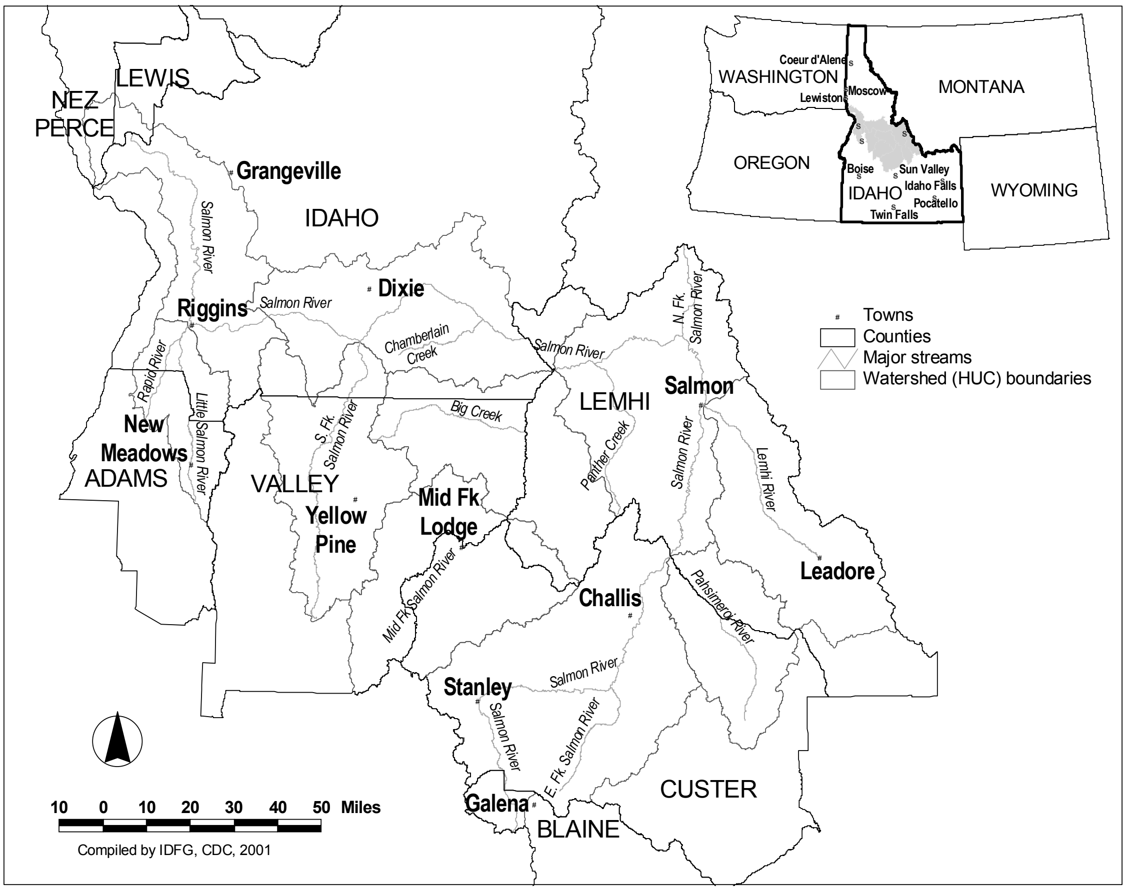
Salmon Subbasin Management Plan

May 2004



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Contracted by
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1 Introduction

The *Salmon Subbasin Management Plan* is the third volume of the *Salmon Subbasin Plan*. The *Salmon Subbasin Plan* was developed as part of the Northwest Power and Conservation Council's (NPCC) Columbia River Basin Fish and Wildlife Program to help direct Bonneville Power Administration's (BPA) funding of projects in the Salmon subbasin that mitigate for damage to fish and wildlife caused by the development and operations of the Columbia River's hydropower system. The *Salmon Subbasin Management Plan* was developed in an open public process that included the participation of a wide range of state, federal, local, and tribal governments, local managers, landowners, and other stakeholders; a process the NPCC hopes will ensure support of the final plan and direct funding to fish and wildlife projects that will do the most good.

An adopted subbasin plan is intended to be a living document that increases analytical, predictive, and prescriptive ability to restore fish and wildlife. The *Salmon Subbasin Plan* will be updated every three years to include new information that will enable the revision of the biological objectives, strategies, and implementation plan. The NPCC views plan development as an ongoing process of evaluation and refinement through adaptive management, research, and evaluation. More information about subbasin planning can be found at http://www.nwcouncil.org.

Due to its large size, the Salmon subbasin was split between two working groups: the Upper Salmon and Lower Salmon working groups. The Idaho Department of Fish and Game (IDFG) was the lead entity responsible for completing a subbasin assessment and inventory for both the Upper and Lower Salmon. The Nez Perce Tribe (NPT) was the lead entity responsible for developing the portions of the plan for the Lower Salmon; the Shoshone-Bannock Tribes (SBT) was the lead entity responsible for developing the portions of the plan for the Upper Salmon. Issues in the Middle Fork Salmon River were addressed within the upper and lower working groups. Both the Nez Perce Tribe and the Shoshone-Bannock Tribes contracted with Ecovista to coordinate the planning process and to write the management plan volume of the subbasin plan. Issues in the Middle Fork Salmon River were addressed within both the upper and lower working groups. The lead entities and Ecovista integrated the lower and upper subbasin efforts into a single, unified subbasin plan. The lead entities submitted the completed *Salmon Subbasin Management Plan* to the Council on May 28, 2004.

The *Salmon Subbasin Plan* includes three interrelated volumes that describe the characteristics, management, and vision for the future of the Salmon subbasin:

Assessment (Volume 1)—The assessment examines the biological potential of the Salmon subbasin to support key habitats and species, and limiting factors that reduce this potential. The assessment describes existing and historic resources and conditions within the subbasin, focal species and habitats, environmental conditions, out-of-subbasin impacts, ecological relationships, and limiting factors, and it provides a final synthesis and interpretation.

Inventory (Volume 2)—The inventory summarizes fish and wildlife protection, rehabilitation, and artificial production activities and programs within the Salmon subbasin over the last five years or that are about to be implemented. The inventory includes a GAP analysis that analyzes the ability of existing projects to address needs identified in the management plan.

