of recreation pack stock and vehicle use. Coordination of multiple uses has been and continues to be a major concern of the Salmon National Forest. A focal point of Forest **planning** was identification of anadromous fish habitats and the decision to protect these resource areas during multiple use management.

Enhancement Activity 1 -- Isolate riparian/streamside zone from grazing areas by fencing (Fig. 8). This option would allow vegetation to become established in greater abundance. Direct bank disturbance would also be eliminated and habitat conditions would improve. It is anticipated that additional abundance of vegetation within the streamside zone would serve to lessen sediment delivery to the stream. cost estimates include materials, labor and administration.

<u>Inplace</u>	<u>Proposed</u>	<u>Total</u>
1.5 <b>mies</b>	<b>2.8 miles</b>	4.3 miles

costs:

**2.8 miles @ \$3,500 to \$5,000/mi. = \$ 9,500 to 14,000**

Table 6. Summary of enhancement activities and cost estimates associated with improvement of habitat in Camas Creek near Meyers Cove.

<u>Enhancement</u>	<u>Amount</u>	<u>cost</u>	<u>Comments</u>
<u>Multiple Use Coordination</u>			
Activity 1 Fencing	2.8 Miles	\$ 14,000	- Complete isolating all riparian zones from livestock, 1.5 miles in place
Activity 2 Coordination			
Water Development	2 Each	\$ 6,000	- Compensation for reduced access
Stream Crossings	2 Each	\$ 1,750	- Construct two fords with gravel revetment
Reseed Upland Meadows	200 Acres	\$ 16,000	- Improve forage to compensate for reduction in acres
<u>Riparian Areas</u>			
Activity 1 Bank Reshaping	700 to 1150 Feet	\$ 6,900	- Potential sites: Camas 1-4, 2-4, 2-5, 3-6; West Fork 1-1, 1-4, 1-9, 1-13, 1-17, 1-19
Activity 2 Reseeding Riparian Area			
Plant Seedlings	16 to 26 Acres	\$ 1,560	- Plant grasses and forbs to accelerate recovery
	0 Acres	\$ 6,800	- Accelerate recovery of large woody vegetation
Activity 3 Bank Stabilization	1150 to 1600 Feet	\$ 8,000	- Potential sites: Camas 1-2, 2-1, 2-3, 2-10-3-4, 3-5; West Fork 1-2, 1-3, 1-6, 1-8, 1-10
<u>Instream Habitat</u>			
Activity 1 Rock Placement	30 to 50 Each	\$ <u>2,500</u>	- Placement of large boulders for additional cover
		Total \$ <u>063,510</u>	

