Section 6 - Resident fish

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6. Resident Fish

6.1 Executive Summary

The multi-year implementation plan provides a framework for resident fish restoration efforts in the Columbia Basin -- that includes ecological objectives and a schedule for key activities. The framework identifies the work that needs to be accomplished in the current year and activities planned for future years. Fish and wildlife agencies and tribes will use this information to develop detailed annual work plans that can be used to solicit project proposals. This multi-year planning process will help ensure that all resident fish projects meet clear restoration objectives, are part of a comprehensive strategy, and are based on the best existing scientific knowledge. Columbia Basin resident fish comanagers, under the auspices of the Columbia Basin Fish & Wildlife Authority (CBFWA), are working with Northwest Power Planning Council (Council) staff to develop a multi-year implementation plan for resident fish.

The resident fish plan is one part of a comprehensive long-term integrated implementation plan for all Fish & Wildlife enhancement & recovery activities within the region. Using an ecosystem framework, the resident fish managers in conjunction with Council staff collected baseline information on subregion/subbasin summary templates. The information -- including management objectives, strategies, critical assumptions, performance standards, and budget priorities -- was incorporated into a resident fish database. This computer database provides a tool for systematic tracking and analysis of long-term project implementation with respect to alignment with strategic goals and objectives. A systems approach can be used to view the resident fish implementation planning process in a holistic context that incorporates the dynamic interaction of society, the biological system, and the environment (Figure 6-1).

The **goal of the resident fish program** is to promote the long term viability of native fish in native habitats where possible, while recognizing that in areas where habitat has been irrevocably changed from the native ecosystem we can only protect and enhance the ecosystem that remains. Long term viability of native and non-native fish populations will achieve conservation, consumptive and non-consumptive management objectives in the Columbia River Basin utilizing two major themes. First, resident fish mitigation efforts to address resident fish losses due to human caused impacts, including the construction and operation of the hydrosystem. Second, resident fish substitution efforts to address the loss of salmon and steelhead in those areas permanently blocked to anadromous fish as a result of the construction and operation of hydroelectric dams.

The overall management strategies for resident fish are:

- Protect, maintain, and enhance native fish populations and their habitats.
- Protect, maintain, and enhance non-native fish populations in waters unsuitable for native species.
- Establish, maintain, and enhance fish assemblages (both native and non-native species complexes) which maximize ecosystem productivity and stability -- while providing sustainable consumptive and non-consumptive resident fisheries.
- Replace lost fisheries with the appropriate native or non-native resident fish, depending on type and availability of habitat, food, and other species.

- Conduct research to better understand critical uncertainties, and to determine the best methods for resident fish protection and enhancement.
- Monitor and evaluate actions designed to enhance resident fish populations in order to maximize the cost-effectiveness of the overall resident fish program, and to maximize basin-wide resident fisheries opportunities.

Resident fish managers have identified management issues by subregion, subbasin, and fish population (see Section 6.7). The following points provide a synopsis of the major policy issues:

- Impacts of the **operation of the Federal Columbia River Power System (FCRPS)** -- including flow augmentation to benefit anadromous salmon as mandated by the NMFS FCRPS Biological Opinion -- on resident fish species.
- Balance between the flow augmentation regimes to benefit ESA-listed Snake River salmon and ESA-listed Kootenai River white sturgeon; specifically the detrimental impacts of a second flow peak in the Kootenai River in August (two periods of de-watering) on the biological system -- especially potential stranding and food-web effects on juvenile sturgeon[1].

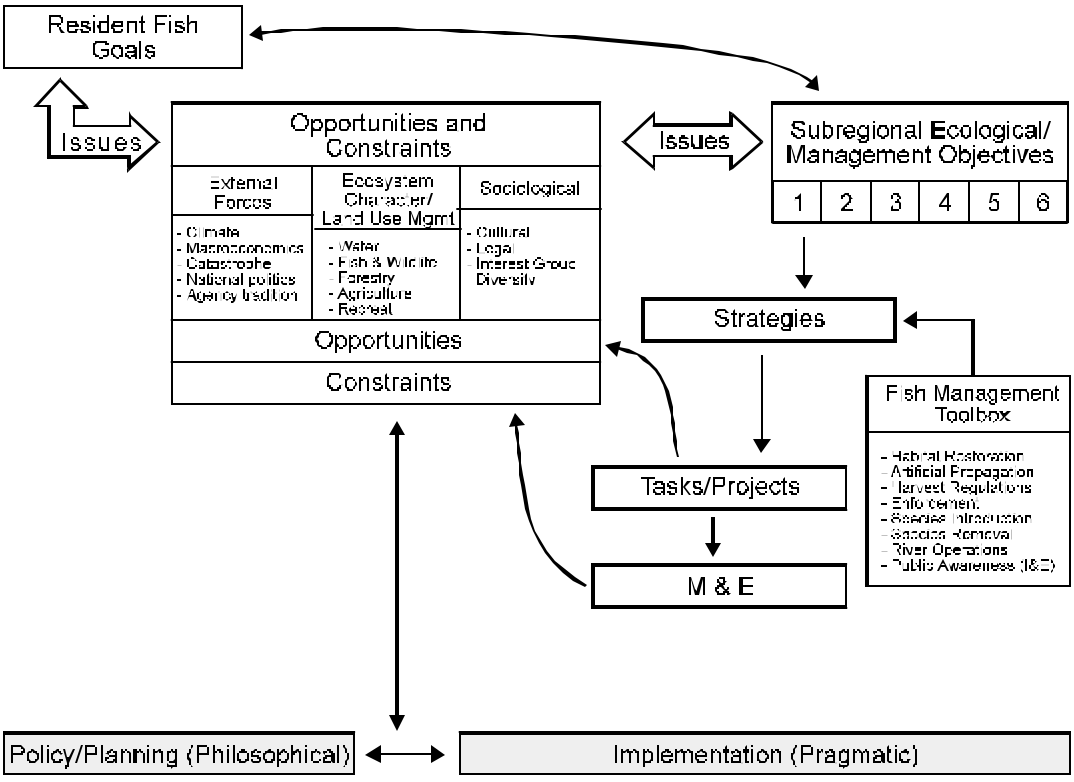

Figure 6- 1 Systems view of resident fish planning and implementation process

[1] August flow regimes have not been identified by the USFWS as a conflict between the USFWS' Biological Opinion for Kootenai River white sturgeon and the NMFS' Biological Opinion for Snake River salmon (Fred Olney, Memo dated November 21, 1996).

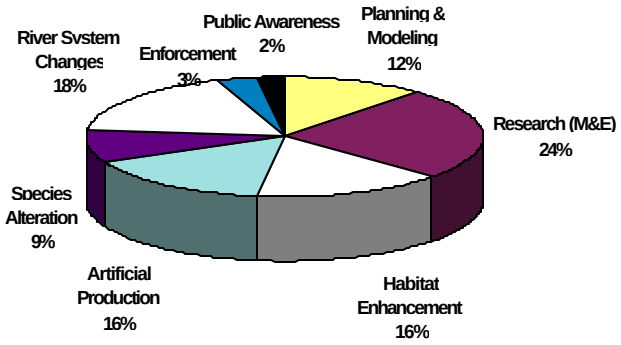

Figure 6- 2 Composition of 128 specific strategies for enhancement of resident fish

- Operation and modification of specific mainstem dam projects (e.g., river flows, gas saturation, and reservoir level regimes) according to criteria -- e.g., Biological and Integrated Rule Curves, water quality standards, and flow criteria -- that will mitigate the impacts on resident fish species.
- **Loss assessments** of anadromous and resident fish populations and their habitats, depleted or extirpated by hydrosystem development, need to be completed in all subregions.
- **Mitigation** for loss of resident fish species production due to hydrosystem construction, operations and associated habitat degradation[2].
- **Watershed restoration** as mitigation for the degradation of critical habitat of several resident fish and invertebrate species (e.g., bull trout, redband trout, westslope cutthrout trout, kokanee, mountain & pigmy whitefish, burbot, and snails) across most subregions and subbasins.
- **Watershed protection** to ensure the persistence of existing resident fish populations.
- **Substitution** of resident fish species (native and exotic[3] species) for losses of anadromous salmonid production due to migration blockage[4].
- Increased **fisheries** -- values & opportunities for both sport fisheries and Tribal ceremonial & subsistence fisheries guaranteed by Treaty Rights and Executive Orders.
- **Enforcement** of federal, tribal and state laws pertaining to fish habitat (e.g., land and water management) and fishing regulations -- for the protection of resident fish populations.

[2] Mitigation as defined by the Power Act and the Council's Program.
[3] In this document the word "*exotic*" is used as an antonym of "*native*" and a synonym of "*non-native*"; exotic is defined as "a fish (species or population) that did not originate and evolve in a given geographic area -- such as the Columbia Basin or a specific subregion or subbasin" (see the Glossary, Appendix 13).
[4] Substitution as defined by Section 10.8 of the Council's Program

Table 6- 1 Native and introduced resident fish species targeted for management actions under the Fish and Wildlife Program

Species targeted for management action in a subregion are denoted with a 'P'. Mitigation actions are denoted with an 'M'. Substitution actions are denoted with as 'S'.

Species	Genus Species	ESA Status[1]	Subregion[2]					
			LCR	LMC	UMC	UCR	LSR	USR
Sturgeon	**Acipenseridae**							
White sturgeon[3]	Acipenser transmontanus		P	PM	PM	PMS	PM	PM
Kootenai white sturgeon[3]	A. transmontanus spp.	E				PM		
Salmon & Trout	**Salmonidae**							
Bull trout[3]	Salvelinus confluentus	W	PM	PM	P	PMS	PM	PM
Red Band / rainbow trout[4]	Oncorhynchus mykiss spp.	R	P	PM	PM	PMS	PM	PM
Westslope cutthroat trout[4]	Oncorhynchus clarki lewisi	d			P	PMS	PM	P
Yellowstone cutthroat trout[4]	Oncorhynchus clarki bouvieri	d						PM
Lahontan cutthroat trout[5]	Oncorhynchus clarki henshawi	T				PS		P
Coastal cutthroat trout[3]	Oncorhynchus clarki clarki		P	P				
Brown trout[5]	Oncorhynchus trutta			P	P	P	P	P
Brook trout[5]	Salvelinus fontinalus			P	P	PS	P	P
Lake trout[5]	Salvelinus namaycush				P	P	P	P
Kokanee[4]	Oncorhynchus nerka spp.		P	P	P	PMS	PM	P
Mountain whitefish[3]	Prosopium williamsoni		P	P	P	P	P	P
Pigmy whitefish[3]	Prosopium coulteri					P	P	P
Lake whitefish[5]	Coregonus clupeaformis				P	P	P	P
Arctic grayling[4]	Thymallus arcticus	d				P	P	P
Codfish Family	**Gadidae**							
Burbot[3]	Lota lota	d			P	PM		
Perch Family	**Percidae**							
Yellow perch[5]	Perca flavescens		P	P	PS	PS	P	P
Walleye[5]	Stizostedion vitreum vitreum		P	P	PS	PS		
Sunfish Family	**Centrarchidae**							
Largemouth bass[5]	Micropterus salmoides		P	P	PS	PMS	P	P
Smallmouth bass[5]	Micropterus dolomieui		P	P	PS	P	PMS	P
Crappie[5]	Pomoxis spp.		P	P	PS	P	P	P
Pike Family	**Esocidae**							
Northern pike[5]	Esox lucius					P		
Catfish Family	**Ictaluridae**							
Channel catfish[5]	Ictalurus punctatus		P	P	PS	P	P	P

[1]E = endangered, W = warranted but precluded, R = status review, d = depleted, T = threatened.

[2]LCR = Lower Columbia River and tributaries downstream from Bonneville Dam; LMC = Mid-Columbia River and tributaries between Bonneville and ____ Dams; UMC = Mid-Columbia River and tributaries between ____ and ____ Dams; UCR = Upper Columbia River and tributaries upstream from _____ Dam; LSR = Lower Snake River and tributaries downstream from Hells Canyon Dam; USR = Upper Snake River and tributaries upstream from Hells Canyon Dam

[3] Native species throughout basin.

[4] Native species in some areas of the basin and introduced in other portions.

[5] Introduced species throughout basin.

Management objectives for resident fish restoration, and the corresponding strategies and actions, are planned and implemented within an ecosystem framework (See Section 6.5). For purposes of managing resident fish populations, the Columbia Basin is divided into six subregions, each of which is further subdivided several subbasins, based on hydrologic units (refer to the GIS map at the end of the Executive Summary). Resident fish managers have identified fish populations (i.e., species within a management unit) that are targeted for restoration actions (Table 6.1). Native species that are given top priority for mitigation actions throughout all or most of their range are white sturgeon, Kootenai River white sturgeon, bull trout, and redband trout. In specific subregions mitigation is planned for westslope cutthroat trout, Yellowstone cutthroat trout, kokanee, mountain whitefish, arctic grayling, and burbot. Substitution is planned for rainbow trout, yellow perch, smallmouth bass, and largemouth bass in specific subbasins -- in areas above dams that have blocked anadromous fish migrations.

The total historical funding of the resident fish program, during 1978-1994 was about $41.7 million. Of this total $26.491 million (63.5%) was spent on mitigation projects and $15.212 million (36.5%) was spent on resident fish substitution (Figure Exec-3). In recent years, the Council has given substitution a high priority (refer to Section 10.8 of the Program).

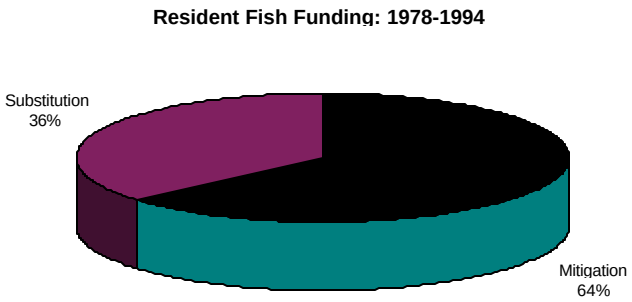

Figure 6- 3 Proportion of the 1978-1994 resident fish historical budget ($41.7 million) addressing mitigation versus substitution projects

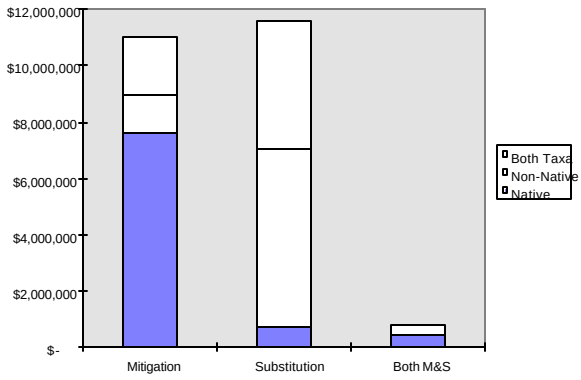

Figure 6- 4 Proportion of the total FY1997 resident fish budget ($23 million) addressing resident fish species groups within the mitigation and substitution categories

The total requested resident fish budget for FY 1997 (about $23.5 million) is comprised of 47.1% mitigation projects and 49.5% substitution projects; another 3.4% of the projects relate to both categories. The breakdown of the total budget request for FY 1997 -- according to both project type and fish species group is illustrated in Figure Exec-4. Projects with native target species comprise 69% of the budget for mitigation, while projects with non-native target species represent about 55% of the budget for substitution.

Budget projections for resident fish first priority projects in six subregions of the Columbia River Basin, 1997-2006 are presented in Table 6.2. The total currently funded budget of $15.5 million for FY 1997

is distributed among the subregions as follows: Lower Columbia River, 0.3%; Lower Mid-Columbia River, 5%; Upper Mid-Columbia River, 5%; Upper Columbia River, 48%; Lower Snake River, 10%; Upper Snake River, 31%.

Table 6- 2 Multi-year resident fish restoration budget projects based on total cost of all planned FY 1997 projects

Budget Estimate Subtotals -- by Subregion	1997			Out-Year Budget Projections[5]				
	Funded	Un-funded	Total	1998	1999	2000	2001	2002
Lower Columbia	$48	$16	**$64**	$66	$68	$70	$72	$74
Lower Mid-Columbia	$844	$1,650	**$2,495**	$2,570	$2,647	$2,726	$2,808	$2,892
Upper Mid-Columbia	$765	$0	**$765**	$788	$811	$836	$861	$887
Upper Columbia	$7,479	$5,314	**$12,794**	$13,178	$13,573	$13,980	$14,400	$14,832
Lower Snake	$1,609	$279	**$1,889**	$1,945	$2,004	$2,064	$2,126	$2,190
Upper Snake	$4,741	$751	**$5,492**	$5,657	$5,826	$6,001	$6,181	$6,367
Total	**$15,486**	**$8,011**	**$23,498**	**$24,203**	**$24,929**	**$25,677**	**$26,447**	**$27,240**
All figures in thousands of dollars								

[5] Budget projections for 1998-2002 are based on annual increase of 3 percent from the baseline of all planned resident fish projects (i.e., currently funded + unfunded).

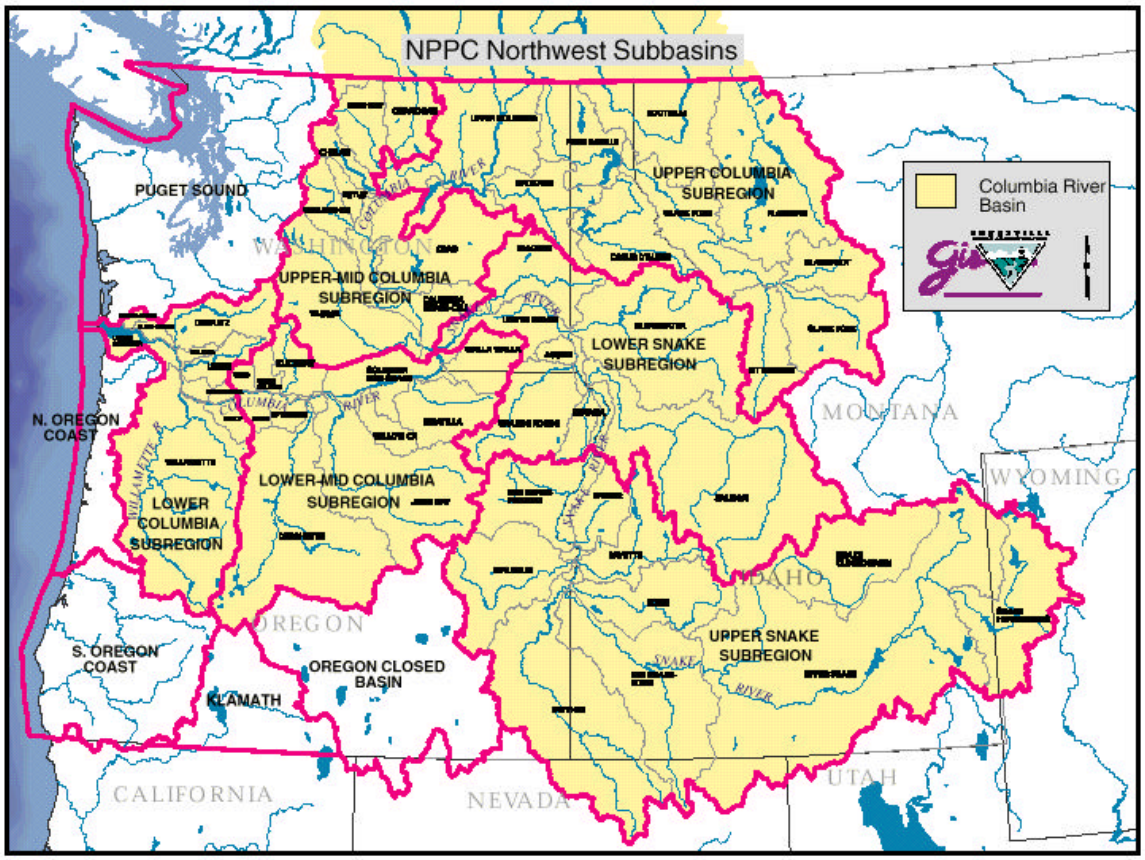

Figure 6- 5 GIS map of the Columbia Basin illustrating the six subregions as defined by the Northwest Power Planning Council, and the anadromous and non-anadromous subbasins

6.2 Introduction

Resident fish are freshwater fish that live and migrate within the rivers, streams and lakes of the Columbia River Basin, but are not anadromous. Resident fish exist throughout the Columbia Basin and are particularly important in areas where anadromous fish runs are blocked by natural or manmade obstructions.