Management Plan (Volume 3)—The management plan defines a vision for the future of the subbasin, and outlines biological goals and strategies to restore and protect aquatic and terrestrial species and habitats to be implemented during the next 10 to 15 years. The management plan includes a research, monitoring, and evaluation plan to determine the success of implemented strategies in addressing limiting factors and to reduce uncertainties and data gaps. The management plan also includes information about the relationship between proposed activities and the Endangered Species Act (ESA) and Clean Water Act (CWA). The management plan prioritizes objectives and strategies and concludes with final management recommendations.

The completed *Salmon Subbasin Management Plan* was submitted to the NPCC by the Nez Perce Tribe Watershed Division and the Shoshone-Bannock Tribes on May 28, 2004.

1.1 Contract Entities and Plan Participants

Multiple agencies and entities are involved in managing and protecting fish and wildlife populations and their habitats in the Salmon subbasin. Numerous federal, state, and local land managers are responsible for land and water use management, including protecting and restoring fish and wildlife habitat. Federal involvement in this arena stems from ESA responsibilities and from management responsibilities for federal lands. The following section describes the entities contractually involved in producing the *Salmon Subbasin Management Plan*, and describes the planning process.

1.1.1 Northwest Power and Conservation Council

The NPCC is responsible for developing and periodically revising the Columbia River Basin Fish and Wildlife Program. In the 2000 revision, the NPCC proposed that 62 locally developed subbasin plans, as well as plans for the mainstem Columbia and Snake rivers, be developed and adopted into its Fish and Wildlife Program. The NPCC has administered subbasin planning contracts pursuant to requirements in its Master Contract with the BPA (NPCC 2002). The NPCC is responsible for reviewing and adopting each subbasin plan, including ensuring that it is consistent with the vision, biological objectives, and strategies adopted at the Columbia Basin and province levels.

1.1.2 Bonneville Power Administration

The BPA is a federal agency established to market power produced by the federal dams in the Columbia Basin. As a result of the Northwest Power Act of 1980, BPA is required to allocate a portion of power revenues to mitigate the damages caused to fish and wildlife populations and habitat from federal hydropower construction and operation. These funds are provided and administered through the Lower Snake River Compensation Plan (LSRCP) (USACE 1975). BPA provided the funding to the NPCC for subbasin planning.

1.1.3 Nez Perce Tribe

The Nez Perce Tribe (NPT) served as the lead entity and fiscal agent for the planning effort for the Lower Salmon subbasin, managing the contract with the NPCC and contracting for other services, as required, to prepare the subbasin plan. The Nez Perce Tribe is responsible for managing, protecting, and enhancing treaty fish and wildlife resources and habitats for present and future generations. Tribal government headquarters are located in the Clearwater River subbasin in Lapwai, with offices in Kamiah and Orofino. The Nez Perce Tribe has treaty reserved fishing, hunting, and gathering rights pursuant to the 1855 Treaty with the United States. Nez Perce Tribe fish and wildlife activities relate to all aspects of management, including recovery, rehabilitation, mitigation, enforcement, and resident fish programs.

The Nez Perce Tribe contracted with the NPCC to deliver the portions of *Salmon Subbasin Management Plan* pertaining to the lower portion of the subbasin. This included ensuring that opportunity occurred for participation in the process by fish and wildlife managers, local interests, and other key stakeholders, including tribal and local governments.

1.1.4 Shoshone-Bannock Tribes

The Shoshone-Bannock Tribes served as the lead entity and fiscal agent for the planning effort for the Upper Salmon subbasin, managing the contract with the NPCC and contracting for other services, as required, to prepare the subbasin plan. The Shoshone-Bannock Tribes will pursue, promote, and where necessary, initiate efforts to rehabilitate the Snake River system and affected unoccupied lands to a natural condition. This includes the rehabilitation of component resources to conditions that most closely represent the ecological features associated with a natural riverine ecosystem. In addition, the Shoshone-Bannock Tribes will work to ensure the protection, preservation, and where appropriate-the enhancement of Rights reserved by the Shoshone-Bannock Tribes under the Fort Bridger Treaty of 1868 and any inherent aboriginal rights.

The Shoshone-Bannock Tribes contracted with the NPCC to deliver the portions of the *Salmon Subbasin Management Plan* pertaining to the upper portions of the subbasin. The Shoshone-Bannock Tribes provided opportunities for participation in the process by fish and wildlife managers, local interests and other key stakeholders, including tribal and local governments.

1.1.5 Project Team

The Shoshone-Bannock Tribes and the Nez Perce Tribe contracted with Ecovista to coordinate the planning process and to write the management plan for the Salmon subbasin. The Nez Perce Tribe contracted with Idaho Council on Industry and the Environment to organize the public involvement and public relations tasks for the lower subbasin. The Shoshone-Bannock Tribes contracted with the Upper Salmon Basin Watershed Project to organize the public involvement and public relations tasks for the upper subbasin. Staff from the contractors made up the members of the Project Team (Table 1).

Under a separate contract, the IDFG developed the assessment and inventory for the Salmon subbasin.

Table 1. The Project Team for the Salmon subbasin.

Name	Affiliation	Role
Darin Saul	Ecovista	project coordinator, technical writer and editor
Jennifer Boie	Ecovista	ecologist, technical writer
Craig Rabe	Ecovista	fisheries biologist, technical writer
Lisa Audin	Ecovista	aquatic ecologist, technical writer
Susan Johnson	Ecovista	wildlife biologist, technical writer
Lance Hebdon	Idaho Department of Fish and Game	fisheries biologist, technical writer
Jon Beals	Idaho Department of Fish and Game	wildlife biologist, technical writer

Name	Affiliation	Role
Pat Barclay	Idaho Council on Industry and the Environment	public involvement coordinator
Russell Knight	Upper Salmon Basin Watershed Project	public involvement coordinator

1.1.6 Planning Team

The Planning Team was composed of representatives from government agencies with jurisdictional authority in the subbasin, tribes, fish and wildlife managers, county and industry representatives, and private landowners (Table 2 and Table 3). The Planning guided the public involvement process, develop the vision statement, reviewed the biological objectives, and participate in prioritizing subbasin strategies. Regular communication among and input by team members occurred throughout the planning process. See Appendix A for more information about recruitment for and participation on the Salmon Planning Team.