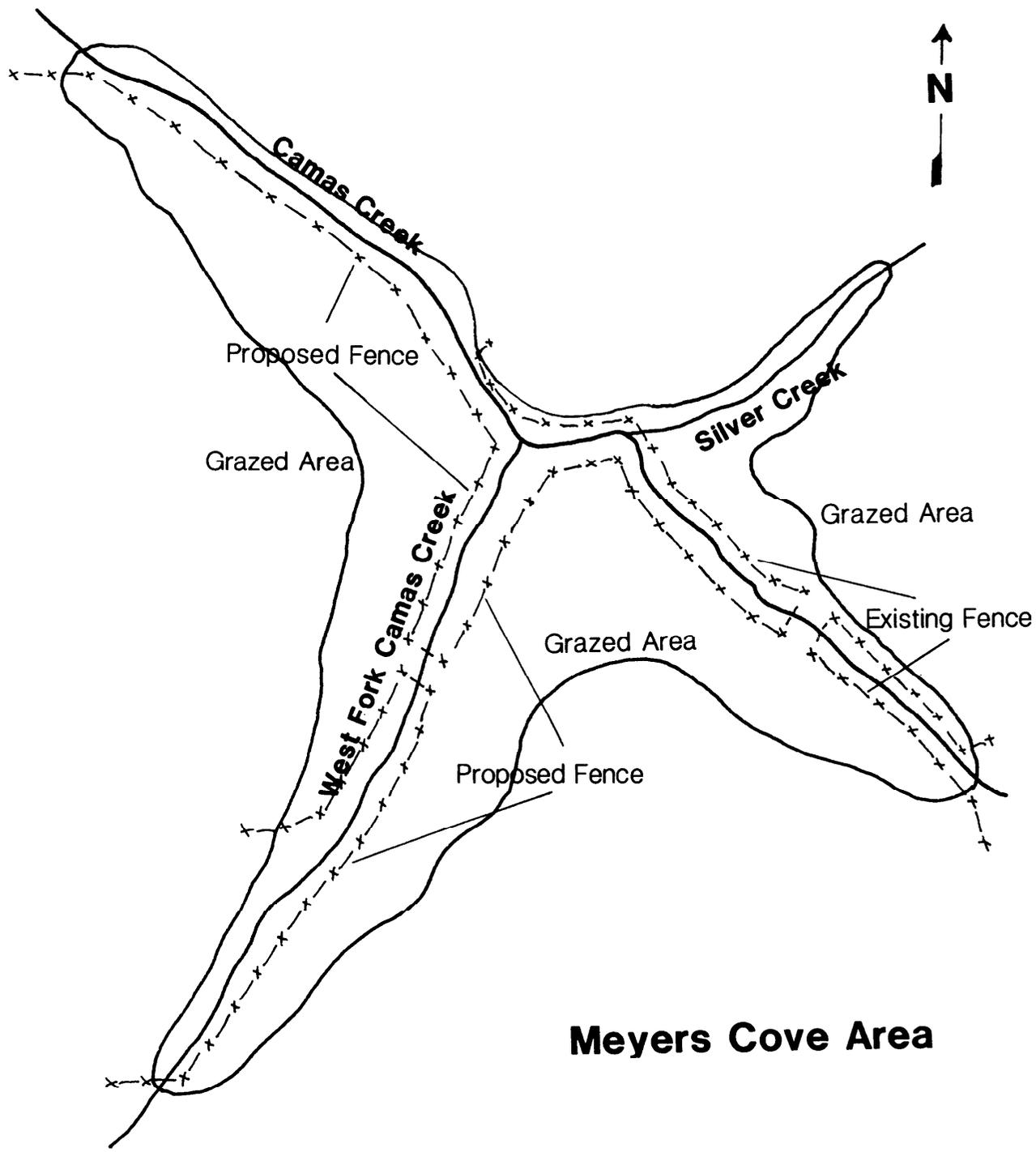


Figure 8. Proposed and existing fencing in the Meyers Cove area needed to coordinate grazing use and protect riparian resources.

Enhancement Activity 2 -- Coordinate riparian and stream enhancement with **allotment** use. In order to effect positive changes in livestock use of the Meyers Cove area, certain improvements, in addition to fencing, will be necessary.

1. Construct two water developments to compensate for lost access to Camas Creek and the West Fork. cost estimates include tanks, delivery lines and installation.

Cost \$3,000 ea. = \$ 6,000

2. Construct livestock crossings on West Fork Camas Creek and main Camas Creek to lessen bank damage and sediment delivery to the streams. Cost estimates include revetment, shaping and sloping and labor. = \$ 1,750

3. Reseed upland meadows with **more** productive grasses to compensate for forage in riparian acres that will not be available to grazing. Cost estimates include seed mix, land preparation and application, and administration.

**costs:**

200 acres treated @ \$50 to \$80/ac = \$16,000

II. Enhancement of riparian/streamside areas -- Isolation of the riparian area adjacent to the stream channels is expected to allow for a gradual recovery. This recovery is anticipated to be very slow requiring a considerable length of **time** for fishery benefits to be realized. Options identified for riparian enhancement were designed to expedite recovery, making fishery benefits available in a shorter time period.

Enhancement Activity 1 -- Reshaping and resloping of vertical channel and streambanks. It is anticipated that between 15 to 25 percent of the 4,605 feet of unstable banks could benefit. Reshaping would reduce sediment delivery and accelerate vegetative recovery. cost estimates include backhoe rental, travel time, setup and administration of activities.