This plan was developed by regional resident fish managers to provide a framework for identifying, selecting, and implementing projects which address resident fish responsibilities related to development and operation of the Federal Columbia River Power System. Resident Fish responsibilities generally fall into two categories identified in the Council's Fish and Wildlife Program: 1) protection, mitigation, and enhancement of native or introduced species; and 2) substitution for loss of anadromous fish production using endemic and exotic fish.

The Council’s program specifically cites the following native resident species as having special interest for restoration: (1) white sturgeon, including the Kootenai River population, (2) kokanee (native and exotic), (3) bull trout, (4) burbot, (5) redband trout, and (6) westslope cutthroat trout. In addition to

these species, the proposed resident fish projects for FY 1997 include the following categories as target fish: whitefish, Yellowstone cutthroat trout, Lahontan cutthroat trout, rainbow trout, adfluvial rainbow trout, brook trout, brown trout, lake trout, crappie, largemouth bass, smallmouth bass, yellow perch, walleye, and "non-game fish". Resident fish species targeted for management action in the Columbia Basin are listed by common and scientific names in Table 6.1.

This plan includes general goals for resident fish management throughout the region, species and subregion- or subbasin-specific management objects, strategies for achieving objectives, critical hypotheses, and performance measures. In addition, this plan describes policy issues which must be considered before implementation. Finally, the plan identifies resident fish projects funded in FY97 and the schedule proposed by project implementors for project completion.

6.3 Approach

This plan was developed based on a synthesis of pertinent statutes, rules, policies, and plans including the Northwest Power Planning Council Columbia River Basin Fish and Wildlife Program; Endangered Species Act Biological Opinions and draft salmon and sturgeon recovery plans; Tribal salmon restoration and resident fish management and mitigation plans; and pertinent material for the States of Oregon, Washington, Idaho, and Montana State (see preceding section for more complete description).

Resident fish co-management meetings have been conducted throughout the Columbia Basin to coordinate long term implementation plans and activities. At these meetings, the Northwest Power Planning Council staff has been collecting pertinent information pertaining to 5-year planning and implementation -- using both "*top-down*" and "*bottom-up*" approaches. The *top-down* approach involves the identification, by all relevant resident fish managers, of high priority management issues -- by subregion, subbasin and species of concern. The bottom-up approach consists of compilation of empirical data on actual management actions into a regional computerized database on resident fish project implementation. Data were summarized using subregional templates, pertaining to the management goals, objectives, and strategies with reference to individual projects (ongoing and new) planned for implementation in FY 1997. The resident fish database provides a tool for systematic tracking and analysis of long-term project implementation with respect to alignment with strategic goals and objectives.

We generally define "management objectives" consistent with the Science Review Team definition:

> Management objectives should describe the direction and purpose of fish and wildlife recovery efforts. They should address the question of why recovery programs consist of a given set of strategies and actions. They describe the desired biological state for the watershed in regard to ecosystem characteristics, defining species and management actions. Watershed in this context refers to the Columbia River Basin (including the mainstem rivers as a system), subregions of the Basin (e.g. the Snake River Basin, mid-Columbia, lower Columbia) and individual subbasins. These are hierarchically nested such that there should be vertical consistency between individual subbasin objectives, subregional objectives and management objective for the entire Basin. Different management objectives and ecological relationships

can be accommodated by simply moving up or down levels from the Basin to the subbasin levels. Development of management objectives will be an iterative process that cycles between what is desired for watersheds and what is possible given ecological, social and economic constraints (SRT, August 16, 1996).

The Science Review Team reserved the term "biological objective" for use as a legal description of management objectives which have been approved and mandated for implementation by the Northwest Power Planning Council. In addition, the Science Review defined "ecological objectives" as the type of biological or physical changes or conditions needed to achieve the management objective. Where management objectives are typically defined in terms of numbers or pounds of fish, ecological objectives can also include habitat characteristics, correction of identified problems, and biological conditions such as survival changes, diversity and productivity. Ideally, ecological objectives can be quantitative indices relating to needed survival changes, return per spawner or other indices of ecological change, or simply qualitative assessments of ecological change or condition needed to meet specific management objectives. In our attempt to identify management objectives, we sometimes substituted ecological objectives where target levels where unclear.

This plan lists management objectives, strategies, critical hypotheses, and performance measures by subregion. Objectives identify species and subregion areas of interest. Strategies, critical hypotheses, and performance measures are organized by subregion area. Biological objectives (those management objectives adopted into the Fish and Wildlife Program) are designated with footnotes. Although we have organized objectives by species, we recognize the importance of managing species assemblages within particular watersheds rather than single species management. The subregion will be focused on ecosystem management over the next five years but is also concentrating on fish populations that are threatened.

6.4 Detailed Goals And Objectives

6.4.1 Basin-wide Goals

The desired outcome of the resident fish program implementation is generally to restore the health and viability of non-anadromous fish populations to achieve conservation, consumptive and non-consumptive management goals in the Columbia River Basin.

Specific goals include:

1. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally-regulated and federally-operated hydropower projects.
2. Ensure the continued persistence, health, and diversity of existing native resident fish species by reducing or removing impacts caused by habitat degradation (including water quality, water quantity, and hydropower development), competition and or hybridization with exotic species, and over harvest (direct and incidental).

3. Restore native resident fish species (subspecies, stocks and populations) to near historic abundance throughout their historic ranges where habitats exist and where habitats can be feasibly restored.
4. Maintain and restore healthy ecosystems and watersheds which preserve functional links among biota to ensure the continued persistence, health and diversity of all species including game fish species, nongame fish species, and other organisms.
5. Increase opportunities for and administer consumptive and nonconsumptive resident fisheries for native, introduced, wild, and hatchery-reared stocks that are compatible with the continued persistence of native resident fish species and their restoration to near historic abundance (includes intensive fisheries within closed or isolated systems).

6.4.2 Lower Columbia Subregion

6.4.2.1 Subbasin Tributaries

A. Sensitive native populations (bull trout, rainbow trout, etc.),

Objectives:

1. Maintain and restore population productivity reduced by hydropower development and operations to healthy levels which provide opportunities for consumptive and nonconsumptive uses of sensitive native populations or other species whose use is constrained to protect sensitive populations in subbasin tributaries.
2. Ensure population levels of sensitive native fish in subbasin tributaries are above minimum viable population sizes which maintain adaptability and genetic diversity, and maximize probability of survival.

   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations

Strategies:

1. Identify and estimate the status of populations and groups of populations of sensitive native fish species with unique genetic characteristics in subbasin tributaries.
2. Identify factors limiting each population, critical habitats or conditions which limit life stages, and population sizes corresponding to management objectives (i.e. biological objectives) for sensitive native fish populations in subbasin tributaries.
3. Select and implement measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore connectivity between isolated subpopulations, and meet biological objectives for sensitive native fish populations in subbasin tributaries.
4. Monitor the status of sensitive native fish populations in subbasin tributaries to evaluate the effectiveness of restoration efforts and to determine when protection and restoration goals have been achieved.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of sensitive native populations in subbasin tributaries.
2. Sensitive native populations in subbasin tributaries can be protected and restored by habitat improvement measures.
3. Habitat improvement measures for anadromous species are insufficient for meeting sensitive native resident species objectives in subbasin tributaries.
4. Effective and efficient implementation of habitat restoration measures for sensitive native fish populations in subbasin tributaries must be predicated on assessments of population distribution and status.

Performance Measures:

1. Distribution, abundance, size composition, genetic characteristics, and habitat associations of sensitive native species in subbasin tributaries.

Related Projects:

9405300 Bull trout assessment - Willamette/McKenzie (in progress)

6.4.3 Lower Mid-Columbia Subregion

6.4.3.1 Mainstem

A. White sturgeon

Objectives:

1. Restore abundance and productivity of naturally-produced white sturgeon to the maximum extent allowable by existing habitat capacity of mainstem reservoirs given reductions caused by hydropower development and operations.
2. Restore long-term sustainable yield of white sturgeon sport and tribal fisheries in mainstem reservoirs given stable brood stock population levels that can be maintained under conditions created by hydropower system development and operations.
3. Identify and consider additional mitigation if abundance and yield of naturally-produced white sturgeon in mainstem reservoirs cannot be restored to levels sustainable under conditions existing before hydropower system development and operation.

   Quantitative objective: sustainable annual harvest or use equivalent to 5 kg/ha/yr for white sturgeon

Strategies:

1. Configure and operate the hydropower system consistent with the salmonid recovery plan, to maximize spawning and rearing success of white sturgeon populations in mainstem reservoirs.
2. Supplement depleted populations of white sturgeon in mainstem reservoirs upstream from Bonneville Dam by transplanting naturally-produced juveniles from below

Bonneville Dam until changes in configuration and operation of the hydropower system are completed.

3. If abundance of naturally-spawning white sturgeon cannot be restored to pre-impoundment levels in mainstem reservoirs, supplement populations with artificially-produced fish where risks to naturally spawning populations are minimal.
4. Monitor population status of white sturgeon to evaluate effectiveness of restoration efforts and conduct research as needed to ensure success of restoration efforts in mainstem reservoirs.
5. Regulate harvest of white sturgeon for each mainstem reservoir population based on estimated abundance and exploitation rates which provide optimum sustainable yields.

Critical Hypotheses:

1. Natural production of white sturgeon in impounded reaches and reservoirs is less than what it was before development and operation of the hydropower system.
2. White sturgeon rearing habitat in many impoundments is underseeded because of reductions in spawning habitat caused by hydropower system development and operations.
3. White sturgeon production in impoundments can be significantly enhanced by some combination of spawning and rearing habitat restoration (hydrosystem configuration operation) and supplementation (transplants and artificial propagation).
4. Naturally spawning white sturgeon populations in impoundments can be preserved and optimum rates of production can be restored while concurrently maintaining limited tribal and recreational fishery opportunities.

Performance Measures:

1. Stable white sturgeon abundance, biomass, age composition, and annual harvest at target levels over a period corresponding to one generation.

Related Projects:

8605000 White sturgeon productivity, status, and habitat requirements (in progress)

B. Sensitive native species (bull trout, coastal cutthroat trout, etc.)

Objectives:

1. Ensure that sensitive native population levels in mainstem reservoirs are above minimum viable population sizes which maintain adaptability and genetic diversity, maximize probability of survival, and do not constrain consumptive and nonconsumptive uses of other species to protect sensitive populations.

   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations

Strategies:

1. Identify and monitor the status of sensitive native fish populations in mainstem reservoirs to evaluate the effectiveness of restoration efforts and to determine when protection and restoration objectives have been achieved.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of sensitive native populations in mainstem reservoirs.
2. Sensitive native populations in mainstem reservoirs can be protected and restored with similar measures to those which restore normative river functions to benefit anadromous species and white sturgeon.

Performance Measures:

1. Detailed habitat protection and restoration plans for sensitive native species in mainstem reservoirs.

Related Projects:

C. Introduced gamefish (walleye, bass, crappie, catfish, etc.)

Objectives:

1. Protect and enhance native wild stocks of anadromous and resident species as a higher priority than introduced gamefish species in mainstem reservoirs.
2. Reduce or eliminate detrimental effects of existing introduced gamefish species on sensitive native species where feasible in mainstem reservoirs.
3. Provide only those opportunities for consumptive and nonconsumptive uses of introduced gamefish populations which do not produce substantial negative effects on sensitive native species in mainstem reservoirs.

   Quantitative objective: optimum sustained yield of walleye, bass, crappie, and catfish conditional on no native species effects

Strategies:

1. Conduct only those assessments of introduced gamefish populations in mainstem reservoirs needed to identify and minimize effects on sensitive native species.
2. Implement hydropower system configurations and operations which reduce numbers or effects of introduced gamefish species in mainstem reservoirs on sensitive native species.
3. Obtain stock assessment information appropriate to optimizing management of introduced gamefish species in mainstem reservoirs incidental to work focused on other problems. (for instance, predation or sturgeon restoration evaluations).

Critical Hypotheses:

1. Eradication of introduced gamefish species from mainstem reservoirs is not feasible or desirable in all cases.
2. Opportunities exist for management of introduced gamefish in mainstem reservoirs which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.

Performance Measures:

1. Angler effort, angler catch rate, and size-specific harvest of introduced gamefish in mainstem reservoirs.

Related Projects:

900770 Predator control program evaluation (anadromous)

6.4.3.2. Subbasin Tributaries

A. Sensitive native populations (bull trout, rainbow trout, etc.),

Objectives:

1. Maintain and restore population productivity reduced by hydropower development and operations to healthy levels which provide opportunities for consumptive and nonconsumptive uses of sensitive native populations or other species whose use is constrained to protect sensitive populations in subbasin tributaries.
2. Ensure population levels of sensitive native fish in subbasin tributaries are above minimum viable population sizes which maintain adaptability and genetic diversity, and maximize probability of survival.

   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations

Strategies:

1. Identify and estimate the status of populations and groups of populations of sensitive native fish species with unique genetic characteristics in subbasin tributaries.
2. Identify factors limiting each population, critical habitats or conditions which limit life stages, and population sizes corresponding to management objectives (i.e. biological objectives) for sensitive native fish populations in subbasin tributaries.
3. Select and implement measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore connectivity between isolated subpopulations, and meet biological objectives for sensitive native fish populations in subbasin tributaries.
4. Monitor the status of sensitive native fish populations in subbasin tributaries to evaluate the effectiveness of restoration efforts and to determine when protection and restoration goals have been achieved.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of sensitive native populations in subbasin tributaries.
2. Sensitive native populations in subbasin tributaries can be protected and restored by habitat improvement measures.
3. Habitat improvement measures for anadromous species are insufficient for meeting sensitive native resident species objectives in subbasin tributaries.
4. Effective and efficient implementation of habitat restoration measures for sensitive native fish populations in subbasin tributaries must be predicated on assessments of population distribution and status.

Performance Measures:

1. Distribution, abundance, size composition, genetic characteristics, and habitat associations of sensitive native species in subbasin tributaries.

Related Projects:

9405400	Bull trout studies in Central and NE Oregon (in progress)
5513600	Study and evaluate bull trout populations in north shore tributaries of the Columbia River in the Bonneville Pool (proposed)
5506800	Resident fish habitat enhancement above McKay Reservoir in the Umatilla Basin
9506000	Umatilla River riparian corridors: Squaw Creek watershed project

B. Introduced gamefish (bass, catfish, etc.)

Objectives:

1. Protect and enhance native wild stocks of anadromous and resident species as a higher priority than introduced gamefish species in subbasin tributaries.
2. Reduce or eliminate detrimental effects of existing introduced gamefish species on sensitive native species where feasible in subbasin tributaries.
3. Provide only those opportunities for consumptive and nonconsumptive uses of introduced gamefish populations which do not produce substantial negative effects on sensitive native species in subbasin tributaries.

   Quantitative objective: optimum sustained yield of bass, catfish, etc. conditional on no native species effects

Strategies:

1. Conduct only those assessments of introduced gamefish populations in subbasin tributaries needed to identify and minimize effects on sensitive native species.
2. Implement hydropower system configurations and operations which reduce numbers or effects of introduced gamefish species in subbasin tributaries on sensitive native species.

3. Obtain stock assessment information appropriate to optimizing management of introduced gamefish species in subbasin tributaries incidental to work focused on other problems. (for instance, predation or sturgeon restoration evaluations).

Critical Hypotheses:

1. Eradication of introduced gamefish species from subbasin tributaries is not feasible or desirable in all cases.
2. Opportunities exist for management of introduced gamefish in subbasin tributaries which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.
3. Conservation objectives for other native resident species in subbasin tributaries will be met by habitat-based strategies addressing key species specifically targeted for action.

Performance Measures:

1. Distribution, abundance, size composition, genetic characteristics, and habitat associations of sensitive native species in subbasin tributaries.
2. Detailed habitat protection and restoration plans for sensitive native species in subbasin tributaries.

Related Projects:

None

6.4.4 Mid-Columbia Subregion

6.4.4.1 Mainstem

A. White sturgeon

Objectives:

1. Restore abundance and productivity of naturally-produced white sturgeon to the maximum extent allowable by existing habitat capacity of mainstem reservoirs given reductions caused by hydropower development and operations.
2. Restore long-term sustainable yield of white sturgeon sport and tribal fisheries in mainstem reservoirs given stable brood stock population levels that can be maintained under conditions created by hydropower system development and operations.
3. Identify and consider additional mitigation if abundance and yield of naturally-produced white sturgeon in mainstem reservoirs cannot be restored to levels sustainable under conditions existing before hydropower system development and operation.

   Quantitative objective: sustainable annual harvest or use equivalent to 5 kg/ha/yr for white sturgeon

Strategies:

1. Configure and operate the hydropower system consistent with the salmonid recovery plan, to maximize spawning and rearing success of white sturgeon populations in mainstem reservoirs.
2. Supplement depleted populations of white sturgeon in mainstem reservoirs upstream from Bonneville Dam by transplanting naturally-produced juveniles from below Bonneville Dam until changes in configuration and operation of the hydropower system are completed.
3. If abundance of naturally-spawning white sturgeon cannot be restored to pre-impoundment levels in mainstem reservoirs, supplement populations with artificially-produced fish where risks to naturally spawning populations are minimal.
4. Monitor population status of white sturgeon to evaluate effectiveness of restoration efforts and conduct research as needed to ensure success of restoration efforts in mainstem reservoirs.
5. Regulate harvest of white sturgeon for each mainstem reservoir population based on estimated abundance and exploitation rates which provide optimum sustainable yields.

Critical Hypotheses:

1. Natural production of white sturgeon in impounded reaches and reservoirs is less than what it was before development and operation of the hydropower system.
2. White sturgeon rearing habitat in many impoundments is underseeded because of reductions in spawning habitat caused by hydropower system development and operations.
3. White sturgeon production in impoundments can be significantly enhanced by some combination of spawning and rearing habitat restoration (hydrosystem configuration operation) and supplementation (transplants and artificial propagation).
4. Naturally spawning white sturgeon populations in impoundments can be preserved and optimum rates of production can be restored while concurrently maintaining limited tribal and recreational fishery opportunities.

Performance Measures:

1. Stable white sturgeon abundance, biomass, age composition, and annual harvest at target levels over a period corresponding to one generation.

Related Projects:

8605000 White sturgeon productivity, status, and habitat requirements (in progress)

B. Sensitive native species (bull trout, coastal cutthroat trout, etc.)

Objectives:

1. Ensure that sensitive native population levels in mainstem reservoirs are above minimum viable population sizes which maintain adaptability and genetic diversity, maximize probability of survival, and do not constrain consumptive and nonconsumptive uses of other species to protect sensitive populations.

Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations

Strategies:

1. Identify and monitor the status of sensitive native fish populations in mainstem reservoirs to evaluate the effectiveness of restoration efforts and to determine when protection and restoration objectives have been achieved.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of sensitive native populations in mainstem reservoirs.
2. Sensitive native populations in mainstem reservoirs can be protected and restored with similar measures to those which restore normative river functions to benefit anadromous species and white sturgeon.

Performance Measures:

1. Detailed habitat protection and restoration plans for sensitive native species in mainstem reservoirs.

C. Introduced gamefish (walleye, bass, crappie, catfish, etc.)

Objectives:

1. Protect and enhance native wild stocks of anadromous and resident species as a higher priority than introduced gamefish species in mainstem reservoirs.
2. Reduce or eliminate detrimental effects of existing introduced gamefish species on sensitive native species where feasible in mainstem reservoirs.
3. Provide only those opportunities for consumptive and nonconsumptive uses of introduced gamefish populations which do not produce substantial negative effects on sensitive native species in mainstem reservoirs.