Table 2. The Planning Team for the Salmon subbasin.

Name	Affiliation
Alan Henderson	Landowner Custer County
Becky Johnstone	Warren/Secesh/Burgdorf, Valley, ID, Adams County Snowmobilers
Betty Baker	East Fork rancher (USBWP Advisory Committee)
Bob Loucks	Lemhi county
Bruce McConnell	Lemhi SWCD chairman (USBWP Advisory Committee)
Bruce Mulkey	Lemhi Rancher (USBWP Advisory Committee)
Bruce Smith	USFS
Chad Coulter	Shoshone-Bannock Tribes (USBWP Advisory Committee)
Chris Swersey	Silver Cloud Expeditions (USBWP Advisory Committee)
Cliff Hanson	Custer County Commissioner (USBWP Advisory Committee)
Carolyn Howe	Idaho Women in Timber
Cary Myler	U.S. Fish and Wildlife Service
Dana Weigel	Bureau of Reclamation
Don Olson	Lemhi Rancher (USBWP Advisory Committee)
Doug Baker	East Fork Rancher (USBWP Advisory Committee)
Ed Schriever	Idaho Department of Fish and Game
Ernie Robinson	Rancher, VP Idaho Cattle Association
Felix M. McGowan	Nez Perce Tribe
Glenn Seaberg	USFS (USBWP Advisory Committee)
Greg Painter	IDFG
Guy Hopkins	ID Association of Soil Conservation Districts
Ira Jones	Nez Perce Tribe
Jack Carlson	USFS
Janna Brimmer	USFWS
Jan Skrukrud	IDFG
Jerome Hansen	Idaho Department of Fish and Game
Jerry Hawkins	Salmon River Coalition

Name	Affiliation
Jim Lukins	IDFG
Joe Chester	Landowner Custer County
John Cardwell	Idaho Department of Environmental Quality
John Fred	Shoshone-Bannock Tribes
JR. Baker	Rancher Custer County
Jude Trapani	BLM (USBWP Advisory Committee)
Katie Slavin	USBWP
Lance Hebdon	IDFG
Larry Whittier	Rancher Custer County
Laura Baker	Rancher Custer County
Lynn Herbst	Rancher Lemhi County
Mark Davidson	TNC (USBWP Advisory Committee)
Mark Olson	NRCS (USBWP Advisory Committee)
Mike Paradis	Adams County Commissioner
Nathan Brindza	IDFG
Ray Hennekey	Idaho Department of Fish and Game
Renee Snyder	USFS
Russ Manwaring	West Central Highlands Resource Conservation and Development Council
Ruth Wooding	USFS SNRA
Scott Althouse	Nez Perce Tribe
Shannon Williams	Idaho Cooperative Extension (USBWP Advisory Committee)
Stephen Bauchman	Custer County
Sydney Dowton	Rancher Custer County
Ted O'Neal	Custer SWCD chairman (USBWP Advisory Committee)
Tex Kauer	Rancher Lemhi County
Tom Coates	Custer County
Tom Curet	IDFG
Vic Armacost	Rancher

Table 3. Planning Team members who participated infrequently, or who participated through email or telephone

Name	Affiliation
Angela Somma	NOAA Fisheries
Dave Johnson	Nez Perce Tribe
Ed Raney	Rancher
Kim Apperson	Idaho Department of Fish and Game
Loren Nelson	Landowner
Mark J. Madrid	U.S. Forest Service
Robert Henderson	IDFG

1.1.7 Technical Teams

The Fisheries and Terrestrial Technical Teams included scientific experts with local knowledge who participated in the development of the subbasin assessment and plan (Table 4). The Technical Teams guided and participated in developing the biological objectives, strategies, research and monitoring, and evaluation sections of the management plan. The Salmon Technical Teams met monthly throughout the process and participated in workshops, providing professional knowledge and judgment to fill data gaps. See Appendix A for additional information on the Salmon Technical Teams.

Table 4. Members of the Technical Teams for the Salmon subbasin.

Name	Affiliation
Allen Bradbury	Upper Salmon Basin Watershed Project
Angela Somma	NOAA Fisheries
Arnie Brimmer	Idaho Department of Fish and Game
Bart Gamett	U.S. Forest Service
Bob Esselman	Idaho Department of Fish and Game
Bob Rohrer	Idaho Department of Water Resources
Bret Stansberry	Idaho Department of Fish and Game
Bruce Smith	U.S. Fish and Wildlife Service
Carl Rudeen	Upper Salmon Basin Watershed Project
Cary Myler	U.S. Fish and Wildlife Service
Charlie Petrosky	Idaho Department of Fish and Game
Craig Johnson	Bureau of Land Management
Dave Burns	U.S. Forest Service, Payette National Forest
Diane Evans Mack	Idaho Department of Fish and Game
Felix McGowan	Nez Perce Tribe
Greg Painter	Idaho Department of Fish and Game
Guy Hopkins	ID Association of Soil Conservation Districts
Heather Ray	Shoshone-Bannock Tribes
Howard Lyman	U.S. Forest Service, Nez Perce National Forest
Ira Jones	Nez Perce Tribe
Jan Pisano	NOAA Fisheries
Janna Brimmer	U.S. Fish and Wildlife Service
Jeff Rohlman	Idaho Department of Fish and Game
Joe Krakker	U.S. Fish and Wildlife Service
John Chatel	U.S. Forest Service, Sawtooth National Forest
John Gebhards	Nez Perce Tribe
Jude Trapani	Bureau of Land Management
Kate Forster	Bureau of Land Management, Challis Field Office
Kim Apperson	Idaho Department of Fish and Game
Leander Watson	Shoshone-Bannock Tribes
Loren Kronemann	Nez Perce Tribe
Lowell Suring	U.S. Forest Service
Lynn Stratton	Idaho Department of Fish and Game
Lytle Denny	Shoshone-Bannock Tribes