**costs:**

Reshaping 700 to 1,150 ft. @ \$6/ft. = \$ 6,900

Enhancement Activity 2 -- Reseeding and seedling planting to expedite vegetation recovery. Replanting 30 to 50 percent of the 52+ acres enclosed within the fence would accelerate vegetative recovery and expedite enhancement of fishery values. Cost estimates include hand seeding, seed, and administration.

**costs:**

Reseeding 16 to 26 ac @ \$60/ac (\$45 seed/at and \$15 labor)	=	\$ 1,560
Planting seedlings (willow, cottonwood, alder) 10 ac @ 1,700 seedlings/at and \$.40/seedling. Three years anticipated to complete project.	=	\$ 6,800

Enhancement Activity 3 -- Stabilization of bank sections having excessive cutting or sloughing. It is expected that 25 to 35 percent of the 4,605 feet of unstable streambank could benefit from stabilization (i.e., rock or brush revetment, log structures, etc.).

**costs:**

Stabilizing 1,150 to 1,600 ft. @ \$5/ft.= \$ 8,000

III. Enhancement of Instream Cover -- Under optimal conditions a substantial amount of instream cover is provided to external sources. Large organic debris is added as trees and brush enter the stream, root masses provide cover in undercut areas and stream cover is provided by the vegetation canopy. It is anticipated that these habitat components will increase as the relative health of the riparian zone improves. Rearing habitat is also provided by large substrate materials.

Enhancement Activity 1 -- Increase rearing cover by placement of large rocks.

**costs:**

Add 30 to 50 large boulder-size rocks @ \$50/rack	=	\$ 2,500
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Total Project Cost:

Estimated Maximum Cost = \$70,010

The Forest Service at present has contributed between \$15,000 to \$20,000 toward enhanced coordination and improved riparian and fish habitat in the Meyers Cove area. Another \$12,000 is budgeted for additional work during this fiscal year (FY 1986). Participation in all future enhancement options under the Columbia River Basin Fish and Wildlife Program is encouraged. Cooperative funding of the proposed enhancement will greatly improve the probability of success and expedite efforts for recovery of anadromous fish within the Middle Fork of the Salmon River.

#### Fishery Benefits

The benefits derived from accomplishment of the proposed enhancement items and the influence on anadromous salmon and steelhead production potentials are presented in Table 7. This information was taken from the U.S. Fish and Wildlife study (FWS) which was previously footnoted. The benefits were assumed to increase habitat utilized equally by chinook salmon and steelhead trout.

Greater benefits are anticipated under a combined implementation of all enhancement activities. These benefits would project an increase of 76 returning adult steelhead and 128 returning salmon. These increases would be about 77 percent greater than estimated returns from the Meyers Cove habitat in its present state.

The economic returns generated from the production increase can be calculated in several different ways. The initial analysis of economic values completed by FWS estimated a net average annual worth increase of approximately \$58,000 associated with the enhancement. This amount was obtained using escapement values of \$271 and \$294 for steelhead trout and chinook salmon, respectively.

A benefit-cost analysis using a 4 percent discount rate would yield a 12.94 B/C ratio when carried for 25 years or 16.4 if the project life was extended to 40 years. The analysis was based on a one-time expenditure with benefits beginning in subsequent years. A 9 percent discount rate would yield 8.14 and 8.91 respectively, for the two project lifetimes. Under any of the analyses, the project would appear to have merit because of high potential returns.

Table 7. Predicted increases in steelhead trout and chinook salmon as a result of habitat enhancement in the Meyers Cove area of Camas Creek.

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Condition	Smolts		Steelhead Adults		Chinook Adults	
	Steelhead	Chinook	Total	Enhanced	Total	Enhanced
Present	5,966	31,959	98	--	166	--
Enhanced	4,586	24,570	174	76	294	128

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#### FOOTNOTES

1. Camas Creek from Hammer Creek to South Fork.
2. Idaho Department of Fish and Game, personal communication, 1985.
3. 1982. Lower Snake River Enhancement Study Stream Report. Camas Creek, 11 pp.

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