   Quantitative objective: optimum sustained yield of walleye, bass, crappie, and catfish conditional on no native species effects

Strategies:

1. Conduct only those assessments of introduced gamefish populations in mainstem reservoirs needed to identify and minimize effects on sensitive native species.
2. Implement hydropower system configurations and operations which reduce numbers or effects of introduced gamefish species in mainstem reservoirs on sensitive native species.
3. Obtain stock assessment information appropriate to optimizing management of introduced gamefish species in mainstem reservoirs incidental to work focused on other problems. (for instance, predation or sturgeon restoration evaluations).

Critical Hypotheses:

1. Eradication of introduced gamefish species from mainstem reservoirs is not feasible or desirable in all cases.
2. Opportunities exist for management of introduced gamefish in mainstem reservoirs which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.

Performance Measures:

1. Angler effort, angler catch rate, and size-specific harvest of introduced gamefish in mainstem reservoirs.

Related Projects:

900770 Predator control program evaluation (anadromous)

6.4.4.2 Subbasin Tributaries

A. Sensitive native populations (bull trout, rainbow trout, etc.),

Objectives:

1. Maintain and restore population productivity reduced by hydropower development and operations to healthy levels which provide opportunities for consumptive and nonconsumptive uses of sensitive native populations or other species whose use is constrained to protect sensitive populations in subbasin tributaries.
2. Ensure population levels of sensitive native fish in subbasin tributaries are above minimum viable population sizes which maintain adaptability and genetic diversity, and maximize probability of survival.

   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations

Strategies:

1. Identify and estimate the status of populations and groups of populations of sensitive native fish species with unique genetic characteristics in subbasin tributaries.
2. Identify factors limiting each population, critical habitats or conditions which limit life stages, and population sizes corresponding to management objectives (i.e. biological objectives) for sensitive native fish populations in subbasin tributaries.
3. Select and implement measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore connectivity between isolated subpopulations, and meet biological objectives for sensitive native fish populations in subbasin tributaries.
4. Monitor the status of sensitive native fish populations in subbasin tributaries to evaluate the effectiveness of restoration efforts and to determine when protection and restoration goals have been achieved.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of sensitive native populations in subbasin tributaries.
2. Sensitive native populations in subbasin tributaries can be protected and restored by habitat improvement measures.
3. Habitat improvement measures for anadromous species are insufficient for meeting sensitive native resident species objectives in subbasin tributaries.
4. Effective and efficient implementation of habitat restoration measures for sensitive native fish populations in subbasin tributaries must be predicated on assessments of population distribution and status.

Performance Measures:

1. Distribution, abundance, size composition, genetic characteristics, and habitat associations of sensitive native species in subbasin tributaries.

Related Projects:

B. Introduced gamefish (bass, catfish, etc.)

Objectives:

1. Protect and enhance native wild stocks of anadromous and resident species as a higher priority than introduced gamefish species in subbasin tributaries.
2. Reduce or eliminate detrimental effects of existing introduced gamefish species on sensitive native species where feasible in subbasin tributaries.
3. Provide only those opportunities for consumptive and nonconsumptive uses of introduced gamefish populations which do not produce substantial negative effects on sensitive native species in subbasin tributaries.

   Quantitative objective: optimum sustained yield of bass, catfish, etc. conditional on no native species effects

Strategies:

1. Conduct only those assessments of introduced gamefish populations in subbasin tributaries needed to identify and minimize effects on sensitive native species.
2. Implement hydropower system configurations and operations which reduce numbers or effects of introduced gamefish species in subbasin tributaries on sensitive native species.
3. Obtain stock assessment information appropriate to optimizing management of introduced gamefish species in subbasin tributaries incidental to work focused on other problems. (for instance, predation or sturgeon restoration evaluations).

Critical Hypotheses:

1. Eradication of introduced gamefish species from subbasin tributaries is not feasible or desirable in all cases.

2. Opportunities exist for management of introduced gamefish in subbasin tributaries which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.
3. Conservation objectives for other native resident species in subbasin tributaries will be met by habitat-based strategies addressing key species specifically targeted for action.

Performance Measures:

1. Distribution, abundance, size composition, genetic characteristics, and habitat associations of sensitive native species in subbasin tributaries.
2. Detailed habitat protection and restoration plans for sensitive native species in subbasin tributaries.

Related Projects:

None

6.4.5 Upper Columbia Subregion

6.4.5.1 Mainstem Columbia / Lake Roosevelt

A. Rainbow trout (adfluvial stock)

Objectives:

1. Provide a subsistence and recreational fishery
   Quantitative objective: Harvest 12,000 adult fish annually by the year 2000 and 150,000 fish annually as an ultimate number.
2. Manage the adfluvial rainbow trout populations as self-sustaining naturally reproducing populations.
   Quantitative objective: Escapement of 6,000 annually by the year 2000 and 74,000 fish annually as an ultimate number.
3. Increase parr production consistent with habitat availability.
   Quantitative objective*:* To be developed.

Table 6- 3 Lake Roosevelt Biological Objectives

Species	Stock	Harvest (number	Escapement (number)	Total adults (number)	(pounds)	Year
kokanee	hatchery	290,000	10,000	300,000	2.0	2000
	wild	120,000	60,000	180,000	2.0	*
rainbow trout	net pen	190,000	NA	190,000	1.5	1997
	wild	12,000	6,000	18,000	2.0	2000 (interim)
	wild	150,000	74,000	224,000	2.0	final[t]
walleye	wild	131,000	U	131,000	1.5	1996

[1]*Biological objectives adopted by the NPPC*

NA = not applicable, U = unknown at the present time, * target date will be determined upon completion of baseline investigations, t = target date will be determined after interim goal is achieved

Strategies:

1. Conduct stock assessments and population inventories (both adult and juvenile) to estimate population strength and population dynamics.
2. Continue to suspend stocking of fluvial rainbow trout in tributaries utilized by adfluvial rainbow trout.
3. Monitor the effectiveness of in-stream habitat improvements, passage improvements, and riparian enhancement efforts in increasing parr production.
4. Operate fish weirs on spawning tributaries to assess adult escapement and potential introgression of hatchery fish into the spawning population.
5. Conduct genetic evaluation of potentially distinct stocks of adfluvial rainbow trout.
6. Conduct evaluations of additional streams that may have potential for rainbow production.
7. Initiate watershed management activities to complement stream habitat improvements.
8. Operate Lake Roosevelt consistent with guidelines identified in NPPC Fish and Wildlife Program.
9. Minimize entrainment through Grand Coulee Dam.

Critical hypotheses:

1. Enhancement measures will increase spawning and rearing success of adfluvial rainbow trout.
2. Increased parr production, decreased entrainment, and improved rearing conditions in Lake Roosevelt will result in harvestable surpluses of adfluvial rainbow trout.
3. Minimal genetic introgression has or will occur between wild adfluvial fish and hatchery fish.
4. Hatchery production of rainbow trout is necessary to reduce angling pressure on adfluvial rainbow trout.
5. Current fishing regulations protecting adults in tributaries are adequate.
6. Watershed management programs are necessary if in-stream habitat/passage improvements are to be successful.
7. The adfluvial rainbow trout populations are distinct native stocks.

Performance measures:

1. Increase in parr production over time.
2. Increased adult escapement and harvest numbers (12,000 fish harvest by year 2000 and 150,000 ultimately).
3. Average fish weight of 2 lb.
4. Evidence of adfluvial rainbow trout colonizing areas opened by passage improvements.
5. Increased duration of flows in intermittent streams utilized by adfluvial fish.

Related projects:

8503800 Colville tribal fish hatchery
9001800 Lake Roosevelt Rainbow Trout Habitat/Passage Improvement Project
9404300 Lake Roosevelt Fisheries Monitoring Program
9104600 Spokane Tribal Hatchery
9104700 Sherman Creek Hatchery

B. Hatchery rainbow trout and kokanee salmon

Objectives:

1. Create and maintain a high quality sport and subsistence kokanee salmon and rainbow trout fishery as substitution for lost anadromous fish angling opportunity above Chief Joseph and Grand Coulee Dams..

   Quantitative objective: See Table 6.3.
2. Maintain and enhance self sustaining wild kokanee salmon and rainbow trout populations where appropriate consistent with sound resource protection guideline.
3. Create and maintain a balanced ecosystem able to withstand unfavorable lake operations.

Strategies:

1. Produce 1,000,000 yearling kokanee and 500,000 rainbow trout among the Spokane Tribal Hatchery, Sherman Creek Hatchery and the Lake Roosevelt Net Pen Program for release in June each year.
2. Acclimate and imprint 225,000 kokanee yearlings for net pen rearing at the Kettle Falls net pen site.
3. Trap and spawn adult wild rainbow trout broodstock at Phalon Lake to obtain 1 million eggs annually.
4. Weir tributaries to allow only wild fish pass above the weir to spawn.
5. Operate Grand Coulee Dam consistent with guidelines identified in NPPC Fish and Wildife Program.
6. Monitor the effect of lake elevation and water retention time on the kokanee and rainbow trout populations.
7. Conduct genetic evaluations to determine whether wild kokanee are a unique stock.
8. Conduct stream and lake shoreline redd counts to determine extent of wild spawning.
9. Improve habitat by revegetating the Lake Roosevelt shoreline.
10. Education
11. Monitor and evaluate the effects of fish management actions.
12. Model the effect of lake operations on the food chain.
13. Identify and implement methods to reduce kokanee and rainbow entrainment
14. Develop a fisheries management plan that recommends specific lake operations for improvements to the rainbow and kokanee fisheries.

Critical hypotheses:

1. Increase in 24,000 pounds of hatchery trout annually will result in a measurable increase in recreational harvest.
2. The tributaries and lake shoreline contain adequate gravels to sustain a wild spawning population of kokanee.
3. Release of hatchery origin kokanee salmon and rainbow trout will recruit to the fishery.
4. Improvement of shoreline habitat through revegetation will cause greater survival and recruitment of kokanee salmon and rainbow trout.
5. Lake operations effect the kokanee salmon and rainbow trout populations.
6. Wild captive rainbow trout broodstock maintained in a natural lake are robust and can be used for supplementation and recreational utilization consistent with resource protection guidelines.

Performance Measures:

1. Weight of trout reared for release.
2. Annual harvest and escapement numbers.

Related Projects:

5513300	Phalon Lake Wild Rainbow Trout Trapping and Spawning Facility
5513400	Vegetation Planting Feasibility study--Lake Roosevelt
5513500	Improve Ford Hatchery Water Supply
5521800	Lake Roosevelt kokanee net pens
9001800	Habitat Improvement - Lake Roosevelt
9104600	Spokane Tribal Hatchery O&M
9104700	Sherman Creek Hatchery O&M
9404300	Lake Roosevelt Monitoring / Data Collection Project
9501100	Chief Joseph Kokanee Enhancement Program

C. Warmwater species (walleye, perch, etc.)

Objectives:

1. Create and maintain a substantial, high quality sport and subsistence walleye fishery.
   Quantitative objective: See Table 6.3.
2. Maintain and enhance self sustaining wild walleye populations.
3. Create and maintain a balanced ecosystem able to withstand unfavorable lake operations
4. Assess the feasibility of establishing vegetative plantings within the Lake Roosevelt drawdown zone to enhance the production of several resident fish species through increased plankton production, and rearing habitat for some species.
   Quantitative objective: To be developed based on project feasibility.

Strategies:

1. Monitor the effect of lake elevation and water retention time on the walleye populations (e.g. entrainment).

2. Estimate natural lake production of wild spawning walleye.
3. Education
4. Monitor and evaluate the effects of fish management actions.
5. Model the effect of lake operations on the food chain.
6. Identify and implement methods to reduce walleye entrainment
7. Develop a fisheries management plan that recommends specific lake operations for improvements to the walleye fisheries.
8. Determine the most effective methods and materials for establishing beneficial vegetation in selected reservoir habitats.
9. Test plant vegetation in selected areas.
10. Monitor and evaluate efficacy of survival and productivity of resident fish utilizing these areas.

Critical Hypotheses:

1. The tributaries and lake shoreline contain adequate substrate to sustain a wild spawning population of walleye.
2. Lake operations effect walleye populations.
3. Lack of aquatic and terrestrial vegetation in the drawdown zone of large, fluctuating reservoirs limits the production of several important species of resident game fish species.
4. Increased vegetation in selected near-shore habitats will increase survival, recruitment, and productivity of these fish species.

Performance Measures:

1. Annual walleye harvest and escapement numbers.
2. If feasible to enhance resident fish production through vegetation planting, biological objectives will be developed.

Related Projects:

5513300	Phalon Lake Wild Rainbow Trout Trapping and Spawning Facility
5513400	Vegetation Planting Feasibility study--Lake Roosevelt
5513500	Improve Ford Hatchery Water Supply
5521800	Lake Roosevelt kokanee net pens
9001800	Habitat Improvement - Lake Roosevelt
9104600	Spokane Tribal Hatchery O&M
9104700	Sherman Creek Hatchery O&M
9404300	Lake Roosevelt Monitoring / Data Collection Project
9501100	Chief Joseph Kokanee Enhancement Program

6.4.5.2 Mainstem tributary subbasins (including Colville Indian Reservation)

A. Lahontan cutthroat trout

Objectives:

1. Provide successful subsistence fishery for the Colville Tribal members and non-member sport fishery on trophy Lahontan cutthroat trout in highly alkaline waters of closed lake systems including Omak Lake.

   Quantitative objectives: Catch rates > 1 fish/hour in subsistence fishery and > 0.8 fish/hour in recreational fishery. Condition factor >4.5E-4

Strategies:

1. Outplant 100,000 plus subcatchable Lahontan cutthroat trout into Omak Lake annually.
2. Use eggs collected from "free-ranging" Lahontan cutthroat trout adults in Omak Lake as the basis for hatchery production.
3. Maintain current restrictive fishing regulations for Omak Lake.
4. Conduct stock assessments, population inventories, and angler surveys to estimate population strength, population dynamics, and fishery quality over time (population trends).
5. Initiate marking program that allows monitoring of year class recruitment into the spawning population and into the creel over time.
6. Revise stocking and harvest rates as necessary to maintain Lahontan cutthroat population levels below maximum carrying capacity.
7. Review other highly alkaline Reservation lakes (closed systems) for their potential to support Lahontan cutthroat trout.

Critical hypotheses:

1. Funding will remain available for hatchery O&M and M&E.
2. Omak Lake water chemistry will remain unsuitable for other salmonids.
3. Recruitment in the Lahontan cutthroat trout population will rely completely upon hatchery production until water quality and quantity is improved in the one intermittent tributary stream.
4. Current stocking rates are below the carrying capacity of Omak Lake.
5. Current hatchery protocols are sufficient to provide genetic variation, fish health, and stocking levels necessary to support desired CPUE and fish condition factor.
6. Lake rearing conditions and fishery regulations are sufficient to provide growth rates and population structure necessary to achieve CPUE, fish condition factor, and size desired.
7. "Free-ranging" brood stocks provide progeny that has greater survival characteristics than that of captive brood progeny.
8. Hatchery rearing conditions produce a high quality fish for distribution.
9. Omak Lake will remain a mesotrophic lake.
10. Lahontan cutthroat trout do no adversely affect native fish populations within the reservation.

Performance measures:

1. Annual egg take of 200,000 plus.
2. Annual plants of 100,000 plus subcatchable Lahontan cutthroat trout.

3. CPUE greater than 0.8 fish/hr for sport anglers and 1.0 fish per hour for subsistence anglers.
4. Fish condition factors greater than 4.5E-4.
5. Minimal mortality during hatchery rearing due to diseases or parasitic infections.

Related projects:

8503800 Colville tribal fish hatchery

Table 6- 4 Biological objectives for lakes and streams on the Colville Indian Reservation

		Hatchery production		Fishery goals		
Species	Size	(lb.)	(number)	CPUE (fish/hr)	Avg. FL (in)	Condition KFL
Rainbow trout	fingerling	2,500	200,000			
	subcatchable	13,000	300,000			
	catchable	15,000	81,000		13.5	1.0
Brook trout	fingerling	2,200	176,000			
	subcatchable	13,200	300,000			
	catchable				12.0	1.0
Lahontan cutthroat	subcatchable	4,500	90,000		20.0	0.9
Combined		50,000		>1		

Additionally, in reservation waters, increase natural production of brook trout by 10 percent and rainbow trout by 15 percent by 2000. (source: Northwest Power Planning Council Fish and Wildlife Program)

B. Brook trout

Objectives:

1. Provide successful subsistence fishery for the Colville Tribal members and non-member sport fishery on brook trout in streams of the Colville Reservation.
   Quantitative objective: Catch rates > 1 fish/hour in subsistence fishery and > 0.8 fish/hour in recreational fishery. Condition factor >5.5E-4
2. Improve spawning and rearing conditions for brook trout in areas they currently occupy.
   Quantitative objective: 10% increase in natural production of brook trout by the year 2010.

Strategies:

1. Continue to stock brook trout into Colville Reservation waters (176,000 fingerlings and 300,000 subcatchable fish annually).
2. Use eggs collected from "free-ranging" brook trout adults in Owhi Lake as the basis for hatchery production for Colville Reservation waters.
3. Maintain current fishing regulations for brook trout on the Colville Reservation.

4. Conduct stock assessments, population inventories, and angler surveys to estimate population strength, population dynamics, and fishery quality over time (population trends).
5. Initiate marking program that allows monitoring of year class recruitment into the spawning population and into the creel over time.
6. Revise stocking and harvest rates as necessary to maintain brook trout population levels below maximum carrying capacity.
7. Initiate watershed management from a holistic management approach to maintain or improve habitat for brook trout in areas they currently occupy.
8. Maintain brook trout brood lake (Owhi Lake) in a meso-trophic condition.
9. Plant fish capable of survival and reproduction to increase natural production

Critical hypotheses:

1. Funding will remain available for hatchery O&M and M&E.
2. Owhi Lake will remain in a highly productive and stable meso-eutophic condition.
3. Recruitment from natural and hatchery production will be necessary to support a successful subsistence and sport fishery for brook trout on the Colville Reservation.
4. Brook trout currently have limited if any negative impact on native fish populations in the Colville Reservation.
5. Brook trout will continue to be the focal point of the Colville Tribal subsistence fishery.
6. Current hatchery protocols are sufficient to provide genetic variation, fish health, and stocking levels necessary to support desired CPUE and fish condition factor.
7. Lake rearing conditions and fishery regulations are sufficient to provide growth rates and population structure necessary to achieve CPUE, fish condition factor, and size desired.
8. "Free-ranging" brood stocks provide progeny that has greater survival to the fishery and natural recruitment than that of captive brood progeny.
9. Hatchery rearing conditions produce a high quality fish for distribution.
10. Watershed management will become reality within the bounds of the reservation.
11. Watershed management will be necessary to achieve natural production objectives on the reservation.

Performance measures:

1. Annual egg take of 800,000 from Owhi Lake.
2. Annual plants of 500,000 juvenile brook trout.
3. CPUE greater than 0.8 fish/hr for sport anglers and 1.0 fish per hour for subsistence anglers.
4. Fish condition factors greater than 5.5E-4.
5. Minimal mortality during hatchery rearing due to diseases or parasitic infections.
6. Increase in natural production adults.

Related projects:

8503800 Colville tribal fish hatchery

C. Rainbow trout (non-native stock)

Objectives:

1. Provide successful subsistence fishery for the Colville Tribal members and non-member sport fishery on hatchery-reared rainbow trout in streams of the Colville Reservation.
   Quantitative objective: Catch rates > 1 fish/hour in subsistence fishery and > 0.8 fish/hour in recreational fishery. Condition factor >5.5E-4
2. Improve spawning and rearing conditions for rainbow trout in areas they currently occupy.
   Quantitative objective: 15% increase in natural production of brook trout by the year 2010.