Name	Affiliation
Mark Moulton	U.S. Forest Service
MaryAnn High	U.S. Forest Service, Nez Perce National Forest
Michael Steck	U.S. Forest Service
Nathan Brindza	Idaho Department of Fish and Game
Paddy Murphey	Idaho Department of Fish and Game
Pattie Soucek	U.S. Forest Service, Payette National Forest
Paul Kline	Idaho Department of Fish and Game
Paul Kucera	Nez Perce Tribe
Ray Hennekey	Idaho Department of Fish and Game
Robin Garwood	U.S. Forest Service
Rodger Nelson	U.S. Forest Service, Payette National Forest
Scott Althouse	Nez Perce Tribe
Scott Marshall	Idaho Department of Fish and Game
Scott Russell	U.S. Forest Service. Nez Perce National Forest
Sharon Kiefer	Idaho Department of Fish and Game
Tom Curet	Idaho Department of Fish and Game
Tom Herron	Idaho Department of Environmental Quality
Vince Guyer	Bureau of Land Management
Vince Kozakiewicz	NOAA Fisheries

1.2 Public Outreach and Government Involvement

As the *Salmon Subbasin Management Plan* was developed, four methods of outreach and public participation were used in the Salmon subbasin: Technical Team meetings, Planning Team meetings, public meetings, and a website.

1.2.1 Technical Team Participation

Meetings for the Upper Salmon Technical Teams were held monthly in Salmon; those for the Lower Salmon Technical Teams were held monthly, alternating between New Meadows, McCall, Moscow, and Riggins (aquatics met in McCall and Moscow, terrestrial in New Meadows and Riggins). All meetings were open to the public. Meeting agendas and minutes were posted on the Ecovista website and provided at public meetings. The Technical Teams reviewed and gave input on the technical aspects of the subbasin plan. Technical Team participation and involvement are summarized in Appendix A.

1.2.2 Planning Team Participation

Monthly meetings for the Upper Salmon Planning Team were held in Salmon and for the Lower Salmon team alternated between New Meadows and Riggins. All meetings were open to the public. Meeting agendas and minutes were mailed to team members and others who wished to be kept apprised of the planning process. They were also posted on the Ecovista website (2004a) and provided at Planning Team meetings. The Planning Team developed the vision statement, the socioeconomic objectives and strategies, and the recommendations section of the plan. Planning team participation and involvement are summarized in Appendix A.

1.2.3 Public Meeting Outreach

Public meetings were held to introduce the subbasin planning process and provide an opportunity for input from local people and resource managers. Pat Barclay of the ICIE coordinated the public meeting announcements and logistics for the two sets of Lower Salmon subbasin public involvement meetings. Russell Knight, Project Coordinator for the Upper Salmon Basin Watershed Project, coordinated the public meeting announcements and logistics for the two sets of Upper Salmon subbasin public involvement meetings. Public meeting outreach is summarized in Appendix A.

On February 10, 11, 12, 2004, the first set of public meetings for the Lower Salmon subbasin were held in Grangeville, Riggins, and McCall. The meetings in Grangeville and Riggins had good attendance and participation. McCall had much smaller participation.

On March 1, 2, 3, 2004, the first set of public meetings for the Upper Salmon subbasin were held in Salmon, Challis, and Stanley. Attendance and participation were fair.

On April 6, 7, 8, 2004, the second set of public meetings for the Lower Salmon subbasin were held again in Grangeville, Riggins, and McCall. The meeting in Riggins had good attendance and participation; however, attendance in Grangeville and McCall was very limited.

On April 19, 20, 21, 2004, the second set of public meetings for the Upper Salmon subbasin were held in Salmon, Challis, and Stanley. Attendance and participation were fair, and the meetings were a good source of outreach and information about both the assessment and the plan.

1.2.4 Ecovista Website Information

As the *Salmon Subbasin Management Plan* was developed, draft documents and information relevant to subbasin planning were posted on the Ecovista website at www.ecovista.ws (2004b).

1.3 Review Process

The *Salmon Subbasin Assessment* and *Salmon Subbasin Management Plan* were available through e-mail notification lists compiled by the Project Team and during Technical and Planning Team meetings. The assessment (including focal species, focal habitats, and limiting factors) and management plan (including the vision for the subbasin, problem statements, objectives, and prioritization) were presented at the second round of public meetings in April. Throughout this review process, comments, suggestions, and clarifications were received from local, state, tribal, and federal representatives as well as from landowners and other stakeholders in the subbasin.

Time was not available to obtain letters of endorsement of the plan by the Planning Team. (Once available, they will be included in Appendix B.) Pat Barclay is currently working to obtain letters of endorsement to be sent to the NPCC during the public review process. On behalf of the Shoshone-Bannock Tribes and Nez Perce Tribe, Ecovista forwarded the *Salmon Subbasin Management Plan* to the NPCC for adoption on May 28, 2004.

The summer schedule for the independent scientific review of subbasin plans has been developed. For a majority of the subbasin plans, the Independent Scientific Review Panel (ISRP)/Independent Scientific Advisory Board (ISAB) review process will begin immediately following the May 28 deadline and conclude with submittal of final reports to the NPCC by August 12, 2004. The *Salmon Subbasin Plan* will be reviewed during Week 4: June 29 through July 2 (NPCC 2004a).

A review checklist and comment template is being developed for the ISRP/ISAB review of subbasin plans based on the NPCC's *Technical Guide for Subbasin Planners* and will include the NPCC's review questions. Reviewers must evaluate 1) whether the subbasin plans are complete, scientifically sound, and internally consistent following a transparent and defensible logic path; and 2) whether the subbasin plans are externally consistent with the vision, principles, objectives, and strategies contained in the NPCC's 2000 Fish and Wildlife Program. The checklist also asks reviewers to evaluate whether the plan satisfactorily provides the assessment, inventory and management elements requested by the NPCC and, to recommend the level of need to further treat a specific element of the subbasin plan before the plan meets the criteria of completeness, scientific soundness, and transparency. A sample of the checklist and template was available in March (NPCC 2004b).