Strategies:

1. Continue to stock rainbow trout into Colville Reservation waters (200,000 fingerlings, 300,000 subcatchable, and 81,000 catchable-sized fish annually).
2. Develop a "free-ranging" rainbow trout source of rainbow trout eggs as the basis for hatchery production for Colville Reservation waters (130,000 eggs per year by the year 2000).
3. Continue to obtain eggs from WDFW until local broodstock source is developed.
4. Maintain current fishing regulations for rainbow trout on the Colville Reservation.
5. Conduct stock assessments, population inventories, and angler surveys to estimate population strength, population dynamics, and fishery quality over time (population trends).
6. Initiate marking program that allows monitoring of year class recruitment into the spawning population and into the creel over time.
7. Revise stocking and harvest rates as necessary to maintain brook trout population levels below maximum carrying capacity.
8. Initiate watershed management from a holistic management approach to maintain or improve habitat for brook trout in areas they currently occupy.
9. Plant fish capable of survival and reproduction to increase natural production

Critical hypotheses:

1. Funding will remain available for hatchery O&M and M&E.
2. Reliable rainbow trout brood source can be developed within 10 years that will supply all of the eggs necessary for the hatchery program.
3. Rainbow trout eggs will continue to be available from WDFW until a local egg source is developed.
4. Recruitment from natural and hatchery production will be necessary to support a successful subsistence and sport fishery for brook trout on the Colville Reservation.
5. Rainbow trout currently have no significant negative impact on native fish populations in the Colville Reservation.
6. Rainbow trout will continue to be the focal point of the Colville Tribal subsistence fishery.

7. Current hatchery protocols are sufficient to provide genetic variation, fish health, and stocking levels necessary to support desired CPUE and fish condition factor.
8. Lake rearing conditions and fishery regulations are sufficient to provide growth rates and population structure necessary to achieve CPUE, fish condition factor, and size desired.
9. Natural recruitment is insufficient to achieve CPUE objectives.
10. "Free-ranging" brood stocks provide progeny that has greater survival to the fishery and natural recruitment than that of captive brood progeny.
11. Hatchery rearing conditions produce a high quality fish for distribution.
12. Watershed management will become reality within the bounds of the reservation.
13. Watershed management will be necessary to achieve natural production objectives on the reservation.

Performance measures:

1. Annual rainbow trout egg take of 130,000 from an on-reservoir (free-ranging) source by the year 2000.
2. Annual plants of 581,000 juvenile rainbow trout.
3. CPUE greater than 0.8 fish/hr for sport anglers and 1.0 fish per hour for subsistence anglers.
4. Fish condition factors greater than 5.5E-4.
5. Average fish length greater than 13.5".
6. Minimal mortality during hatchery rearing due to diseases or parasitic infections.
7. Increase in natural production of rainbow trout adults by 15% by 2010.

Related projects:

8503800 Colville tribal fish hatchery

6.4.5.3 Moses Lake (offsite mitigation in Crab subbasin)

A. *Selected warmwater fish species*

Objectives:

1. Assess resident fish species in Moses Lake and Establish management objectives to enhance the recreational fishing opportunity in the lake as substitution for anadromous fish above Chief Joseph and Grand Coulee Dams.

   Quantitative objective: To be completed based on assessment.

Strategies:

1. Identify condition, limiting factors, and management objectives for selected warmwater fish species in Moses Lake.
2. Develop a management plan to achieve the identified biological objectives.

Critical hypotheses:

1. Moses Lake is capable of providing a high quality recreational fishery as partial substitution for loss of anadromous fish angling opportunity above Chief Joseph and Grand Coulee Dams.

Performance Measures:

1. Development of quantifiable biological objectives.

Related Projects:

9502800 Assessment of Fishery Improvements Moses Lake

6.4.5.4 Coeur d'Alene Subbasin (including Tribal Reservation Tributaries)

A. Westslope Cutthroat Trout

Objectives:

1. Protect native populations to maintain genetic diversity at self-sustaining harvestable levels.
   Quantitative objectives: See table 6.5 (harvest goals)
2. Restore degraded habitat in historical use areas where feasible
   Quantitative objectives: See table 6.5 (habitat tables)
3. Increase populations to self-sustainable harvest levels
   Quantitative objectives: See table 6.5 (harvest goals)
4. Mitigate and compensate for anadromous fish losses (i.e. substitution) caused by the construction and operation of the federally regulated and operated hydropower projects
   Quantitative objectives: Use all available resources (i.e. habitat enhancement, supplementation) to meet objectives listed in Tables 6.5 and 6.6.

Table 6- 5 Coeur d'Alene reservation tributaries biological objectives

Tributary	Target level (%[2])	Escapement (number)	Harvest (number)	Biological objective[1] (escapement + harvest)	Year
Alder Creek	25	7,562	4,113	11,675	2001
	50	15,125	8,226	23,351	2005
	75	22,687	12,339	35,026	2009
Benewah Creek	25	9,277	4,880	14,157	2001
	50	18,555	9,759	28,314	2005
	75	27,832	14,648	42,471	2009
Evans Creek	25	5,430	2,944	8,364	2001
	50	10,840	5,888	16,728	2005
	75	16,260	8,832	25,092	2009
Lake Creek	25	5,346	12,877	8,223	2001
	50	10,695	5,751	16,446	2005
	75	16,042	8,626	24,668	2009

[1] *Biological objectives adopted by the NPPC.*

[2] *Percent improvement over current conditions. Biological objectives for wild adfluvial cutthroat trout include rebuilding to 75 percent of the optimal level for adult fish. This will be accomplished by achieving interim biological objectives (25 percent and 50 percent of optimal level) by the target dates noted.*

Table 6- 6 Cutthroat trout biological objectives defined based on tributary habitat enhancement to achieve the following conditions

Tributary, Characteristics	Current Condition	Optimal Condition	Future Desired Condition *(% over current)*			Difference		
			25	**50**	**75**	**25**	**50**	**75**
Lake Creek								
Average residual pool depth	1.9 ft	5.0 ft	2.4	2.9	3.4	0.5	1.0	1.5
Average canopy cover (thermal cover)	13.9%	75%	17.4	20.9	24.4	3.5	7.0	10.5
# Large woody debris (Lineal distance)	<0.1/m							
Riffle-pool ratio	3.6:1	3:2	3:1	3:2	3:2	-.6	-1	0
Average percent fines	19.1%	<10%	14.3	8.4	3.2	-4.8	10.7	-15.5
Benewah Creek								
Average residual pool depth	2.0 ft	5.0 ft	2.5	3.0	3.5	0.5	1.0	1.5
Average canopy cover (thermal cover)	36.6%	75%	45.8	56.4	65.6	9.2	18.4	27.6
(# Large woody debris) (Lineal distance)	<0.1/m							
Riffle-pool ratio	1.8:1	3:2	5:1	3:2	3:2	-.3	0	0
Average percent fines	10.9%	<10%	8.1	5.3	5.3	2.8	5.6	0
Alder Creek								
Average residual pool depth	2.0 ft	5.0 ft	2.5	3.0	3.2	0.5	1.0	1.5
Average canopy cover (thermal cover)	23.8%	75%	29.8	35.7	41.6	5.9	11.8	17.7
# Large woody debris (Lineal distance)	<0.1/m							
Riffle-pool ratio	1.2:1	3:2	1.2:1	NC	NC	0	0	0
Average percent fines	37.6%	<10%	28.2	18.8	9.4	9.4	18.8	28.8
Evans Creek								
Average residual pool depth	2.5 ft	5.0 ft	3.1	3.6	4.3	0.6	1.2	1.8
Average canopy cover (thermal cover)	40.1%	75%	50	60	70	10	20	30
# Large woody debris (Lineal distance)	<0.1/m							
Riffle-pool ratio	10.9:1	3:2	7.9:1	5.3:1	2.6:1	-2.6	-5.3	-7.9
Average percent fines	16.8%	<10%	12.6	8.4	4.2	4.2	8.4	12.6

[1]*Biological objectives adopted by the NPPC.*

[2]*Additionally, produce 25,000 catchable rainbow trout for stocking into trout ponds to provide an interim subsistence and recreation fishery for Coeur d'Alene Tribal members*

Strategies:

1. Analyze biological information and determine limiting factors for adult adfluvial westslope cutthroat in Lake Coeur d'Alene.
2. Implement habitat restoration projects within identified Coeur d'Alene Reservation tributaries
3. Purchase critical watershed areas (land and water) for protection and restoration of native fish species and their habitat.
4. Monitor and evaluate results of restoration efforts
5. Develop educational and informational program for local landowners and the general community on habitat restoration strategies.
6. Explore and develop the use of supplementation facilities to increase westslope cutthroat trout population levels.
7. Monitor and evaluate results of supplementation.
8. Enforcement of stream closures to protect native westslope cutthroat trout.
9. Manage exotic species introductions to promote native fish assemblages.
10. Utilize stocking strategies of introduced fish (i.e. rainbow trout) to minimize hybridization of westslope cutthroat trout.

Critical hypothesis

1. Sustainable harvest is possible
2. Improved habitat will increase carrying capacity
3. Landowners willing to sell critical watershed areas
4. Funding will be available for Monitoring and evaluation, operation and maintenance, and implementation of projects.

Performance Measures

1. Attain biological objectives in section 10.8 of the Northwest Power Planning Council Program (under Coeur d'Alene Tribe).

Related Projects

1. Lake Creek Land Acquisition

B. Bull Trout

Objectives:

1. Protect native populations to maintain genetic diversity at self-sustaining harvestable levels.

   Quantitative objectives: See table 6.5 (harvest goals)

2. Restore degraded habitat in historical use areas where feasible

   Quantitative objectives: See table 6.5 (habitat tables)

3. Increase populations to self-sustainable harvest levels

   Quantitative objectives: See table 6.5 (harvest goals)

4. Mitigate and compensate for anadromous fish losses (i .e. substitution) caused by the construction and operation of the federally regulated and operated hydropower projects

Quantitative objectives: Use all available resources (i.e. habitat enhancement, supplementation) to meet objectives listed in Tables 6.5 and 6.6.

Strategies:

1. Analyze biological information and determine limiting factors for adult adfluvial bull trout in Lake Coeur d'Alene.
2. Implement habitat restoration projects within identified Coeur d'Alene Reservation tributaries
3. Purchase critical watershed areas (land and water) for protection and restoration of native fish species and their habitat.
4. Monitor and evaluate results of restoration efforts
5. Develop educational and informational program for local landowners and the general community on habitat restoration strategies and identification and management strategies for bull trout.
6. Explore and develop the use of supplementation facilities to increase bull trout population levels.
7. Monitor and evaluate results of supplementation.
8. Enforcement of stream closures to protect bull trout.
9. Manage exotic species introductions to promote native fish assemblages.
10. Utilize stocking strategies of introduced fish (i.e. rainbow trout) to minimize hybridization of bull trout.

Critical hypothesis

1. Sustainable harvest is possible
2. Extinction is preventable
3. Improved habitat will increase carrying capacity
4. Landowners willing to sell critical watershed areas
5. Funding will be available for monitoring and evaluation, operation and maintenance, and implementation of projects.

Performance Measures

1. Attain biological objectives in section 10.8 of the Northwest Power Planning Council Program (under Coeur d'Alene Tribe).

Related Projects

1. Lake Creek Land Acquisition

C. Rainbow Trout

Objectives

1. Provide alternate (limited) harvest fishery in closed or isolated systems.

Quantitative objectives: see table 6.5 (production of RBT #'s)

2. Develop additional rainbow trout fisheries to reduce pressure on native stocks
   Quantitative objectives: Upon adoption of project management plan, schedule and stocking levels will be determined.
3. Mitigate in part for anadromous fish losses.
   Quantitative objectives: Use all available resources to meet objectives in NPPC program section 10.8 (Coeur d'Alene Tribe).

Strategies

1. Monitor and evaluate to determine effectiveness of stocking to reduce pressure on wild stocks.
2. Set regulations for enforcement
3. Develop additional ponds to maintain additional Rainbow trout fisheries.
4. Produce 25,000 rainbow trout to stock in pond system

Critical hypothesis

1. Suitable locations exist for new pond construction
2. Habitat in ponds is sufficient for rainbow trout growth

Performance Measures

1. Attain biological objectives in section 10.8 of the Northwest Power Planning Council Program (under Coeur d'Alene Tribe).
2. Catch rates approaching .5 fish/hours
3. Removal rates approaching 60% of stocked fish.

Related Projects

None

6.4.5.5 Lower Pend Oreille Subbasin (below Albeni Falls Dam)

A. *Bull Trout*

Objectives:

1. Preserve and protect population levels above minimum viable population sizes that maintain adaptability and genetic diversity, while minimizing the probability of extinction.
2. Identify current stocks, native population levels, habitat conditions, genetic profiles, geographic ranges for protection and/or restoration.
3. Maintain healthy populations within available habitat
4. Restore degraded habitat in historical use areas where feasible
5. Minimize inter- and intra-specific species interactions (i.e. competition, hybridization, predation)
6. Control illegal harvest and over harvest
7. When appropriate and habitat is available use conservation aquaculture

8. Promote conservation ethic through education.
9. Mitigate and compensate for resident fish losses caused by construction and operation of federally regulated and federally operated hydropower projects.

Quantitative objectives: Use all available resources (e.g. baseline studies, habitat enhancement, artificial propagation etc.) to meet objectives listed in Table 6.7.

Table 6- 7 Biological objectives for largemouth bass, bull trout and cutthroat trout in the Box Canyon Reservoir and tributary streams

Specific interim and final targets for each tributary are to be established upon completion of detailed habitat and fish population assessments that are currently under way.

Area, species	Period	Year	Harvestable biomass (lb/acre)	Harvestable biomass (total lb)	Abundance (no./mi.)	Abundance (total no.)	0+ winter survival (%)
Box Canyon Reservoir							
Largemouth bass	Current		6	44,400			0.4-3.9
	Interim goal	2003	8	59,200			
	Final goal	2008	12	88,800			15-20
Tributary streams							
Bull trout	Current						
	Interim goal	2006			195[1]	48,855[1]	
	Final goal	2016			390[1]	97,410[1]	
Cutthroat trout	Current						
	Interim goal	2006			242[2]	121,106[2]	
	Final goal	2016			484[2]	242,212[2]	

[1]In upper third of each major stream which includes 250 miles of suitable habitat. Includes all ages and final goal will provide for annual spawning escapements of 2,205 adults and sustainable annual harvests of 2,205 fish.
[2]In 500 miles of suitable habitat. Includes adults only and final goal will provide for annual spawning escapements of 156,800 adults and sustainable annual harvests of 85,412 fish..

Strategies:

1. Conduct stock assessments and population inventories to identify limiting factors and threats to existence.
2. Complete bull trout habitat and population inventories to develop specific biological objectives and identify tributary and upland sites for enhancement opportunities.
3. Temperature regulation in Boundary Reservoir.
4. Design, construct, and maintain habitat improvements in tributary streams for bull trout (riparian planting, fencing and instream structures).
5. Education
6. Enforcement of illegal harvest.
7. Monitor and evaluate the effectiveness of habitat improvement projects.

Critical hypotheses:

1. Funding will be available for M&E, O&M and implementation of projects.
2. Improved spawning, rearing and overwintering habitat will increase the carrying capacity in the subbasin.
3. Fencing of riparian areas will stabilize banks.
4. Riparian planting will stabilize banks and provide shade.
5. Increased shade will contribute to cooler water temperatures.
6. Restoration of upland areas will minimize instream habitat degradation.
7. Lack of data pertaining to stock status in the subbasin.
8. Enforcement will decrease illegal harvest.

Performance measures:

1. Attain biological objectives in section 10.8 of the NPPC (below Albeni Falls Dam).

Related projects:

1. Kalispel Resident Fish Project
2. Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams
3. Box Canyon Watershed Project
4. Box Canyon Law Enforcement Project

B. *Westslope cutthroat*

Objectives:

1. Preserve and protect population levels above minimum viable population sizes that maintain adaptability and genetic diversity, while minimizing the probability of extinction.
2. Identify current stocks, native population levels, habitat conditions, genetic profiles, geographic ranges for protection and/or restoration.
3. Maintain healthy populations within available habitat
4. Restore degraded habitat in historical use areas where feasible
5. Minimize inter- and intra-specific species interactions (i.e. competition, hybridization, predation)
6. Control illegal harvest and over harvest
7. When appropriate and habitat is available use conservation aquaculture
8. Promote conservation ethic through education.
9. Mitigate and compensate for resident fish losses caused by construction and operation of federally regulated and federally operated hydropower projects.

Quantitative objectives: Use all available resources (e.g. habitat enhancement, artificial propagation etc.) to meet objectives listed in table 6.7.

Strategies:

1. Conduct stock assessments and population inventories to identify limiting factors and threats to existence.

2. Complete westslope cutthroat trout habitat and population inventories to develop specific biological objectives and identify tributary and upland sites for enhancement opportunities.
3. Temperature regulation in Boundary Reservoir.
4. Design, construct, and maintain habitat improvements in tributary streams for westslope cutthroat (riparian planting, fencing and instream structures).
5. Education
6. Enforcement of illegal harvest.
7. Monitor and evaluate the effectiveness of habitat improvement projects.

Critical hypotheses:

1. Funding will be available for M&E, O&M and implementation of projects.
2. Improved spawning, rearing and overwintering habitat will increase the carrying capacity in the subbasin.
3. Fencing of riparian areas will stabilize banks.
4. Riparian planting will stabilize banks and provide shade.
5. Increased shade will contribute to cooler water temperatures.
6. Restoration of upland areas will minimize instream habitat degradation.
7. Lack of data pertaining to stock status in the subbasin.
8. Enforcement will decrease illegal harvest.

Performance measures:

1. Attain biological objectives in section 10.8 of the NPPC (below Albeni Falls Dam).

Related projects:

1. Kalispel resident fish project
2. Resident fish stock status above Chief Joseph and Grand Coulee Dams
3. Box Canyon watershed project
4. Box Canyon law enforcement project

C. *Largemouth bass*

Objectives:

1. Increase winter survival of age 0+ largemouth bass.
2. Increase the amount of harvestable biomass in Box Canyon Reservoir.
3. Control illegal harvest and over harvest
4. Increase the total largemouth bass biomass in Box Canyon Reservoir.
5. Identify current stock status.

Strategies:

1. Operate and maintain low-capital largemouth bass hatchery to produce 100,000 largemouth bass fry and 50,000 fingerlings for release in the Box Canyon Reservoir.

2. Construct and place artificial cover structures to increase the amount of largemouth bass fry winter cover in the Box Canyon Reach of the Pend Oreille River.
3. Education
4. Enforcement of illegal harvest
5. Monitor and evaluate the effectiveness of habitat improvement projects.
6. Conduct stock assessments and population inventories to identify limiting factors and threats to existence.

Critical hypotheses:

1. Funding will be available for M &E, O & M, and implementation of projects.
2. Insufficient natural recruitment in the Box Canyon Reach.
3. Insufficient cover contributes to poor overwinter survivability of age 0+ largemouth bass.

Performance measures:

1. Attain biological objectives in section 10.8 of the NPPC.

Related projects:

1. Kalispel Resident Fish Project
2. Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams
3. Box Canyon Law Enforcement Project

D. *Yellow perch*

Objectives:

1. Mitigate and compensate for anadromous and resident fish losses caused by the construction and operation of federally regulated and operated projects.

   Quantitative objective: Quantifiable objectives (fish to be sold) will be established upon program implementation.

Strategy:

1. Operate and maintain a yellow perch aquaculture facility.

Critical hypotheses:

1. Funding will be available for two years of O & M and project implementation.

Performance measures:

1. Hatchery is successfully constructed and efficiently producing yellow perch.
2. Hatchery is making a profit.

Related projects:

1. Kalispel perch aquaculture facility.

E. *Non-game species*

Objectives:

1. Preserve and protect population levels above minimum viable population sizes that maintain adaptability and genetic diversity, while minimizing the probability of extinction.
2. Identify current stocks, population levels, habitat conditions, genetic profiles, geographic ranges for protection and/or restoration.
3. Protect fish resources in perpetuity by removing threats that exist to mitigate for uncompensated native fish losses and to prevent further losses and threats to existence.

   Quantitative objectives: To be established from baseline studies when non-game program begins.

Strategies:

1. Conduct habitat assessments, stock assessments, and population inventories.
2. Determine areas within tributaries and upland sites for enhancement opportunities.
3. Monitor and evaluate the effectiveness of the habitat improvement projects.
4. Enforcement of illegal harvest.
5. Species reintroduction and population enhancement through hatchery propagation.

Critical hypotheses:

1. Funding will be available for M &E, O & M, and implementation of projects.
2. Improved spawning, rearing, and overwintering habitat will increase the carrying capacity in the subbasin.
3. Fencing of riparian areas will stabilize banks.
4. Riparian planting will stabilize banks and provide shade.
5. Increased shade will contribute to cooler water temperatures.
6. Restoration of upland areas will minimize instream habitat degradation.
7. Lack of data pertaining to stock status in the subbasin.
8. Enforcement will decrease illegal harvest.

Performance measures:

1. Determination of non-game stock status in the subbasin.

Related projects:

1. Resident fish stock status above Chief Joseph and Grand Coulee Dams

F. *Native but not endemic species (e.g. cutthroat trout, rainbow trout, kokanee salmon, etc.)*

Objectives:

1. Identify historic stocks, population levels, habitat conditions, and geographic ranges as targets for restoration.
2. Increase or protect population levels above minimum viable populations that maintain genetic diversity.

program begins.

3. Restore degraded habitat in historical use areas where feasible.
4. When appropriate stock hatchery origin fish to recover or restore native stocks, also, use hatchery origin fish for utilization opportunity consistent with resource protection guidelines.
5. Mitigate and compensate for resident and anadromous fish losses caused by construction and operation of federally regulated and federally operated hydropower projects.

   Quantitative objectives: To be established from baseline studies when program begins.

Strategies:

1. Design studies that will identify stock status.

Critical hypotheses:

1. Funding will be available for M &E, O & M, and implementation of projects.
2. Improved spawning, rearing, and overwintering habitat will increase the carrying capacity in the subbasin.
3. Lack of data pertaining to stock status in the subbasin.
4. Enforcement will decrease illegal harvest.

Performance measures:

1. Determination of non-game stock status in the subbasin.

Related projects:

1. Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams.

G. *Pygmy whitefish*

Objectives:

1. Maintain healthy populations within available habitat, restore degraded habitat in historical use areas where feasible.
2. Minimize inter-and intra-specific interactions (i.e., competition, hybridization, predation).
3. Control illegal harvest.
4. When appropriate and habitat is available use conservation aquaculture.
5. Promote conservation ethic through education.

   Quantitative objectives: To be established when program begins.

Strategies:

1. Design studies that will identify stock status.

Critical hypotheses:

1. Funding will be available for M &E, O & M, and implementation of projects.

2. Improved spawning, rearing, and overwintering habitat will increase the carrying capacity in the subbasin.
3. Lack of data pertaining to stock status in the subbasin.
4. Enforcement will decrease illegal harvest.

Performance measures:

1. Determination of non-game stock status in the subbasin.

Related projects:

1. Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams.

6.4.5.6 Upper Pend Oreille Subbasin (upstream from Albeni Falls Dam)

A. Resident trout (bull trout, cutthroat trout)

Objectives:

1. Mitigate and compensate for anadromous and resident fish losses caused by the construction and operation of federally regulated and operated projects.
2. Identify current stocks, population levels, habitat conditions, genetic profiles, geographic ranges for protection and/or restoration.
3. Identify historic stocks, population levels, habitat conditions, geographic ranges as targets for restoration.
4. Protect fish resources in perpetuity by removing threats that exist to mitigate for uncompensated native fish losses and to prevent further losses and threats to existence.

Quantitative objectives: .

Strategies:

1. Conduct habitat assessments.
2. Determine areas within tributaries and upland sites for enhancement opportunties.
3. Conduct habitat improvements techniques involving: riparian planting, fencining, and instream structures.
4. Monitor and evaluate the effectiveness of habitat improvement projects.
5. Enforcement of illegal harvest.
6. Species reintroduction and population enhancement through hatchery propagation.
7. Education.
8. Identify limiting factors and threats to existence and remove them.
9. Conduct stock assessments and population inventories.
10. Develop and implement BRC's/IRC's and a mitigation plan.
11. Improve lake level management.

Critical hypotheses:

1. Funding will be available for M&E, O&M and implementation of projects.

2. Improved spawning, rearing and overwintering habitat will increase the carrying capacity in the subbasin.
3. Fencing of riparian areas will stabilize banks and cause channel to incise vertically.
4. Riparian planting will stabilize banks and provide shade.
5. Increased shade will contribute to cooler water temperatures.
6. Restoration of upland areas will minimize instream habitat degradation.
7. Lack of data pertaining to stock status in the subbasin.

Performance measures:

Related projects:

5501100	Lake Pend Oreille Bull Trout Recovery
9404700	Lake Pend Oreille Fishery Recovery
9501400	Idaho Loss Assessment

B. Rainbow trout

Objectives:

1. Mitigate and compensate for resident fish losses caused by the construction and operation of federally regulated and federally operated hydroprojects.
2. Improve sport fishing opportunity for rainbow trout.

Strategies:

1. Conduct habitat assessments.
2. Determine areas within tributaries and upland sites for enhancement opportunties.
3. Conduct habitat improvements techniques involving: riparian planting, fencining, and instream structures.
4. Monitor and evaluate the effectiveness of habitat improvement projects.
5. Enforcement of illegal harvest.
6. Species reintroduction and population enhancement through hatchery propagation.
7. Education.
8. Develop and implement BRC's/IRC's and a mitigation plan.
9. Maintain higher winter lake levels to benefit a major prey item for lake trout (kokanee), thus improving lake trout population size and sport harvest opportunity.

Critical hypotheses:

1. Funding will be available for M&E, O&M and implementation of projects.
2. Improved spawning, rearing and overwintering habitat will increase the carrying capacity in the subbasin.
3. Fencing of riparian areas will stabilize banks and cause the channel in incise vertically.
4. Riparian planting will stabilize banks and provide shade.
5. Increased shade will contribute to cooler water temperatures.
6. Restoration of upland areas will minimize instream habitat degradation.

Performance measures:

1. A statistically significant increase in the rainbow trout sport fishery harvest (both number and size of fish).

Related projects:

9404700 Lake Pend Oreille Fishery Recovery

C. Kokanee salmon

Objectives:

1. Mitigate and compensate for resident fish losses caused by construction and operation of federally regulated and federally operated hydropower projects.
2. Identify current stocks, population levels, habitat conditions, and geographic ranges for protection and/or restoration.
3. Protect fish resources in perpetuity by removing threats to existence to mitigate for uncompensated native fish losses and to prevent further losses.
4. Maintain and improve sport fishing to support annual harvest of 750,000 kokanee.

Strategies:

1. Produce 10-12 million juvenile kokanee annually at Cabinet Gorge for Lake Pend Oreille.
2. Change winter lake level management: keep lake higher in winter to benefit spawning kokanee and incubating eggs.
3. Improve or restore access to historic areas previously blocked.

Critical hypotheses:

1. Winter lake level is controlling the kokanee populations.
2. Food and predation are not limiting kokanee.
3. Thermal stratification will not affect survival.
4. Survival rates of eggs and fry will be higher in years of higher water rates, levels.

Performance measures:

1. A statistically significant increase in numbers of spawning kokanee, increase in sport harvest, increase in hatchery kokanee returns to creek and to hatchery.
2. Sport harvest approaching 750,000 annually.
3. Adult population approaching 3-8 million fish.

Related projects:

9400400 Cabinet Gorge Hatchery Improvements
9403500 Kokanee Impacts Assessment and Monitoring on Lake Pend Oreille
9404700 Lake Pend Oreille Fishery Recovery

D. Lake trout

Objectives:

1. Mitigate and compensate for resident fish losses caused by the construction and operation of federally regulated and federally operated hydroprojects.
2. Improve sport fishing opportunity for lake trout.

Strategies:

1. Maintain higher winter lake levels to benefit a major prey item for lake trout (kokanee), thus improving lake trout population size and sport harvest opportunity.

Critical hypotheses:

1. An increase in kokanee abundance will result in an increase in lake trout abundance which will result in an improved lake trout fishery.

Performance measures:

1. A statistically significant increase in the lake trout sport fishery harvest (both number and size of fish).

Related projects:

9404700 Lake Pend Oreille Fishery Recovery

6.4.5.7 Kootenai River

A. Kootenai white sturgeon

Objectives

1. Mitigate and compensate for decline of white sturgeon in the Kootenai River caused by the construction and operation of Libby Dam
2. Preserve existing gene pool and re-establish natural age structure of the population.
3. Restore recruitment produced by naturally-spawning adult sturgeon in the Kootenai River.
4. Restore this stock of sturgeon to a sufficient abundance and age distribution to allow for ceremonial, subsistence and recreational harvest by tribal members and recreational harvest by sport anglers.
5. Recovery and delisting of Kootenai River white sturgeon population.

   Quantitative objective: Defined in recovery plan.

Strategies

1. Mitigate through a combination of habitat protection and restoration, fish passage improvements, off-site mitigation measures, hatchery production and dam operations.
2. Assist in development/implementation of recovery plan.
3. Implement IRCs and tiered flow regime from Libby Dam to provide sufficient flows and habitat for successful white sturgeon spawning and recruitment.

4. Operate white sturgeon culture station to meet mating strategies and stocking goals outlined in Kincaid breeding plan
5. Monitor tiered approach and optimal temperatures to find threshold between reproductive success and failure.
6. Conduct stock assessments including juvenile food supplies and juvenile survival to identify bottlenecks in natural recruitment and limiting factors.
7. Evaluate water quality in the Kootenai River for heavy metal and phenol pollutants.
8. Develop predictive model to estimate trophic responses to a range of hypothetical management options for the Kootenai River aquatic ecosystem.

Critical Hypotheses:

1. Augmented flows from Libby Dam will result in white sturgeon spawning and recruitment.
2. Habitat loss and lowered productivity has an effect on egg to yearling survival.
3. The lack of nutrients is not the single most important factor limiting restoration of white sturgeon.
4. The captive breeding program will protect and preserve genetic variability of Kootenai Rive white sturgeon while the effectiveness of augmented flows in restoring natural spawning and recruitment is evaluated.

Performance Measures:

1. Successful spawning and recruitment of year classes of white sturgeon, brought about through repeatable flow augmentation from Libby Dam..
2. Maintenance of genetic variability of the population.
3. Rebuilding of age class structure.
4. Ultimately, delisting species.
5. Sustainable consumptive/nonconsumptive fishery on the population.

Related Projects:

5508900	Timing of the development of white sturgeon embryos
8346500	Libby and Hungry Horse Modeling and Technical Analysis
8346700	Libby Reservoir levels/Kootenai IFIM
8806400	Kootenai River white sturgeon study and experimental aquaculture
8806500	Kootenai River Fisheries Investigations
9401200	Kootenai River white sturgeon - M&E
9404900	Kootenai River Ecosystem Improvements Study
9501200	Monitoring of integrated rule curve implementation Hungry Horse/Libby
9501400	Idaho Loss Assessment

B. Resident species (Bull trout, cutthroat trout, rainbow trout, kokanee salmon, mountain whitefish, burbot)

Objectives

1. Mitigate and compensate for resident fish losses caused by construction and operation of federally regulated and federally operated hydropower projects.

   Quantitative objectives:

   a) Restoration of annual loss of 57,183 juvenile Oncorhynchus trout and 125,000 juvenile bull trout in inundated reservoir tributaries;
   b) Restoration of 14,948 Oncorhynchus trout in inundated Kootenai River;
   c) Replace annual loss of 377,156 mountain whitefish from the mainstem Kootenai River due to Libby Dam;
   d) Restoration of 109 miles of spawning and rearing habitat in streams inundated by Libby Reservoir;
   e) Restoration of 34 miles of degraded stream habitat.

2. Create viable populations in historic spawning and rearing areas.

   Quantitative objectives:

   a) Establishment of 5 subpopulations of bull trout in the 25 mile section of the Kootenai River between Libby Dam and Kootenai Falls (that were fractionated when the dam was built) to achieve a viable metapopulation).
   b) Restoration of mountain whitefish spawning populations in newly opened Hungry Horse Reservoir tributaries to provide recreational harvest and food for bald eagles.

4. Recover to sustainable harvest levels the migratory kokanee populations that historically spawned in westside tributaries to the Kootenai River in Idaho.
5. Provide a subsistence and recreational fisheries based on sustainable harvest levels for kokanee salmon in Libby Reservoir, kokanee entrained through Libby Dam into the Kootenai River, and burbot in the Kootenai River.

   Quantitative objective: Harvest and escapement from Table _

Strategies

1. Use habitat improvement techniques to restore habitat necessary to sustain natural reproduction and recruitment: revegetation, bank stabilization, cover installation, spawning substrate improvement, pool formation, and riparian fencing. (including Idaho tributaries to Kootenai River).
2. Correct fish passage problems: screens, fish ladders, jump pool construction, culvert replacement, baffles for velocity reduction and resting areas.
3. Dam operation modifications: implement Integrated Rule Curves, flow ramping rates, seasonal flow restrictions, minimum and maximum flow limits.
4. Harvest management: regulations and enforcement, education, and voluntary angler practices.
5. Hatchery propagation: imprint planting, species reintroductions, and population enhancement (including exploration of the feasibility of instream egg incubation or conservation aquaculture to enhance kokanee in Idaho).
6. Research and monitoring: pre- and post-treatment sampling, cost effectiveness evaluations. (including annual trends in kokanee year class and growth, nutrification alteration effects, burbot tagging and recovery to identify habitats and movements)

7. Assess the feasibility of various technologies to control entrainment at Libby Dam.
8. Identify historic, and current stocks, population levels, habitat conditions, geographic range of rainbow trout and burbot as targets for protection and/or restoration.
9. Evaluate Water quality in the Kootenai River for heavy metal and phenol pollutants.
10. Develop a predictive model to estimate trophic responses to a range of hypothetical management options for the Kootenai River aquatic ecosystem.

Critical Hypotheses:

1. Improved spawning, rearing, and overwintering habitat will increase carrying capacity in a given stream.
2. Improved fish access to tributary habitat blocked by man-caused barriers will initiate spawning runs of fluvial and adfluvial stocks.
3. Restoration of natural thermal regime and removal of unnatural thermal fluctuation will enhance fish growth potential and aquatic prey production.
4. By restoring a more natural river function and reducing reservoir surface fluctuation (IRCs), riparian vegetation will stabilize shorelines and banks, channels will stabilize with adequate cover and pool habitat, naturalized flows will provide cues for spawning migrations and create a spring freshet to resort and cleanse river sediments.
5. Improved public awareness and compliance will focus harvest and angling pressure away from critical fish restoration sites.
6. New innovative hatchery propagation techniques and stocking strategies can provide tool for species recovery and replace lost fish production.
7. IRC's will be implemented in a form acceptable to Montana and Kootenai Tribe.
8. Winter power production in the Kootenai River prevents burbot migration and spawning.
9. Alteration of the natural hydrograph and lowered productivity of the system due to construction and operation of Libby Dam has caused the aquatic system to decline.

Performance Measures:

1. Identification of bull trout, cutthroat trout, rainbow trout, and burbot stocks and their status.
2. Valid estimates of bull trout, cutthroat trout, rainbow trout, and burbot losses due to hydropower development.
3. Development and implementation of a mitigation plan.
4. Improved bull trout, cutthroat trout, and rainbow trout production, growth and survival.
5. Protection, restoration, and reconnection of spawning and rearing habitat (miles by gradient and stream order).
6. Implement balanced dam operations.
7. Maintain population of 1.5 million kokanee in Libby Reservoir (>300 mm TL), annual harvest of 600,000 (reservoir and river), and annual escapement of 40,000 adult spawners to headwater tributaries.
8. Successful spawning and recruitment by burbot.

9. Production of thorough biological status report of aquatic biota and recommendations for nutrient/productivity manipulation.

Related Projects:

8346500 Libby and Hungry Horse Modeling Technical Analysis
8346700 Libby Reservoir levels/Kootenai IFIM
8806400 Kootenai River white sturgeon study and experimental aquaculture
8806500 Kootenai River Fisheries Investigations
9404900 Kootenai River Ecosystem Improvements Study
9501200 Monitoring of integrated rule curve implementation Hungry Horse/Libby
9501400 Idaho Loss Assessment
9602600 Montana Model Watershed Program

Table 6- 8 Biological objectives for kokanee salmon in four Kootenai River tributaries to restore historic fisheries by the Kootenai Tribe of Idaho

Stream	Harvest (number)	Escapement (number)	Biological Objective	Period	Year Completed
Parker Creek	0	350	350	Interim	2000
	200	500	700	Long Term	2008
Long Canyon Creek	800	800	1,600	Interim	2000
	2,144	1,056	2,300	Long Term	2008
Smith Creek	100	500	600	Interim	2000
	700	500	1,200	Long Term	2008
Boundary Creek	550	550	1,100	Interim	2000
	1,474	726	2,200	Long Term	2008

6.4.5.8 Flathead Subbasin

A. Resident gamefish species (Bull trout, kokanee salmon, westslope cutthroat trout, mountain whitefish)

Objectives

1. Mitigate for annual fish losses caused by construction and operation of Hungry Horse Dam.
   Quantitative objective: 350,000 juvenile bull trout, 100,000 adult kokanee, 65,500 juvenile cutthroat trout
2. Replace Hungry Horse Dam caused loss of critical spawning and rearing habitat in streams inundated by Hungry Horse Reservoir.
   Quantitative objective: 78 miles of habitat
3. Restore mountain whitefish spawning populations in newly opened Hungry Horse Reservoir tributaries to provide recreational harvest and food for bald eagles.

Strategies

1. Use habitat improvement techniques: revegetation, bank stabilization, cover installation, spawning substrate improvement, pool formation.
2. Correct fish passage problems: screens, fish ladders, jump pool construction, culvert replacement, baffles for velocity reduction and resting areas.
3. Thermal control in 47 miles of Flathead River through operation of selective withdrawal structure on Hungry Horse Dam.

4. Dam operation modifications: implement Integrated Rule Curves, flow ramping rates, seasonal flow restrictions, minimum and maximum flow limits.
5. Harvest management: regulations and enforcement, education, and voluntary angler practices.
6. Hatchery propagation: imprint planting, species reintroductions, and population enhancement.
7. Research and monitoring: pre- and post-treatment sampling, cost effectiveness evaluations.

Critical Hypotheses:

1. Improved spawning, rearing, and overwintering habitat will increase carrying capacity in a given stream.
2. Improved fish access to tributary habitat blocked by man-caused barriers will initiate spawning runs of fluvial and adfluvial stocks.
3. Restoration of natural thermal regime and removal of unnatural thermal fluctuation will enhance fish growth potential and aquatic prey production.
4. By restoring a more natural river function and reducing reservoir surface fluctuation (IRCs), riparian vegetation will stabilize shorelines and banks, channels will stabilize with adequate cover and pool habitat, naturalized flows will provide cues for spawning migrations and create a spring freshet to resort and cleanse river sediments.
5. Improved public awareness and compliance will focus harvest and angling pressure away from critical fish restoration sites.
6. New innovative hatchery propagation techniques and stocking strategies can provide tool for species recovery and replace lost fish production.
7. IRC's will be implemented in a form acceptable to Montana.

Performance Measures:

1. Increase in juvenile bull trout and bull trout production, growth, and survival.
2. Kokanee recruitment to fishable size, maturation and spawning, natural reproduction, egg to fry and yearling survival (30% survival of kokanee 1 year after stocking, yearling to adult survival of 10% or 100,000 kokanee, harvest of 50,000 kokanee >11", and fishing pressure of 100,000 hours).
3. Increases in catch rates of native species.
4. Protect, restore, or reconnect habitat (miles by gradient and stream order).
5. Implementation of balanced dam operations.
6. Increased abundance of native species.
7. Linear stream distance of riparian vegetation restored/enhanced by planting or fencing.
8. Linear distance of stream channel reconstructed.
9. Preparation of a mitigation plan to compensate for fisheries losses due to construction and operation of Libby Dam including loss/gain statement, criteria for project prioritization and list of mitigation options.
10. Stimulation of public interest in the Flathead drainage using education, public scoping meetings, and a citizen advisory committee.