Regarding plan adoptability, the NPCC's Legal Division is organizing a framework that members may use to make the determinations required by the Federal Power Act relative to subbasin plan amendment recommendations. The framework is essentially a way of organizing our review around the Act's standards that apply to program amendments for the Fish and Wildlife Program measures found in section 4(h), and the standards set in the 2000 Fish and Wildlife Program in the unique context of subbasin plans. The framework will be discussed with NPCC members in the near future.

2 Vision for Salmon Subbasin

The Planning Teams developed the vision and guiding principles for the *Salmon Subbasin Management Plan* during the fall of 2004. The vision presents the Planning Teams' desirable future for the subbasin. The guiding principles supplement, clarify and contextualize the vision. These principles are not listed in order of their ranking; they are meant to be understood as important and interconnected.

2.1 Vision Statement

The vision for the Salmon Subbasin is a productive and sustainable ecosystem that is resilient to natural and human disturbance, with diverse, native aquatic and terrestrial species, which will support long-term sustainable resource-based activities and harvest goals, while managing the impacts and needs of a growing human population.

2.2 Guiding Principles

- Respect, recognize, and honor all legal rights, legal authorities, jurisdictions and reserved treaty rights, including private property rights, while recognizing local culture and custom.

- Protect, enhance, and restore habitats to sustain and recover native aquatic and terrestrial species diversity and abundance with emphasis on the recovery and delisting of Endangered Species Act listed species.

- Foster ecosystem stewardship of natural resources, recognizing all components of the ecosystem, including the human component.

- Provide opportunities for local natural resource-based economies to coexist and participate in recovery of aquatic and terrestrial species.

- Promote and enhance local participation in, and contribution to, information and education, natural resource problem solving, and subbasinwide conservation efforts to promote understanding and appreciation of healthy and properly functioning ecosystems.

- Identify and prioritize opportunities to utilize resources to implement the Salmon Subbasin Plan, Pacific Northwest Electric Power Planning and Conservation Act, and local, state, federal, and tribal programs.

- Develop a scientific foundation to diagnose ecosystem problems, design, prioritize, monitor, and evaluate management to better achieve Plan objectives.

- Enhance species populations to healthy levels that support tribal treaty and public harvest goals.

3 Problem Statements, Objectives, and Strategies

The problem statements, biological objectives, and strategies presented in this section were developed by the Project Team in collaboration with the Technical and Planning Teams based on information in the *Salmon Subbasin Assessment* and the *Salmon Subbasin Inventory* and professional knowledge. .

3.1 Problem Statement Summary

The problem statement summary is analogous to the *working hypothesis* in NPCC documents. Both provide a scientific basis for biological objectives and strategies. In this plan, we follow the recommendation of the ISRP (2003) to state the hypotheses as problem statements. The problem statement for the Salmon subbasin draws from findings presented in the subbasin assessment and professional knowledge to integrate available scientific information and knowledge into the management plan. The problem statement draws from and is consistent with the scientific foundation that underlies the NPCC's Fish and Wildlife Program. The NPCC recognizes eight scientific principles (NPCC 2001a) that form the scientific foundation. The problem statement summary provides an explicit scientific rationale under which various component problem statements, objectives, and strategies are organized. The following problem statement summary for the Salmon subbasin was developed from the working hypothesis presented in section 4.2.5 of the *Salmon Subbasin Assessment.*

Changes in habitat quality and quantity both inside and outside of the subbasin have resulted in declines in focal species. Predation, harvest, competition, linkage/fragmentation and disease are key factors that limit focal habitats and species in the Salmon subbasin (see assessment section 3). Limiting factors impacting terrestrial habitats include the following: 1) altered fire regimes (primarily resulting from fire suppression practices); 2) grazing/browsing by livestock; 3) altered hydrologic regimes (impoundments, water management, channel modifications and diversions); 4) timber harvest; 5) land-use conversion (both urban and agricultural); 6) exotic invasive species; and, 7) road construction. These limiting factors have altered the composition and distribution of the focal habitats and species in the Salmon subbasin (see assessment section 3). Natural and anthropogenic disturbance pressures have caused changes to habitat-forming ecological processes, which have directly or indirectly acted to modify habitat conditions, with resulting impacts on associated species.

3.2 Problem Statements, Objectives, and Strategies

The following list of component problem statements, objectives, and strategies expand upon the problem statement summary. Problem statements frame problems resulting from limiting factors to species and habitats, drawing from the findings of the assessment. Biological objectives describe the physical and biological changes needed to address the problems resulting from limiting factors described in the problem statements. Strategies provide specific steps necessary to accomplish the biological objectives. The strategies and biological objectives were developed to address the factors that limit focal species and habitats and that inhibit natural ecological processes in the Salmon subbasin. Achieving an objective through implementation of strategies moves the subbasin closer to attaining the subbasin vision.

For organizational purposes, problem statements, objectives, and strategies are grouped in three categories: biological, environmental, and socioeconomic, although these three components are intractably linked. The problem statements, objectives, and strategies under biological components are generally directed toward fish and wildlife populations, when sufficient data exist. Problem statements, objectives, and strategies meant to address habitat for fish and wildlife populations are listed under environmental components. The biological objectives were developed by the Project and Technical Teams, with support from the Planning Team. The Planning Teams developed the socioeconomic objectives and strategies that address the interrelationships between economy, culture and efforts to protect and restore aquatic and terrestrial species and habitats.

The objectives in the following sections are consistent with the four overarching biological objectives for the 2000 Columbia River Basin Fish and Wildlife Program (NPCC 2004c):

1. A Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife.

2. Mitigation across the basin for the adverse effects to fish and wildlife caused by the development and operation of the Columbia basin hydrosystem.

3. Sufficient populations of fish and wildlife for abundant opportunities for tribal trust and treaty right harvest and for non-tribal harvest.

4. Recovery of fish and wildlife that are listed under the Endangered Species Act and that are affected by the development and operation of the Columbia basin hydrosystem.

The formatting of the problem statements, objectives, and strategies follows the recommendations made by the ISRP in their review of the Clearwater Subbasin Plan (ISRP 2003). The ISRP’s suggested format was consistent with guidance in the Technical Guide (NPCC 2001a) and used in this document with minor modifications.

3.2.1 Biological Components

The problem statements and biological objectives developed to address problems in the Salmon subbasin are listed in Table 5. These problems, objectives, and strategies are generally directed toward fish and wildlife populations, when sufficient data exist. The more detailed textual presentation of the problems and objectives includes associated strategies and a discussion section that provides a rationale and supporting information for each set of problem statement, objective and strategies. This section is divided into two parts, the objectives and strategies addressing problems impacting aquatic species followed by those for terrestrial species.

Table 5. Biological problems statements, objectives, and limiting factors in the Salmon subbasin.

Biological Problem Statements	Biological Objectives	Limiting Factors	Assessment Link
Aquatic Species			
Problem 1: Out-of-basin factors limit adult returns (as measured by SAR) in the Salmon River subbasin.	1A: Increase the number of naturally spawning adults to achieve recovery goals in Table 6 within 24 years (timeline is consistent with the NPCC's Fish and Wildlife Program). This should amount to 4–6% SAR for spring-summer chinook, 3% for fall chinook (minimum), 4% for sockeye (minimum), and 4% for steelhead (minimum) as measured at Lower Granite Dam and in the tributaries. 1B: Achieve goals defined in Table 6 for the Salmon subbasin through the application of artificial propagation programs. Minimize short- and long-term genetic, ecological, and life history effects on wild populations.	Out-of-subbasin effects	3.2
Problem 2: Small population size of anadromous and resident species leads to an increased risk of extinction.	2A: By 4th field HUC, carry out focused activities designed to improve our understanding and definition of small populations, while protecting the genetic integrity of wild populations that are below historical levels.	Increased extinction risk	3.1
Problem 3: Integral to the above statements, the lack of information (data gaps) precludes effective management of aquatic focal species.	3A: Address data gaps necessary to measure freshwater survival 3B: Compare freshwater conditions between populations to more accurately define habitat rehabilitation needs. 3C: Address data gaps necessary to measure progress towards recovery and delisting	Data gap reduces the effectiveness of species management	4.1.6.2

Biological Problem Statements	Biological Objectives	Limiting Factors	Assessment Link
Problem 4: Predation, hybridization, and competition between non-native species and juvenile resident and anadromous salmonids are occurring throughout the subbasin, but the extent and severity of these interactions as well as treatment actions are poorly understood.	4A: Determine predation-associated mortality rates on juvenile focal species, and if significant, prescribe appropriate management actions 4B: Reduce and prevent impacts of brook trout x bull trout hybridization. In the next 10 years, establish the degree of bull x brook trout hybridization and determine the potential to diminish future brook x bull trout hybridization 4C: Assess the effects of competition between introduced species and native anadromous and resident salmonids	Negative effects associated with exotic x native species interactions; Data gap reduces the effectiveness of species management	2.2.5
Terrestrial Species			
Problem 5: Limited understanding of historic and existing terrestrial species composition, recent population trends, and habitat conditions and trends, inhibits the ability to effectively manage or conserve these species.	5A: Increase understanding of existing and historic composition, recent population trends, habitat conditions and trends, and limiting factors of the terrestrial species of the Salmon subbasin.	Data Gaps reduce the effectiveness of species management	1.5.2, 1.7.2, 1.7.3, 2.0, 2.3 2.3.8, 2.3.9, 3.0 3.1
Problem 6: Human alteration of ecosystem composition, structure, and function has had varying levels of impacts on terrestrial species composition, population trends and habitat quality in the Salmon subbasin.	6A: Sustain viable populations of terrestrial species. 6B: Evaluate and quantify terrestrial losses associated with continued operation and secondary impacts of Lower Snake River Projects.	All limiting factors	2.0, 2.3, 2.3.8, 2.3.9, 3.0, 3.1, 3.2.2.1, 3.2.2.8

3.2.1.1 Aquatic Species

The first of the three aquatic subsections addresses biological problems affecting focal populations at the subbasin level. The biological problem statements, objectives, and strategies are linked to problems identified in the assessment (see sections 2.2, 2.3.9, 3.1, and 3.2). Specific linkages to the assessment are provided in Table 5.

The goal of the aquatics portion of this plan is to define where resources should be allocated to protect and/or rehabilitate necessary ecosystem processes important to the recovery of anadromous and resident populations to a level that will provide for in-basin harvest. This would include meeting and exceeding delisting criteria defined by NOAA (Appendix C). Some measures of adult abundance are addressed in objective 2A by objectives and strategies needed to meet these targets. Viable Salmonid Populations (VSP) criteria provide a means of analyzing population response to implementing pertinent objectives and strategies. These criteria include the following:

- abundance
- life history diversity
- spatial distribution
- and genetic diversity.

To achieve adult abundance targets out-of-basin issues, small population issues, production issues, and habitat issues will need to be addressed.

Problem 1: Out-of-basin factors limit adult returns (as measured by SAR) in the Salmon River subbasin.

Aquatic Objective 1A: Increase the number of naturally spawning adults to achieve recovery goals in Table 6 within 24 years (timeline is consistent with the NPCC's Fish and Wildlife Program). This should amount to 4 to 6% SAR for spring/summer chinook, 3% for fall chinook (minimum), 4% for sockeye (minimum), and 4% for steelhead (minimum) as measured at Lower Granite Dam and in the tributaries.

Strategies:

1A1. Participate in province and basinwide coordinated studies and water management forums designed to examine flows, temperatures, fish passage, and ocean mortality associated with differential migration timing and life histories of anadromous salmonids and lamprey. Conduct research within the context of identifying management versus basinwide environmental effects. Work with other entities to ameliorate and mitigate limiting factors.

1A2. Determine population specific smolt-to-adult return rates (SARs) for anadromous salmonids on a representative set of index streams. Develop historic run reconstruction data and evaluate protocols for comparison between Salmon River, other Snake River basin, and comparable downriver populations.

1A3. Evaluate progress annually.

Aquatic Objective 1B. Achieve goals defined in Table 6 for the Salmon subbasin through application of artificial propagation programs. Minimize short- and long-term genetic, ecological, and life history effects on wild populations.

Strategies:

1B1. Meet mitigation responsibilities for ongoing LSRCP and IPC hatchery programs.

1B2. Implement additional artificial propagation programs to meet goals identified in Table 6 for anadromous salmonids and lamprey.