Related Projects:

8345600 Libby and Hungry Horse Modeling technical analysis
9101901 Hungry Horse Fisheries Mitigation - Confederated Salish and Kootenai Tribes
9101903 Hungry Horse Mitigation/Habitat improvements
9101904 Hungry Horse Mitigation - Creston Fish Recovery
9501200 Monitoring of Integrated Rule Curve Implementation Hungry Horse/Libby
9502500 Flathead River Instream Flow Study
9502600 Montana Model Watershed Program

6.4.6 Lower Snake Subregion

6.4.6.1 Mainstem and major tributary mainstems

A. White sturgeon

Objectives:

1. Restore abundance and productivity of naturally-produced white sturgeon to the maximum extent allowable by existing habitat capacity given the reduced capacities caused by hydropower development and operations.
2. Restore long-term sustainable yield of white sturgeon sport and tribal fisheries given brood stock population levels that can be sustained under conditions created by hydropower system development and operations.
3. Identify and consider additional mitigation if abundance and yield of naturally-produced white sturgeon cannot be restored to levels sustainable under conditions existing before hydropower system development and operation.

   Quantitative objective: sustainable annual harvest or use equivalent to 5 kg/ha/yr for white sturgeon

Strategies:

1. Configure and operate the hydropower system consistent with the salmonid recovery plan, to maximize spawning and rearing success of white sturgeon populations.
2. If abundance of naturally-spawning white sturgeon cannot be restored to pre-hydrosystem levels, supplement populations with artificially-produced fish where risks to naturally spawning populations are minimal.
3. Monitor population status of white sturgeon to evaluate effectiveness of restoration efforts and conduct research as needed to ensure success of restoration efforts.
4. Regulate harvest of white sturgeon at the population level based on estimated abundance and exploitation rates which provide optimum sustainable yields.

Critical Hypotheses:

1. Natural production of white sturgeon is less than what it was before development and operation of the hydropower system.

2. White sturgeon rearing habitat in many areas is underseeded because of reductions in spawning habitat caused by hydropower system development and operations.
3. White sturgeon production can be significantly enhanced by some combination of spawning and rearing habitat restoration (hydrosystem configuration and operation) and supplementation.
4. Naturally spawning white sturgeon populations can be preserved and optimum rates of production can be restored while concurrently maintaining conservative tribal and recreational fishery opportunities.

Performance Measures:

1. Stable white sturgeon abundance, biomass, age composition, and annual harvest at target levels over a period corresponding to one generation.

Related Projects:

8605000 White sturgeon productivity, status, and habitat requirements (in progress)
8605001 Evaluate rebuilding Snake River sturgeon (HCD-LGD)

B. Sensitive native species (bull trout, westslope cutthroat trout, redband, etc.)

Objectives:

1. Ensure that sensitive native population levels are above minimum viable population sizes which maintain adaptability and genetic diversity, maximize probability of survival, and do not constrain consumptive and nonconsumptive uses of other species to protect sensitive populations.
   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations
2. Restore populations to near historic levels with sustaini)able harvest opportunities.
   Quantitative objective: sustainable harvest rate of .5 fish/hr.

Strategies:

1. Obtain stock assessment information of sensitive native fish populations incidental to work focused on other problems. (for instance, predation, fall chinook rearing, or sturgeon restoration evaluations).
2. Restore anadromous fish habitat and abundance to near historic levels to provide nutrients, food resources, and habitat conditions suitable for sensitive resident species.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of sensitive native populations in mainstem areas.
2. Sensitive native populations in mainstem areas can be protected and restored with similar measures to those which restore normative river functions to benefit anadromous

species and white sturgeon.

3. Sampling effort associated with other projects is adequate to identify distribution and relative abundance of sensitive species in mainstem areas.

Performance Measures:

1. Detailed habitat protection and restoration plans for sensitive native species in mainstem areas.

C. Introduced gamefish (bass, crappie, catfish, etc.)

Objectives:

1. Reduce or eliminate detrimental effects of existing introduced gamefish species on sensitive native species where feasible in mainstem areas.
2. Provide only those opportunities for consumptive and nonconsumptive uses of introduced gamefish populations which do not produce substantial negative effects on sensitive native species in mainstem areas.

   Quantitative objective: Optimum sustained yield of bass, crappie, and catfish conditional on no substantial native species effects

Strategies:

1. Conduct assessments of introduced gamefish populations in mainstem areas needed to identify and minimize their effects on sensitive native species.
2. Implement hydropower system configurations and operations which reduce effects of introduced gamefish species in mainstem areas on sensitive native species.
3. Obtain stock assessment information appropriate to optimizing management of introduced gamefish species in mainstem areas incidental to work focused on other problems. (for instance, predation or sturgeon restoration evaluations).

Critical Hypotheses:

1. Eradication of introduced gamefish species from mainstem areas is not feasible nor desirable in all cases.
2. Opportunities exist for management of introduced gamefish in mainstem areas that optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.

Performance Measures:

1. Angler effort, angler catch rate, and size-specific harvest of introduced gamefish in mainstem areas.

Related Projects:

900770 Predator control program evaluation (anadromous)

6.4.6.2 Subbasin Tributaries

A. Native species (bull trout, cutthroat trout, redband, etc.)

Objectives:

1. Maintain and restore population productivity reduced by hydropower development and operations to healthy levels which provide opportunities for consumptive and nonconsumptive uses of native populations or other species whose use is constrained to protect sensitive populations in subbasin tributaries

   Quantitative objective: interim sustainable harvest rate of .5 fish/hr.
2. Ensure population levels of native fish in subbasin tributaries are above minimum viable population sizes which maintain adaptability and genetic diversity, and maximize probability of survival.

   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations

Strategies:

1. Identify and estimate the status of unique populations and groups of native fish species in subbasin tributaries.
2. Identify limiting factors (i.e., critical habitat per life stage, genetic introgression, etc.) affecting management objectives (i.e., biological objectives) for native fish populations in subbasin tributaries.
3. Implement selected measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore connectivity between isolated subpopulations, and meet biological objectives for native fish populations in subbasin tributaries.
4. Improve and maintain stream flows in the subbasin to more resemble the natural hydrograph (including timing, volume, duration, temperature etc.) to benefit native resident fish.
5. Implement an irrigation diversions screening program with monitoring and evaluation, and screen maintenance provisions.
6. Provide educational information to the public to promote conservation of bull trout and westslope cutthroat trout.
7. Provide enforcement emphasis to protect weak stocks from illegal harvest and harassment.
8. Purchase land and water for the purpose of protecting and restoring native fish species.
9. Restore anadromous fish habitat and abundance to near historic levels to provide nutrients, food resources, and habitat conditions suitable to support sensitive resident species.
10. Monitor the status of native fish populations in subbasin tributaries to evaluate the effectiveness of restoration efforts and to determine when protection and restoration goals have been achieved.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of native populations in subbasin tributaries.
2. Native populations in subbasin tributaries can be protected and restored by habitat improvement and fish resource management measures.
3. Habitat improvement measures for anadromous species are insufficient for meeting native resident species objectives in subbasin tributaries.
4. Effective and efficient implementation of habitat restoration measures for native fish populations in subbasin tributaries are predicated on assessments of population distribution and status.
5. Enforcement emphasis and public information will increase protection for weak native stocks, such as bull trout and westslope cutthroat trout.
6. Some level of sustained harvest is possible with application of measures to conserve and restore populations and habitat.Performance Measures:

Performance Measures:

1. Distribution, abundance, size composition, genetic characteristics, and habitat associations of native species in subbasin tributaries.

Related Projects:

9405400 Bull trout studies in Central and NE Oregon (in progress)

B. Hatchery-reared and introduced gamefish (rainbow trout, bass, etc.)

Objectives:

1. Protect and enhance native wild stocks of anadromous and resident species as a higher priority than hatchery or introduced gamefish species in subbasin tributaries.
2. Reduce or eliminate detrimental effects of existing hatchery or introduced gamefish species on sensitive native species where feasible in subbasin tributaries.
3. Provide only those opportunities for consumptive and nonconsumptive uses of hatchery or introduced gamefish populations which do not produce substantial negative effects on sensitive native species in subbasin tributaries.

   Quantitative objective: significant fisheries for rainbow trout, bass, etc. conditional on no substantial native species effects

Strategies:

1. Obtain stock assessment information appropriate to optimizing management of hatchery-reared and introduced species.
2. Implement stock specific measures including setting population escapement goals (e.g., redd densities, individual spawner densities) to ensure stocks are maintained and/or restored to healthy levels consistent with available habitat.

3. Develop localized westslope cutthroat trout broodstock to allow westslope cutthroat trout stocking, rather than rainbow trout, for fishery augmentation.
4. Develop ponds to maintain additional intensive and isolated fisher

Critical Hypotheses:

1. Opportunities exist for management of hatchery-reared and introduced gamefish which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.

Performance Measures:

1. Angler effort, angler catch rate, and size-specific harvest of hatchery-reared and introduced gamefish.
2. Genetic assessment to monitor the status of westslope cuthroat trout populations relative to stocking programs based on localized broodstock.

Related Projects:

6.4.6.3 Dworshak Reservoir and Tributraries

A. Native species (bull trout, cutthroat trout, etc.)

Objectives:

1. Maintain and restore population productivity reduced by hydropower development and operations to healthy levels which provide opportunities for consumptive and nonconsumptive uses of native populations .
   Quantitative objective: interim sustainable harvest rate of .5 fish/hr.
2. Ensure population levels of native fish in Dworshak Reservoir are above minimum viable population sizes which maintain adaptability and genetic diversity, and maximize probability of survival.
   Quantitative objective**:** minimum breeding populations of 150-300 individuals and >9% probability of persistence for at least 5 generations

Strategies:

1. Identify and estimate the status of populations and groups of populations of native fish species with unique genetic characteristics in Dworshak Reservoir and the associated upstream North Fork Clearwater River watershed.
2. Identify factors limiting each population, critical habitats or conditions which limit life stages, and population sizes corresponding to management objectives (i.e. biological objectives) for native fish populations in Dworshak Reservoir.
3. Select and implement measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore genetic integrity and connectivity

between isolated subpopulations, and meet biological objectives for native fish populations in Dworshak Reservoir.

4. Maintain stream flows in the subbasin to mimic the natural hydrograph (including timing, volume, duration, temperature etc.) to conserve native resident fish.
5. Provide educational information to the public to promote conservation of bull trout and westslope cutthroat trout.
6. Provide enforcement emphasis to protect stocks from illegal harvest and harassment.
7. Monitor the status of native fish populations in subbasin tributaries to evaluate the effectiveness of restoration efforts and to determine when protection and restoration goals have been achieved.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of native populations in Dworshak Reservoir and its upstream tributaries.
2. Native populations in Dworshak Reservoir and tributaries can be protected and restored by habitat improvement and fisheries management measures.
3. Effective and efficient implementation of habitat restoration and fisheries management measures for native fish populations must be predicated on assessments of population distribution and status.
4. Enforcement and public information will imnprove protection for bull trout and westslope cutthroat trout stocks.
5. Some level of sustained harvest is possible with application of measures to restore populations and habitat.
6. Westslope cutthroat trout abundance is determined primarily by introgression with introduced rainbow trout and harvest.
7. Introgression increases with increased stocking of rainbow.
8. Westslope cutthroat trout abundance decreases with adverse habitat changes that are less impactive to rainbow trout.
9. Introgression increases with increased stocking of rainbow.
10. Bull trout abundance is determined primarily by brook trout ditribution and tributary habitat quality.

Performance Measures:

1. Distribution, abundance, size composition, genetic characteristics, and habitat associations ofnativespecies in Dworshak Reservoir and upstream tributaries.

Related Projects:

8740700	Dworshak Impacts/M&E & Bio-Int Rule Curves
9501600	Genetic Inventory Westslope Cutthroat Trout

B. Hatchery-reared and introduced gamefish (kokanee, rainbow trout, bass, etc.)

Objectives:

1. Pursue opportunities for improving reservoir/lake fisheries for kokanee salmon(consumptive and nonconsumptive) compatible with or isolated from native species recovery and protection programs.

   Quantitative Objectives: 30-50 adult kokanee/hectare, 300,000+ angler hours annually

3. Increase opportunities for sustainable trout fisheries that are compatible with the continued persistence of native resident species and their restoration to near historic abundances (includes intensive fisheries within closed or isolated systems).

   Quantitative Objectives: 50%+ return to creel of stocked trout. 20,000-100,000 pounds of westslope cutthroat trout from local broodstock stocked annually forr Dworshak mitigation. 1+ fish/hr harvest rate for target fisheries.

4. Develop additional hatchery trout fisheries to substitute, in part, for anadromous fisheries until anadromous fisheries impacted by federally licensed and federally operated hydroelectric facilities, are restored to near historic levels.

   Quantitative Objective: Pond development/management/maintenance within the NPT Reservation to support 8,750-10,500 pounds of trout annually for a consumptive fishery.

5. Increase opportunities for sustainable smallmouth bass fisheries that are compatible with the continued persistence of native resident species and their restoration to near historic abundance.
6. Promote self-sustaining smallmouth bass fisheries in suitable habitat.
7. Promote quality bass fishing (i.e., suitable ratio of >280 mm fish to >180 mm fish).

   Quantitative Objecftive: PSD = 30 for smb. Relative Weight near 100 for all size classes of smb.

Strategies:

1. Control or eliminate kokanee entrainment through Dworshak Dam.
2. Manage water levels in Dworshak to promote smallmouth bass reproduction, and maximize terrestrial invertebrate influx and plankton and benthic food production.
3. Actively revegetate Dworshak Reservoir shoreline areas food production and rearing habitat for trout and smallmouth bass.
4. Locate a pure strain of North Fork Clearwater westslope cutthroat trout for broodstock development.
5. Develop/Manage/Maintain 14 fish ponds averaging 6 acres with production of 125-130 pounds per acre.

Critical Hypotheses:

1. The "normative river" concept will be applied to Dworshak Dam operations so as to match outflow to inflow in late spring through summer.
2. Recommended reservoir operations provide the only or the most cost-effective alternative of meeting planning objectives.

3. Selective water withdrawal and can reduce entrainment and improve reservoir productivity.
4. Kokanee abundance and harvest are determined primarily by entrainment mortality and spawning escapement.
5. Entrainment mortality increases as high flows through the reservoir move age-0 fish into the forebay and stimulate migration by age-0 and age-1 fish.
6. Increased dam discharge increases flow through the reservoir.
7. Bass abundance and harvest are determined primarily by growth and recruitment.
8. Bass growth and condition increases with temperature and food supply.
9. Bass and trout food supply increases with a more stable surface elevation which allows passive or active littoral vegetation development.
10. Bass recruitment is directly related to spawning success.
11. Bass spawning success is reduced by dam discharges which reduce reservoir surface elevation and strand nests or increase elevation and flood nests with cold water.
12. The genetic impacts of exotic rainbow trout stocking into westslope cutthroat trout populations are reversible.
13. Recommended reservoir operations provide the only or the most cost-effective alternative of meeting planning objectives.
14. Suitable locations exist within the Nez Perce Reservation for development of 12 new fish ponds averaging 6 acres.

Performance Measures:

1. kokanee abundance/density, catch/harvest rates, fishery yield, return to creel percentage, genetic profiles, population structure indeces, surface area of littoral vegetation.

Related Projects:

8740700	Dworshak Impacts/M&E & Bio-Int Rule Curves
8709900	Dworshak Impacts Assessment
9501600	Genetic Inventory Westslope Cutthroat Trout
9501400	Idaho Loss Assessment
9501300	Nez Perce Trout Ponds

6.4.7 Upper Snake Subregion

6.4.7.1 Mainstem / Hells Canyon Reservoirs

A. *White sturgeon*

Objectives:

1. Provide fishery opportunities for white sturgeon to the maximum extent allowable by existing habitat capacity of mainstem reservoirs given reductions caused by hydropower development and operations.

   Quantitative objective: biomass at carrying capacity and significant angler effort

Strategies:

1. Supplement populations with artificially-produced fish such that risks are minimal to naturally spawning populations downstream from Hells Canyon Dam and upstream from Brownlee Reservoir.
2. Monitor and regulate fisheries for white sturgeon to optimize benefits.
3. Improve water quality to prevent summer fish kills.

Critical Hypotheses:

1. Natural production of white sturgeon in reservoirs is no longer feasible with development and operation of the hydropower system.
2. White sturgeon production in impoundments can be significantly enhanced by supplementation.
3. Water quality is reduced by anthropomorphic sources of nutrients.

Performance Measures:

1. Stable white sturgeon abundance, biomass, age composition, and angler success rates.

Related Projects:

5504100 Consumptive Sturgeon Fishery - Hell's Canyon/Oxbow Pools

B. Sensitive native species (bull trout, redband, etc.)

Objectives:

1. Protect native fish and their habitats in perpetuity.
2. Restore and maintain the health and diversity of native resident fish populations and their habitats.

   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations.
3. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects.
4. Protect and maintain the health and diversity of watersheds.
5. Pursue opportunities for resident fisheries (consumptive and nonconsumptive) compatible with or isloated from native species protection and recovery programs.

   Quantitative objectives: To be developed for all objectives.

Strategies:

1. Identify and estimate the status of populations and groups of populations of native fish species with unique genetic characteristics.
2. Identify factors limiting each population, critical habitats or conditions which limit life stages, and population sizes corresponding to management objectives (i.e. biological objectives) for native fish populations.
3. Select and implement measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore connectivity between isolated subpopulations, and meet biological objectives for native fish populations.
4. Identify historic native fish population levels, habitat conditions, and geographic ranges as targets for restoration.
5. Monitor and evaluate results of efforts to restore fish populations, habitats and fisheries.
6. Continue to quantify and refine targets for protection, restoration, and fisheries.
7. Restore anadromous fisheries to near historic levels to provide nutrients and food resources to support sensitive resident species near historic levels.
8. Develop and implement BRC's and IRC's.
9. Improve streamflows to more resemble the natural hydrograph (including timing, volume, duration, temperature etc.) to benefit resident fish.
10. Purchase land and water for the purpose of protecting and restoring native fish species . This inclueds all the required analyses and permits.
11. Implement an irrigation diversion screening program with monitoring, evaluation, and screen maintenance provisions.
12. Provide educational information to the public to promote conservation of sensitive native species.
13. Provide enforcement emphasis to protect stocks from illegal harvest and harassment.
14. Develop and implement subregional/subbasin mitigation plans based on loss assessments
15. Form an Watershed Councils when and where needed.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of sensitive native populations in mainstem reservoirs.
2. It is possible to estimate historic population levels, habitat conditions, and geographic ranges.
3. Populations will respond to protection/restoration measures.
4. Some level of sustainable harvest is possivle with the application of restoration and protection measures.
5. Extinction is preventable.

Performance Measures:

1. Detailed habitat protection and restoration plans for sensitive native species in mainstem reservoirs.
2. Implementation of BRC's and IRC's.

3. Implementation of restoration plans.
4. Identification of native stocks and their status.
5. Valid estimates of native fish losses due to hydropower development.
6. Improved flow regimes in the subbasin that benefit native resident fish.

Related Projects:

9106700	Idaho Water Rental
5501900	Genetic Analysis of Snake River Salmonids
5502000	Snake River Native Salmonid Assessment
9501400	Idaho Loss Assessment

C. Introduced gamefish (bass, crappie, catfish, etc.)

Objectives:

1. Protect and enhance native wild stocks of anadromous and resident species as a higher priority than introduced gamefish species in mainstem reservoirs.
2. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects.
3. Provide opportunities for consumptive and nonconsumptive uses of introduced gamefish populations which do not produce substantial negative effects on sensitive native resident or anadromous species.

   Quantitative objective: optimum sustained yield of bass, crappie, and catfish conditional on no negative native species effects. Other quantitative objectives to be developed for all objectives.

Strategies:

1. Evaluate the effects of hydropower system operations to identify alternatives for optimizing management of introduced gamefish species in mainstem reservoirs within the constraints imposed by anadromous and native resident fish objectives.
2. Monitor and regulate populations and fisheries to optimize benefits.
3. Create and maintain consumptive, nonconsumptive, or trophy fisheries in closed or isolated waters or such that they do not impact native species protection and recovery programs.

Critical Hypotheses:

1. Opportunities exist for management of introduced gamefish in mainstem reservoirs which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.
2. These fisheries/populations do not negatively impact native resident populations.
3. These fisheries will be self-sustaining.

Performance Measures:

1. Angler effort, angler catch rate, and size-specific harvest of introduced gamefish in mainstem reservoirs.

Related Projects:

D. Hatchery-reared trout

Objectives:

1. Protect and enhance native wild stocks of anadromous and resident species as a higher priority than hatchery-reared trout in mainstem reservoirs.
2. Enhance existing trout fisheries and pursue development of others that are compatible with the preservation and enhancement of native resident and anadromous species to substitute for lost anadromous fisheries.
3. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects.

   Quantitative objective: significant fisheries for rainbow trout conditional on no negative native species effects.

Strategies:

1. Monitor and regulate fisheries and stocking programs to optimize benefits to anglers (e.g. catch rates, return to creel, etc.) and to ensure no negative impacts to native species.
2. Develop and maintain consumptive, noncomsumptive, and trophy fisheries in closed or isolated waters.

Critical Hypotheses:

1. Opportunities exist for management of hatchery-reared trout which optimize consumptive and nonconsumptive use and do not negatively affect sensitive native species.

Performance Measures:

1. Angler effort, angler catch rate, and catch rate of hatchery-reared trout.

Related Projects:

6.4.7.2 Subbasin Tributaries (downstream from Shoshone Falls)

A. Native species (bull trout, cutthroat trout, etc.)

Objectives:

1. Protect native fish and their habitats in perpetuity.

2. Restore and maintain the health and diversity of native resident fish populations and their habitats.

   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations.
3. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects.
4. Protect and maintain the health and diversity of watersheds.
5. Pursue opportunities for resident fisheries (consumptive and nonconsumptive) compatible with or isloated from native species protection and recovery programs.

   Quantitative objectives: To be developed for all objectives.

Strategies:

1. Identify and estimate the status of populations and groups of populations of native fish species with unique genetic characteristics.
2. Identify factors limiting each population, critical habitats or conditions which limit life stages, and population sizes corresponding to management objectives (i.e. biological objectives) for native fish populations.
3. Select and implement measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore connectivity between isolated subpopulations, and meet biological objectives for native fish populations.
4. Identify historic native fish population levels, habitat conditions, and geographic ranges as targets for restoration.
5. Monitor and evaluate results of efforts to restore fish populations, habitats and fisheries.
6. Continue to quantify and refine targets for protection, restoration, and fisheries.
7. Restore anadromous fisheries to near historic levels to provide nutrients and food resources to support sensitive resident species near historic levels.
8. Develop and implement BRC's and IRC's.
9. Improve streamflows to more resemble the natural hydrograph (including timing, volume, duration, temperature etc.) to benefit resident fish.
10. Purchase land and water for the purpose of protecting and restoring native fish species . This inclueds all the required analyses and permits.
11. Implement an irrigation diversion screening program with monitoring, evaluation, and screen maintenance provisions.
12. Provide educational information to the public to promote conservation of sensitive native species.
13. Provide enforcement emphasis to protect stocks from illegal harvest and harassment.
14. Develop and implement subregional/subbasin mitigation plans based on loss assessments
15. Form an Watershed Councils when and where needed.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of native populations in subbasin tributaries.
2. Native populations in subbasin tributaries can be protected and restored by habitat improvement measures.
3. Habitat improvement measures for anadromous species are insufficient for meeting native resident species objectives in subbasin tributaries.
4. Effective and efficient implementation of habitat restoration measures for native fish populations in subbasin tributaries must be predicated on assessments of population distribution and status.
5. Enforcement emphasis and public information will increase protection for native stocks.
6. Some level of sustained harvest is possible with application of measures to restore and protect populations and habitat.
7. It is possible to estimate historic population levels, habitat conditions, and geographic ranges.
8. Extinction is preventable.

Performance Measures:

1. Detailed habitat protection and restoration plans for sensitive native species
2. Implementation of BRC's and IRC's.
3. Implementation of restoration plans.
4. Identification of native stocks and their status (Distribution, abundance, size composition, genetic characteristics, and habitat associations, etc).
5. Valid estimates of native fish losses due to hydropower development.
6. Improved flow regimes in the subbasin that benefit native resident fish.
7. Recovery of weak stocks.

Related Projects:

9405400 Bull trout studies in Central and NE Oregon (in progress)
9106700 Idaho Water Rental
5501900 Genetic Analysis of Snake River Salmonids
5502000 Snake River Native Salmonid Assessment
5505600 Habitat Enhancement & Protection - Shoshone-Paiute Reservation 9501400 Idaho Loss Assessment
5508400 Hunter Creek - BPT
5508600 Stinking Water Salmonid Project

B. Hatchery-reared and introduced gamefish (rainbow trout, bass, etc.)

Objectives:

1. Protect and enhance native wild stocks of anadromous and resident species as a higher priority than hatchery-reared or introduced gamefish species.

2. Enhance trout fisheries that are compatible with the preservation and enhancement of native resident and anadromous species to substitute, in part, for anadromous fisheries until anadromous fisheries impacted by federally licensed and federally operated hydroelectric facilities, are restored to near historic levels.

   Quantitative objective: significant fisheries for rainbow trout, bass, etc. conditional on no native species effects

3. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects.

   Quantitative objectives: To be developed for all objectives.

Strategies:

1. Monitor and regulate fisheries and stocking programs to optimize benefits to anglers (e.g. catch rates, return to creel, etc.) and to ensure no negative impactsa to native species.
2. Develop and maintain consumptive, noncomsumptive, and trophy fisheries in closed or isolated waters.
3. Obtain stock assessment information appropriate to optimizing management of hatchery-reared and introduced species
4. Implement stock specific measures including setting population escapement goals (e.g., redd densities, individual spawner densities) to ensure stocks are maintained and/or restored to healthy levels consistent with available habitat.

Critical Hypotheses:

1. Opportunities exist for management of hatchery-reared and introduced gamefish which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.

Performance Measures:

1. Angler effort, angler catch rate, and size-specific harvest of hatchery-reared and introduced gamefish.

Related Projects:

8815600 Duck Valley Fish Stocking Program
9500600 SBT/SPT Joint Culture Facility
9501500 Billy Shaw Reservoir Development

6.4.7.3 Brownlee Pool to Shoshone Falls (mainstem and reservoirs)

A. Native species (White sturgeon, bull trout, redband trout etc.)

Objectives:

1. Protect native fish and their habitats in perpetuity.
2. Restore and maintain the health and diversity of native resident fish populations and their habitats.

   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations.
3. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects.
4. Protect and maintain the health and diversity of watersheds.
5. Pursue opportunities for resident fisheries (consumptive and nonconsumptive) compatible with or isloated from native species protection and recovery programs.

   Quantitative objectives: To be developed for all objectives.

Strategies:

1. Identify and estimate the status of populations and groups of populations of native fish species with unique genetic characteristics.
2. Identify factors limiting each population, critical habitats or conditions which limit life stages, and population sizes corresponding to management objectives (i.e. biological objectives) for native fish populations.
3. Select and implement measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore connectivity between isolated subpopulations, and meet biological objectives for native fish populations.
4. Identify historic native fish population levels, habitat conditions, and geographic ranges as targets for restoration.
5. Monitor and evaluate results of efforts to restore fish populations, habitats and fisheries.
6. Continue to quantify and refine targets for protection, restoration, and fisheries.
7. Restore anadromous fisheries to near historic levels to provide nutrients and food resources to support sensitive resident species near historic levels.
8. Develop and implement BRC's and IRC's.
9. Improve streamflows to more resemble the natural hydrograph (including timing, volume, duration, temperature etc.) to benefit resident fish.
10. Purchase land and water for the purpose of protecting and restoring native fish species . This includes all the required analyses and permits.
11. Implement an irrigation diversion screening program with monitoring, evaluation, and screen maintenance provisions.
12. Provide educational information to the public to promote conservation of sensitive native species.
13. Provide enforcement emphasis to protect stocks from illegal harvest and harassment.
14. Develop and implement subregional/subbasin mitigation plans based on loss assessments
15. Form Watershed Councils when and where needed.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of native populations in mainstem reaches.
2. Native populations can be protected and restored by habitat improvement measures.
3. Habitat improvement measures for anadromous species are insufficient for meeting native resident species objectives.
4. Effective and efficient implementation of habitat restoration measures for native fish populations in subbasin tributaries must be predicated on assessments of population distribution and status.
5. Enforcement emphasis and public information will increase protection for native stocks.
6. Some level of sustained harvest is possible with application of measures to restore and protect populations and habitat.
7. It is possible to estimate historic population levels, habitat conditions, and geographic ranges.
8. Extinction is preventable.

Performance Measures:

1. Detailed habitat protection and restoration plans for sensitive native species
2. Implementation of BRC's and IRC's.
3. Implementation of restoration plans.
4. Identification of native stocks and their status (Distribution, abundance, size composition, genetic characteristics, and habitat associations, etc).
5. Valid estimates of native fish losses due to hydropower development.
6. Improved flow regimes in the subbasin that benefit native resident fish.
7. Recovery of weak stocks.

Related Projects:

9106700	Idaho Water Rental
5501900	Genetic Analysis of Snake River Salmonids
5502000	Snake River Native Salmonid Assessment
9501400	Idaho Loss Assessment

B. Hatchery-reared and introduced trout

Objectives:

1. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally regulated and federally operated hydropower projects.
2. Manage non-native resident fish stocks to ensure the health and diversity of native resident fish stocks, anadromous fish stocks, and wildlife stocks, and their habitats, then maximize consumptive and nonconsumptive use of non-native stocks when appropriate.

Quantitative Objectives: to be developed for all objectives.

Strategies:

1. Pursue opportunities for resident fisheries (consumptive, nonconsumptive, and trophy) compatible with or isolated from native species recovery and protection programs.
2. Monitor and regulate fisheries and stocking programs to optimize benefits to anglers (e.g. catch rates, return to creel, etc.) and to ensure no negative impactsa to native species.

Critical Hypotheses:

1. Opportunities exist for management of hatchery-reared trout which optimize consumptive and nonconsumptive use and do not negatively affect sensitive native species.

Performance Measures:

1. Angler effort, angler catch rate, and catch rate of hatchery-reared trout.

Related Projects:

C. Introduced warmwater gamefish (bass, crappie, catfish, etc.)

Objectives:

1. Protect and enhance native wild stocks of anadromous and resident species as a higher priority than introduced gamefish species in mainstem reaches. 2. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects.
2. Provide opportunities for consumptive and nonconsumptive uses of introduced gamefish populations which do not produce substantial negative effects on sensitive native resident or anadromous species.
3. Reduce or eliminate detrimental effects of existing introduced gamefish species on sensitive native species where feasible in mainstem reaches.

   Quantitative objectives: optimum sustained yield of bass, crappie, and catfish conditional on no negative native species effects - to be further developed. Other quantitative objectives to be developed for all objectives.

Strategies:

1. Evaluate the effects of hydropower system operations to identify alternatives for optimizing management of introduced gamefish species in mainstem reaches within the constraints imposed by anadromous and native resident fish objectives.
2. Monitor and regulate populations and fisheries to optimize benefits.
3. Create and maintain consumptive, nonconsumptive, or trophy fisheries in closed or isolated waters or such that they do not impact native species protection and recovery programs.
4. Conduct only those assessments of introduced gamefish populations in mainstem reservoirs needed to identify and minimize effects on sensitive native species.

5. Implement hydropower system configurations and operations which reduce numbers or effects of introduced gamefish species in mainstem reservoirs on sensitive native species.

Critical Hypotheses:

1. Opportunities exist for management of introduced gamefish in mainstem reservoirs which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.
2. These fisheries/populations do not negatively impact native resident populations.
3. These fisheries will be self-sustaining.
4. Eradication of introduced gamefish species from mainstem reservoirs is not feasible or desirable in all cases.

Performance Measures:

1. Angler effort, angler catch rate, and size-specific harvest of introduced gamefish in mainstem reaches.

Related Projects:

6.4.7.4 Shoshone Falls to headwaters

A. White sturgeon (introduced)

Objectives:

1. Provide fishery opportunities for white sturgeon to the maximum extent allowable by existing habitat capacity of the reach without negatively impacting sensitive native species.

   Quantitative objective: biomass at carrying capacity and significant angler effort. To be developed further.

Strategies:

1. Supplement populations with artificially-produced fish such that risks are minimal to naturally spawning populations downstream.
2. Monitor and regulate fisheries for white sturgeon to optimize angling benefits.
3. Modify fishery and sturgeon population to prevent any negative impact to native species in the reach.

Critical Hypotheses:

1. White sturgeon population is having no negative impact on sensitive native species.
2. The population is sustainable through stocking or natural production.

Performance Measures:

1. Stable white sturgeon abundance, biomass, age composition, and angler success rates.

Related Projects:

B. Native species (cutthroat trout, etc.)

Objectives:

1. Protect native fish and their habitats in perpetuity.
2. Restore and maintain the health and diversity of native resident fish populations and their habitats.

   Quantitative objective: minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations.
3. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects.
4. Protect and maintain the health and diversity of watersheds.
5. Pursue opportunities for resident fisheries (consumptive and nonconsumptive) compatible with or isloated from native species protection and recovery programs.

   Quantitative objectives: To be developed for all objectives.

Strategies:

1. Identify and estimate the status of populations and groups of populations of native fish species with unique genetic characteristics.
2. Identify factors limiting each population, critical habitats or conditions which limit life stages, and population sizes corresponding to management objectives (i.e. biological objectives) for native fish populations.
3. Select and implement measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore connectivity between isolated subpopulations, and meet biological objectives for native fish populations.
4. Identify historic native fish population levels, habitat conditions, and geographic ranges as targets for restoration.
5. Monitor and evaluate results of efforts to restore fish populations, habitats and fisheries.
6. Continue to quantify and refine targets for protection, restoration, and fisheries.
7. Restore anadromous fisheries to near historic levels to provide nutrients and food resources to support sensitive resident species near historic levels.
8. Develop and implement BRC's and IRC's.
9. Improve streamflows to more resemble the natural hydrograph (including timing, volume, duration, temperature etc.) to benefit resident fish.
10. Purchase land and water for the purpose of protecting and restoring native fish species . This includes all the required analyses and permits.
11. Implement an irrigation diversion screening program with monitoring, evaluation, and screen maintenance provisions.
12. Provide educational information to the public to promote conservation of sensitive native species.
13. Provide enforcement emphasis to protect stocks from illegal harvest and harassment.

14. Develop and implement subregional/subbasin mitigation plans based on loss assessments
15. Form an Watershed Councils when and where needed.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of native populations in mainstem reaches.
2. Native populations can be protected and restored by habitat improvement measures.
3. Habitat improvement measures for anadromous species are insufficient for meeting native resident species objectives.
4. Effective and efficient implementation of habitat restoration measures for native fish populations in subbasin tributaries must be predicated on assessments of population distribution and status.
5. Enforcement emphasis and public information will increase protection for native stocks.
6. Some level of sustained harvest is possible with application of measures to restore and protect populations and habitat.
7. It is possible to estimate historic population levels, habitat conditions, and geographic ranges.
8. Extinction is preventable.

Performance Measures:

1. Detailed habitat protection and restoration plans for sensitive native species
2. Implementation of BRC's and IRC's.
3. Implementation of restoration plans.
4. Identification of native stocks and their status (Distribution, abundance, size composition, genetic characteristics, and habitat associations, etc).
5. Valid estimates of native fish losses due to hydropower development.
6. Improved flow regimes in the subbasin that benefit native resident fish.
7. Recovery of weak stocks.

Related Projects:

9106700	Idaho Water Rental
5501900	Genetic Analysis of Snake River Salmonids
5502000	Snake River Native Salmonid Assessment
9501400	Idaho Loss Assessment
9201000	Habitat Restoration/Enhancement Ft. Hall Bottoms
9500600	SBT/SPT Joint Culture Facility

C. Hatchery-reared and introduced trout

Objectives:

1. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally regulated and federally operated hydropower projects.
2. Manage non-native resident fish stocks to ensure the health and diversity of native resident fish stocks, anadromous fish stocks, and wildlife stocks, and their habitats, then maximize consumptive and nonconsumptive use of non-native stocks when appropriate.

   Quantitative Objectives: to be developed for all objectives.

Strategies:

1. Pursue opportunities for resident fisheries (consumptive, nonconsumptive, and trophy) compatible with or isolated from native species recovery and protection programs.
2. Monitor and regulate fisheries and stocking programs to optimize benefits to anglers (e.g. catch rates, return to creel, etc.) and to ensure no negative impacts to native species.

Critical Hypotheses:

1. Opportunities exist for management of hatchery-reared trout which optimize consumptive and nonconsumptive use and do not negatively affect sensitive native species.

Performance Measures:

1. Angler effort, angler catch rate, and catch rate of hatchery-reared trout.

Related Projects:

9500600 SBT/SPT Joint Culture Facility

D. Introduced warmwater gamefish (bass, crappie, catfish, etc.)

Objectives:

1. Protect and enhance native wild stocks of resident species as a higher priority than introduced gamefish species.
2. Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects.
3. Provide opportunities for consumptive and nonconsumptive uses of introduced gamefish populations which do not produce substantial negative effects on sensitive native resident species.
4. Reduce or eliminate detrimental effects of existing introduced gamefish species on sensitive native species where feasible.

   Quantitative objectives: optimum sustained yield of bass, crappie, and catfish conditional on no negative native species effects - to be further developed. Other quantitative objectives to be developed for all objectives.

Strategies:

1. Evaluate the effects of hydropower system operations to identify alternatives for optimizing management of introduced gamefish species in mainstem reaches within the constraints imposed by anadromous and native resident fish objectives.
2. Monitor and regulate populations and fisheries to optimize benefits.
3. Create and maintain consumptive, nonconsumptive, or trophy fisheries in closed or isolated waters or such that they do not impact native species protection and recovery programs.
4. Conduct only those assessments of introduced gamefish populations in mainstem reservoirs needed to identify and minimize effects on sensitive native species.
5. Implement hydropower system configurations and operations which reduce numbers or effects of introduced gamefish species in mainstem reservoirs on sensitive native species.

Critical Hypotheses:

1. Opportunities exist for management of introduced gamefish in mainstem reservoirs which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.
2. These fisheries/populations do not negatively impact native resident populations.
3. These fisheries will be self-sustaining.
4. Eradication of introduced gamefish species from mainstem reservoirs is not feasible or desirable in all cases.

Performance Measures:

1. Angler effort, angler catch rate, and size-specific harvest of introduced gamefish in mainstem reaches.
2. Eradication of introduced gamefish species from mainstem reservoirs is not feasible or desirable in all cases.
3. Opportunities exist for management of introduced gamefish in mainstem reservoirs which optimize consumptive and nonconsumptive use and do not significantly affect sensitive native species.

Related Projects:

6.4.7.5 Owyhee Bruneau River Drainage

A. Native species (Bull trout, Redband trout, etc.)

Objectives:

1. Manage stream and reservoir fisheries to preserve the genetic integrity of native desert redband trout and other native species.
2. Work cooperatively with state and federal land management agencies and grazing permittees to improve riparian and aquatic habitats.

3. Increase reservoir fishing opportunities.
4. Maintain and improve bull and redband trout populations in the Owyhee River drainage.