1B3. Implement innovative propagation techniques to meet goals identified in Table 6 for anadromous salmonids.

1B4. Monitor and evaluate program effectiveness in meeting goals identified in Table 6, and to enable adaptive management of the program.

Table 6. Anadromous adult return objectives for the Salmon subbasin.

Species	Goals	Long-term[1] Return	Natural Spawning Component	Hatchery Component		Treaty and Nontreaty Harvest Component
				Broodstock Need	Rack Return	
Spring Chinook	Future	119,000–128,000	> 36,400[2]	4,110[3]		94,000[4]
	Current mean (range)		3,886[5] (312–9,760)	3,350	2,615 (37–12,642)	4,447[6] (0–22,895)
	Unmet Goals					
Summer Chinook	Future	60,200–126,000	> 36,400[2]	2,050[3]		112,000[4]
	Current mean (range)		3,886[5] (312–9,760)	2,050	2,322 (36–12,624)	2,192[7] (0–8,560)
	Unmet Goals			0		
Fall Chinook	Future	5,000	2,100[8]–2,500[9]	Undefined	Undefined	Undefined
	Current		49	0	0	0
	Unmet Goals	4,951				
Sockeye	Future	8,000–44,500	2,000[2]			2,000[4]
	Current mean (range)		28[10] (0–257)	undefined	28[10] (0–257)	0
	Unmet Goals					
Steelhead	Future	145,000–192,900	> 21,600[2]	1,740[3]		126,000[4]
	Current mean (range)	Unknown	Unknown	1,740	2,658 (338 – 11,862)	22,601[11] (11,212–61,074)
	Unmet Goals			0		
Coho[1]	Future	20,000	Undefined	Undefined	Undefined	Undefined

[1] Some aquatics technical team members were not comfortable with the identification of target goals for coho for Salmon due to the lack of documentation of historical/viable populations of coho salmon utilizing the Salmon River basin. For that reason coho were not included in the Assessment. Coho were also not mentioned in the 1991 Salmon

Species	Goals	Long-term[1] Return	Natural Spawning Component	Hatchery Component		Treaty and Nontreaty Harvest Component
				Broodstock Need	Rack Return	
	Existing Condition	Unknown	Unknown	0	0	Unknown
	Unmet Goals	<20,000				
Lamprey	Future	Undefined	Undefined	Undefined	Undefined	Undefined
	Existing Condition	Unknown	Unknown	0	0	Unknown
	Unmet Goals	Unknown	Unknown			NA
Sturgeon	Future	Undefined	Undefined	Undefined	Undefined	Undefined
	Existing Condition		163[12]	0	0	Unknown
	Unmet Goals					
Bull Trout	Future	Undefined	Undefined	Undefined	Undefined	Undefined
	Existing Condition	Unknown	Unknown	0	0	Unknown
	Unmet Goals					

[1] Long-term return objectives are derived from management plans as described in Appendix D, Appendix Table 4. This table does not necessarily imply consensus by all management agencies but merely gives direction to managers who must work out the rehabilitation and recovery of each species and population over time through implementation of the plan.
[2] NMFS interim abundance delisting criteria (spring and summer chinook salmon combined; A and B run steelhead combined).
[3] Future broodstock needs will likely change as a result of negotiations within the US v. Oregon process. The value shown is projected if the Sawtooth Hatchery were to be at its original LSRCP production design
[4] Goals from 1990 Salmon and Steelhead Production Plan
[5] Existing condition is mean adult returns estimated from run reconstruction using redd count data for spring and summer chinook salmon in the Salmon subbasin. The time series of data that was agreed upon for run reconstruction was 1994-2003
[6] Sport and tribal harvest for Little Salmon River and Salmon River (Sport harvest data from IDFG, Tribal harvest data from 2003 TAC Columbia River Fisheries Biological Assessment).
[7] Sport and tribal harvest for South Fork Salmon spring chinook. (Sport harvest data from IDFG, Tribal harvest data from 2003 TAC Columbia River Fisheries Biological Assessment).
[8] Estimate based on fall chinook salmon spawning habitat quantification in the lower Salmon River (Nez Perce Tribe data)
[9] NMFS interim abundance target for fall chinook salmon in the mainstem Snake River.
[10] All anadromous returning sockeye salmon regardless of release or retention for hatchery spawning.
[11] Includes sport harvest only, no data available for Tribal Harvest.
[12] Nez Perce Fisheries Data.

Discussion: Out-of-subbasin factors such as estuarine and ocean conditions, hydropower impacts on water quality and fish passage, mainstem hydroelectric corridor water quality and quantity conditions, and downriver and ocean fisheries are the primary factors limiting recruitment of anadromous salmonid spawners to the Salmon Subbasin (see assessment section 3.2). To achieve the extensive stock rebuilding called for in this plan (Table 6), it will be necessary to improve both out-of-subbasin and in-subbasin conditions. Achieving the SARs for anadromous species listed in the above objective will reflect progress made towards improving out-of-subbasin conditions.

Achieving goals identified in Table 6 will necessitate the use of artificial propagation programs to meet harvest augmentation goals, to enhance natural

and Steelhead production Plan. The information placing coho in the Salmon is from Nez Perce Tribal history and the coho inclusion in the goals table was from NPT request.

production, and to reintroduce historically present species such as coho salmon. Hatchery and genetic management plans will be used as guidelines to minimize potential genetic, ecological, or life history effects of supplemented fish on wild/natural populations (see hatchery and genetic management plans in Appendices 2-4 through 2-18 of the assessment for information defining methods to minimize short and long-term effects). Monitoring and evaluation will accompany supplementation efforts to determine project effectiveness, to identify and describe potential risks, and to provide the information necessary for adaptive management of the program.