Strategies:

1. Stock other strains and species of fish where they will not pose a threat to preserving native species.
2. Restock streams with depleted populations where habitat conditions have been restored with redband trout by collecting fish or eggs from adjacent areas that contain native redband trout.
3. Develop a broodstock reservoir foir redband trout to annually produce fingerlings that could be used to stock reservoirs and streams in this area.
4. Determine distribution and density of redband populations within the basin.
5. Determine habitat condition of streams containing redband trout.
6. Establish riparian vegetation objectives in management plan capable of protecting streambanks and riparian areas during high water.
7. Monitor station on major tributaries of the Owyhee River capable of protecting streambanks, riparian conditions, aquatic habitat, and fish production.
8. Seek opportunities to construct new fishing reservoirs in cooperation with federal, state, and private landowners.
9. Restock reservoirs with appropriate stocks of fish when drought conditions cause fish kills or dewatering.
10. Renovate existing reservoirs that historically were stocked.
11. Establish/maintain catch-and-release regulation and encourage adoption of similar protective regulations by the Nevada Division of Wildlife.
12. Support effort by state and federal agencies to remove manmade migration barriers.
13. Renovate reservoirs with undesirable fish populations when they limit the fishery.

Critical Hypotheses:

1. Operation of the Federal Columbia River Hydropower System has significantly reduced the distribution, abundance, and population viability of sensitive native populations in subbasin tributaries.

Performance measures:

Related Projects:

6.5 Issues

This section describes fishery management issues that were identified by the Resident Fish Managers (RFM) at Workgroup meetings throughout the Columbia Basin during 1996. Issues were identified by the relevant fishery managers for each subregion. These issues will need further development & refinement during the development of the Multi-year implementation planning process.

Resident fish management issues can be grouped into four levels of resolution:

Global issues which relate to interactions between resident fish, anadromous fish, and wildlife.
Basin-wide issues that transcend subregions and are specific to resident fish populations, e.g., Federal Columbia River Power System (FCRPS) operations.
Subregional issues that affect fish species assemblages and entire aquatic communities, e.g., operation of a particular reservoir or river reach.
Subbasin / population issues that affect a specific fish species in a specific habitat, e.g., reduced spawning success of the Kootenai River population of white sturgeon.

6.5.1. Global

1. Anadromous fish enhancement versus resident fish enhancement, both in US and Canada.
   a) Conflicts with other ESA activities; Kootenai River white sturgeon and Snake River snails.
   b) Altered natural river hydrographs.
   c) Greater interest and demand for resident fisheries with the elimination of salmon fishing opportunities.
   d) Gas abatement for resident fish.
   e) Annual reservoir elevation scenarios affect resident and wildlife life histories and overall reservoir productivity.
   f) Integrated Rule curves have not been implemented.
   g) How Resource tradeoffs decided.
2. Native versus non-native resident fish enhancement.
   a) Maintenance of genetic diversity of all native species/stocks/populations versus maximum fish production of easily-managed target stocks.
   b) Competition and genetic introgression.
3. Enhanced natural production versus artificial propagation.
4. Forest and range management practices threaten resident fish habitat via sedimentation from road building, clearcutting, and deterioration of riparian corridors.
5. Substantial reduction in nutrient input (due to lack) of salmon carcasses) to many infertile streams reduces productivity and therefore historic populations of resident fish.
6. Reconfiguration of lower Snake Dams provide more flexibility in overall FCRPS river operations.
7. Setting funding implementation priorities for resident fish mitigation versus anadromous fish substitution projects (also crediting benefits for each).

6.5.2. Basin-wide Resident Fish

1. Forest and range management practices threaten resident fish habitat via sedimentation from road building, clearcutting, mining, livestock grazing, and deterioration of riparian corridors.
2. Exotic fish introductions threaten the well-being of the native fishes through competition and genetic introgression.
3. The potential exists for temporary or permanent resident fish substitution for lost anadromous production in areas where anadromous fish are not blocked.
4. Resident fish loss assessments are an extremely important issue for IDFG statewide and for Shoshone-Bannock Tribes, Nez Perce Tribe, and Shoshone-Paiute Tribes in the Snake River Basin -- at both federally regulated and federally operated hydropower projects -- this issue should be included in all Subregions/subbasins within Idaho.
5. There is inadequate quantitative genetic data to determine the extent of genetic introgression, especially with regards to bull trout/brook trout, westslope cutthroat trout/rainbow trout, and redband trout/exotic rainbow trout.
6. Substitution is an important overall issue; however the relative importance of substitution for the loss of anadromous fish and mitigation for the loss of native resident fish is subject to debate.
7. Loss assessments on resident fish species are of a relatively low priority for some managers, since the major mitigation factor for them is loss of anadromous fish production (anadromous fish loss assessments have been done).
8. There is a need to maintain & enhance both tribal subsistence fisheries and recreational fisheries on resident fish in subbasin, e.g., Lake Roosevelt.
9. Comanagers need to develop a resident fish management plans that includes a common vision and guiding policies to achieve integrated and effective resource enhancement (i.e., combining or coordinating wild fish policies species plans, subbasin plans, etc.).
10. River operations for power and flood control causing fluctuations in flows, volumes, and limnology of reservoirs -- affecting resident fish productivity.
11. Adverse effects of habitat degradation on sustainability of native fish populations.
12. Non-game status for protection of certain resident fish species.
13. Substitution for loss of native resident fish production with non-native resident fish should only occur where native species restoration is no longer possible due to altered habitats.
14. Issues surrounding enhancement of native vs. non-native resident fish species.
15. BPA resident fish mitigation responsibilities.
16. Criteria for FY 1997 funding of resident fish enhancement activities gave preference to resident fish substitution at the expense of resident fish mitigation measures in Montana (refer to letter from Joe DosSantos, Chairman, Hungry Horse Implementation Group to Bill Towey, Resident Fish Managers Workgroup chair -- dated October 3, 1996).
17. Upper Columbia River subregion is given priority over Upper Snake subregion
18. Resident fish substitution issues in the Snake River basin are not adequately addressed because of outstanding questions regarding federal operations vs. regulations (FERC licensing)

6.5.3. Sub-Regional

1. FERC re-licensing of Montana Power Company and Washington Water Power dams.

2. "Connectivity" of portions of the river basin with Lake Pend Oreille is an issue for benefits to adfluvial stocks of bull trout, cutthroat, and kokanee that previously had access to hundred of miles of tributaries for spawning and rearing.
3. Biological opinion on the Kootenai River white sturgeon only deals with river operations for May - July (spawning), but a year-round river operations assessment is needed (effects on larval & juvenile sturgeon unknown).
4. Wet vs. dry year concessions negates IRC gains (more water is released from reservoirs during dry years)
5. Plankton and fish entrainment issues at dams relative to spring release vs. August release of water.
6. Conflicts between Kootenai River white sturgeon recovery among tribes and agencies.

6.5.4. Subbasin

1. Operations of Box Canyon Reservoir for to improve fish production.
2. Lake elevation management of Lake Pend Oreille, Cabinet Gorge Reservoir and Noxon Rapids Reservoir.
3. Power Peaking at Cabinet Gorge Dam affects hundreds of miles of river.
4. Mitigation has not occurred for Albeni Falls, Minidoka, Palisades, Black Canyon, Dworshak, Anderson Ranch, and Boise Diversion Dams -- i.e., resident fish losses due to construction (e.g., blocked migrations) & operation of these Federally-owned and operated hydropower projects have not yet been addressed.
5. Thermal issues affecting resident fish at Boundary Reservoir.
6. Mysid shrimp introductions for lake trout management affecting native species assemblages, e.g., kokanee, westslope cutthroat, and bull trout.
7. Noxon Rapids & Cabinet Gorge dams are currently involved in FERC re-licensing activities (licenses expire 2001) which could accommodate controversial fish conservation measures to mitigate impacts.
8. Re-establishment of adfluvial stocks or mitigation for their loss is an issue with the Confederated Salish and Kootenai Tribes of the Flathead Nation pertaining to historic subsistence use in Montana portions of the Clark Fork drainage.
9. Fish passage issues need to be resolved at Thompson Falls Dam (Montana Power Company).
10. Resident fish habitat losses due to diking of river banks in the Lower Kootenai River in Idaho and BC
11. Changed winter flow regimes may have reduced burbot spawning success.
12. Effects of increased August river flows in the Flathead River system.
13. Flathead Lake nutrient stripping -- cascading food web dynamics.
14. Hatchery catchable rainbow (exotic stocks) have been stocked in native cutthroat or redband streams -- affecting wild populations
15. Inadequate and improper timing of flows in Boise River below Lucky Peak.
16. Poor water quality because of irrigation return flows in several reaches of the upper Snake River and its tributaries.

6.6 Current Resident Fish Program Costs

Projects currently funded (FY97) under the Resident Fish Program are identified in Table 6.9 with budgets requested by project implementors for future years. The FY 1997 resident fish budget $15.1 million. Currently unfunded projects submitted for consideration by resident fish managers are summarized in Table 6.10. Out-year budget amounts are best current estimates. Actual out-year expenditures will be identified by resident fish managers in annual work plans.

Table 6- 9 Current and out-year budgets requested by implementors of resident fish projects funded for FY97

Proj #	Project Title	Species[6]	M/S	Measure	1997	1998	1999	2000	2001
9405300	BULL TROUT - WILLAMETTE/MCKENZIE	BT	M	10.5	48	60	10	10	
8605000	W. STURGEON PROD., STATUS, & HABITAT	WS	M	10.4	2,294	2,650	2,900	3,200	3,500
9405400	BULL TROUT IN CENTRAL AND NE OREGON	BT	M	10.5	239	250	200		
8709900	DWORSHAK DAM IMPACTS ASSESSMENT	BT, CT, KS, RT, RBT	M	10.3	167	175	135	135	135
8740700	DWORSHAK IMPACTS, M&E, & RULE CURVES	BT, KS, SMB, WCT	M	10.3	143	150	120	120	120
9501300	NEZ PERCE TROUT PONDS	RT	S	10.8	287	750	750	750	300
9501600	GENETIC INV. WESTSLOPE CUTTHROAT	BT, WCT	M	10.3	167	145	100	100	100
5503500	R STOCKS ABV CHIEF JOE & GRAND COULEE	BT, CT, N-G, RT	S	10.8	56	390	405	421	438
5522300	BOX CANYON WATERSHED	BT, CT	M/S	10.8	61	67	69	72	74
8346500	LIBBY/HUNGRY HORSE MODELING & ANAL	BT, CT, KS, RT, RBT, WCT, WS	M	10.3	331	35	37	40	40
8346700	LIBBY RESERVOIR LEVELS/KOOTENAI IFIM	BT, Burbot, CT, KS, N-sp, RT, RBT, WS	M	10.3	311	500	520	600	750
8503800	COLVILLE TRIBAL FISH HATCHERY	BkT, LCT, RT	S	10.8	350	355	360	365	370
8806400	KOOTENAI STURG. STUDY & AQUACULTURE	WS	M/S	10.8	480	620	680	720	800
8806500	KOOTENAI R. FISHERIES INVESTIGATIONS	Burbot, RT, WS	M	10.8	486	559	615	676	744
9001800	HABITAT IMPROVEMENT - LAKE ROOSEVELT	AdRT	S	10.8	199	216	225	236	
9004400	STRM SURVEY, HTCRY, HAB IMPROV, MNTR COEUR D	BT, RT, WCT	S	10.8	765	1,512	918	726	417

[6] Species abbreviations: BT= bull trout; WS= burbot & non-game species; S= sturgeon; CT= cutthroat trout; WCT= westslope cutthroat trout; LCT= Lahontan cutthroat trout; RT= rainbow trout; AdRT= adfluvial rainbow trout; RBT= redband trout; BkT= brook trout; LT= lake trout; KS= kokanee salmon; SMB= smallmouth bass; LMB= largemouth bass; W= walleye; YP= yellow perch; N-G= Non-game; N-Sp= not specific.

9101901	HUNGRY HORSE MITIGATION - CS-K TRIBES	BT, KS, WCT	M	10.3	67	145	70	72	75
9101903	HUNGRY HORSE MITIGATION / HABITAT IMPROVEMENTS	BT, KS, WCT	M	10.3	382	470	480	490	500
9101904	HUNGRY HORSE MITIGATION - CRESTON	BT, KS, WCT	M	10.3	465	484	503	523	544
9104600	SPOKANE TRIBAL HATCHERY - O&M	KS, RT	S	10.8	420	441	463	486	511
9104700	SHERMAN CREEK HATCH. O&M	KS, RT	S	10.8	178	185	192	202	210
9401200	KOOTENAI RIV. W. STURG. M&E	WS	M	10.6	96	100	100	100	110
9404300	L. ROOSEVELT MONITORING / DATA COL.	KS, RT, W, WS, YP	S	10.8	1,243	1,300	1,300	800	700
9404700	LAKE PEND OREILLE FISHERY RECOVERY	BT, CT, KS, LT, RT	M	10.6	315	330	330	295	295
9404900	KOOTENAI R. ECOSYSTEM IMPROVEMENTS	BT, Burbot, KS, N-sp, RT, RBT, WS	S	10.8	227	200	204	109	
9500100	KALISPEL TRIBE RESIDENT FISH	BT, CT, LMB	S	10.8	645	511	286	297	303
9500400	LIBBY RES. MITIGATION PLAN	N-sp	M	10.3	38				
9500900	LK. ROOSEVELT RAINBOW TROUT NET PENS	RT	S	10.8	96	100	110	110	110
9501100	CHIEF JOSEPH KOKANEE ENHANCEMENT	KS	S	10.8	574	600	600	600	
9501200	IRC IMPLEMENT. HUNGRY HORSE / LIBBY		M	10.3	0	0	0	0	0

Proj #	**Project Title**	**Species[7]**	**M/S**	**Measure**	**1997**	**1998**	**1999**	**2000**	**2001**
9502500	FLATHEAD RIVER INSTREAM FLOW STUDY	BT, WCT	M	10.2	96	100	100	100	0
5505600	HABITAT ENHANCE & PROTECT. SHOSHONE-PAIUTE RESERV.	BT, RT, RBT	S	10.2	645	240	240	240	300
5508600	STINKINGWATER SALMONID PROJECT	BT, RBT	M	10.5	191	100	100	400	200
8815600	DUCK VALLEY FISH STOCKING PROGRAM	RT	S	10.8	105	110	110	120	120
9106700	IDAHO WATER RENTAL - RESIDENT F&W IMPACTS - Ph III	BT, CT, RBT, WS	M	5.5A	115	125	125	125	125
9201000	HABITAT RESTOR. / ENHANCE. FORT HALL BOTTOMS	CT, RT	M	10.3	120	130	130	130	135
9500600	SBT/SPT JOINT CULTURE FACILITY	CT, RT, RBT	M/S	10.3	315	350	350	350	350
9501500	BILLY SHAW RES DEVELOP.	RT	S	10.8	3,360	100	100	100	100

All figures in thousands of dollars

[7] Species abbreviations: BT= bull trout; WS= burbot & non-game species; S= sturgeon; CT= cutthroat trout; WCT= westslope cutthroat trout; LCT= Lahontan cutthroat trout; RT= rainbow trout; AdRT= adfluvial rainbow trout; RBT= redband trout; BkT= brook trout; LT= lake trout; KS= kokanee salmon; SMB= smallmouth bass; LMB= largemouth bass; W= walleye; YP= yellow perch; N-G= Non-game; N-Sp= not specific.

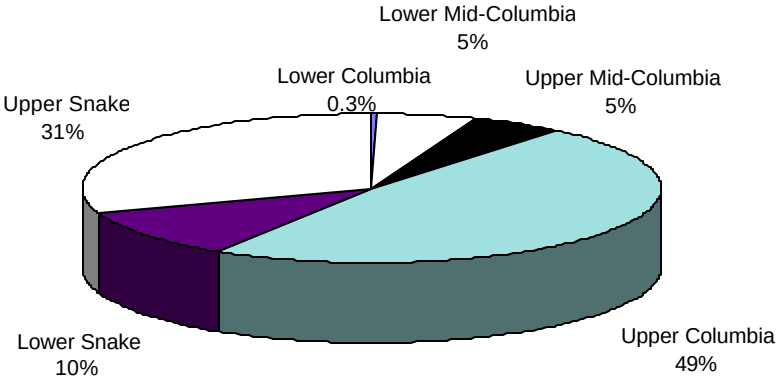

Figure 6- 6 Breakdown of FY 1997 resident fish budget for currently funded projects, by subregion

Table 6- 10 Budgets requested in project proposals for resident fish projects not funded for FY97

Proj #	Project Title	Species[8]	M/S	Measure	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
550110 0	LAKE PEND OREILLE BULL TROUT RECOVERY				143	200	300	300	300
550180 0	PAHSIMEROI RIVER FISH LOSS AND IRRIGATION INTAKE ASSESSMENT				182	128	97	97	97
550190 0	GENETIC ANALYSIS OF SNAKE RIVER SALMONIDS				48	125	125	125	125
550200 0	SNAKE RIVER NATIVE SALMONID ASSESSMENT				191	250	250	250	250
550360 0	YELLOW PERCH AQUACULTURE FACILITY				1912	375	375		
550410 0	CONSUMPTIVE STURGEON FISHERY-HELLS CANYON/OXBOW				239	250	250	250	250
550500 0	PEAVY CABIN ROAD				11				
550510 0	TETRA ALPHA MINE RESTORATION				6				
550520 0	SAWMILL CREEK INLAND FISH HABITAT RESTORATION				38				
550680 0	RESIDENT FISH HABITAT ENHANCEMENT ABOVE MCKAY RESERVOIR IN THE UMATILLA BASIN				143	160	170	180	190
550720	CONSERVATION GENETICS OF COLUMBIA				66				

[8] Species abbreviations: BT= bull trout; WS= burbot & non-game species; S= sturgeon; CT= cutthroat trout; WCT= westslope cutthroat trout; LCT= Lahontan cutthroat trout; RT= rainbow trout; AdRT= adfluvial rainbow trout; RBT= redband trout; BkT= brook trout; LT= lake trout; KS= kokanee salmon; SMB= smallmouth bass; LMB= largemouth bass; W= walleye; YP= yellow perch; N-G= Non-game; N-Sp= not specific.

Proj #	Project Title	Species[8]	M/S	Measure	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
0	BASIN BULL TROUT								
550840 0	HUNTER CREEK				191	200	200	400	200
550890 0	TIMING OF THE DEVELOPMENT OF WHITE STURGEON EMBRYOS				48	60	30		
551330 0	PHALON LAKE WILD RAINBOW TROUT TRAPPING AND SPAWNING FACILITY				72	15	15	15	15
551340 0	VEGETATION PLANTING FEASIBILITY STUDY - LAKE ROOSEVELT				96	85	85		
551350 0	IMPROVE WATER SUPPLY IN ORDER TO INCREASE TROUT PRODUCTION AT FORD HATCHERY BY 24,000 POUNDS				72	215	88	88	88
551360 0	STUDY AND EVALUATE BULL TROUT POPULATIONS IN NORTH SHORE TRIBUTARIES OF THE COLUMBIA RIVER IN THE BONNEVILLE POOL				143	200	200	200	
552030 0	HOOD RIVER BULL TROUT RESTORATION				8	10			
552180 0	LAKE ROOSEVELT KOKANEE NET PENS				167				
552240 0	BOX CANYON WATERSHED LAW ENFORCEMENT OF RESIDENT FISH				49	53	55	58	60
930160 0	HUNGRY HORSE RESIDENT FISH HATCHERIES				2000	1000	500		
940040 0	CABINET GORGE HATCHERY IMPROVEMENTS				14	25	15	15	15
940350 0	KOKANEE IMPACTS ASSESSMENT & MONITORING ON LK PEND OREILLE				51				
950140 0	IDAHO LOSS ASSESSMENT				246	157	257	257	300
950260 0	MONTANA MODEL WATERSHED PROGRAM				115	100	100	100	100
950270 0	LAKE ROOSEVELT STURGEON				252	264	264	264	264
950280 0	ASSESSMENT OF FISHERY IMPR. MOSES LAKE				274	198	207	105	48
950600 2	UMATILLA RIVER RIPARIAN CORRIDORS: SQUAW CREEK WATERSHED PROJECT (RESIDENT FISH PORTION)				1300	30	30	30	30

All figures in thousands of dollars

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