Innovative propagation techniques have shown promise in the Salmon subbasin as cost effective, biologically successful approaches to natural salmonid production. The Streamside Incubation Program conducted by the Shoshone-Bannock Tribe, Idaho Model Watershed Project, Idaho Fish and Game, and the Salmon and Challis National Forest staff has been ongoing since 1995 (B. Smith, USFS, personal communication, April, 2004). The program included stream sites in the Salmon and Challis National Forests; Leadore, North Fork, Challis, Yankee Fork and Salmon/Cobalt districts; Sawtooth recreation area and extend over 200 miles within the Salmon River Drainage and on private lands. Modified incubator boxes and Whitlock Vibert boxes are used to hatch steelhead eggs obtained from the Pahsimeroi and Sawtooth hatcheries, and Slate Creek fish trap weir. Hatch rates (% mortality) from the inexpensive incubators have varied over the life of the project and between sites, but have remained consistent to rates in hatcheries and have been consistently higher than rates of wild fish (Galindo and Rinehart 1997). In 2002, an average of 98% of the 527,430 steelhead eggs that were incubated at 13 sites in the Salmon subbasin hatched, and when combined with 125,207 outplanted fry, yielded a total of 604,232 fry (Bruce Smith, USFS, unpublished data, 2004).

Establishment of representative index stocks is necessary for long-term monitoring of specific anadromous fish population SAR rates (along with escapement, productivity, life history characteristics, genetic diversity, etc. identified in subsequent problem statements) applicable to the Salmon subbasin. Population specific SAR information in the Salmon subbasin is needed to successfully manage these populations.

Problem 2: Small population size of anadromous and resident species leads to an increased risk of extinction.

Aquatic Objective 2A: By 4th field hydrologic unit, carry out focused activities designed to improve our understanding and definition of small populations, while protecting the genetic integrity of wild populations that are below historical levels.

Strategies:

2A1. Preserve the genetic integrity of existing wild stocks in the Salmon Subbasin. Preserve the genetic diversity of existing wild stocks in the Salmon Subbasin. Protect and monitor abundance and productivity of wild stocks in the subbasin that have not been influenced by hatchery intervention. Apply gene conservation measures (cryopreservation) to prevent irretrievable loss of genetic diversity.

2A2. Continue ongoing and develop new programs in areas where intervention has already occurred and in order to meet interim abundance and delisting targets in Appendix Table 1, Appendix Table 2, and Appendix Table 3. Support the refinement of genetic preservation techniques such as captive broodstock, cryopreservation, and artificial propagation (e.g., Johnson Creek supplementation program).

2A3. Collect tributary specific wild adult steelhead abundance data and continue to improve on extinction risk analysis, relative to population and effective population size, and population growth rate determination.

2A4. Identify where there is a lack of knowledge pertaining to the population size of anadromous and resident focal species. Use this information to further refine enhancement and rehabilitation methods and to fill data gaps.

2A5. Apply safety net hatchery intervention based on extinction risk analysis and benefit risk assessments.

2A6. Enforce conservation practices, and laws and regulations applicable to protecting and restoring fish and wildlife populations and habitats

2A7. Evaluate effectiveness of ongoing programs during the life of the plan.

Discussion: Maintaining a sufficient population size of focal fish species is important to maintain the genetic diversity necessary to allow these species the ability to adapt to a changing environment. Small population size is of concern due to the potential for increased risk of localized extinction. In some cases small population size in individual populations may be a limiting factor in their ability to recover. Reduced population size magnifies the potential effect that genetic stochasticity, demographic stochasticity, and environmental variation may have on a population. Theoretically, as a population decreases in size, inbreeding and genetic drift increase, resulting in the loss of genetic variation and subsequently a reduction in individual fitness and population adaptability. This decreases reproduction and increases mortality resulting in further decreases in population size and increased likelihood of extinction. Demographic stochasticity refers to random variation in population parameters such as sex ratios, age structure, or birth and death rates. Small populations may develop intrinsic demographic problems such as unbalanced sex ratios and unstable age distributions of spawning adults, and random failures in survival and fertility that may fatally disrupt persistence. Stochastic environmental events such as floods, droughts, or ice flows may also affect reproductive success. These factors become increasingly important to continued population persistence for small populations.

Currently, extinction risk analyses have been performed under the Safety Net Artificial Propagation project to identify anadromous fish populations at serious risk of extirpation. Implementation of safety net hatchery intervention would be viewed as a priority if the extinction risk and benefit risk analyses identified that such intervention was necessary to prevent extirpation of a threatened species under the ESA.

In other cases insufficient information exists to even determine the number of adult steelhead, and other focal species, in tributary streams in the Salmon subbasin. This information is needed to describe basic population size and population growth rate, and to provide information to assess risk metrics.

BPA has invested significant funding in protecting and restoring aquatic and terrestrial species and habitat in the Salmon subbasin. Enforcement of existing conservation practices, laws, and regulations is necessary to protect this investment and to strengthen the overall protection and restoration effort in the subbasin.

Problem 3: Lack of information (data gaps) precludes effective management of aquatic focal species in the Salmon subbasin.

Aquatic Objective 3A: Address data gaps necessary to measure freshwater survival and productivity.

Strategies:

3A1. Use new and existing projects (ISS and GPM) to further the knowledge of egg to smolt survival and the mechanisms that affect survival.

3A2. Determine juvenile or smolt per female measurement to further knowledge of freshwater productivity.

3A3. Use information developed in strategies 3A1 and 3A2 to aid in the definition of project prioritization.

Aquatic Objective 3B: Compare freshwater conditions among populations to more accurately define habitat rehabilitation needs.

Aquatic Objective 3C: Address data gaps necessary to measure progress towards delisting and full recovery as identified in

Table 6.

3C1. Quantify population specific adult and juvenile abundance information for focal species on a representative set of index streams.

3C2. Determine population-specific smolt-to-adult return (SAR) rates for chinook salmon and steelhead on a representative set of index streams.

3C3. Determine population productivity (e.g., spawner to spawner ratios and/or lambda) on a representative set of index streams.

3C4. Measure reproductive success of adult hatchery salmon and steelhead through parentage analysis.

3C5. Use information to obtained from strategies 3C1 through 3C4 to assess delisting criteria when it becomes available.

Discussion: Currently, some key performance measure information for focal fish species in the Salmon subbasin is lacking or is limited in scope. Lack of this information has and continues to affect conservation planning, ESA listing decisions, recovery monitoring, and identification of conservation program priorities. Emphasis on collecting key performance measure information (e.g., Appendix E, Appendix Table 5 and Appendix Table 6) (filling data gaps) will provide the necessary information for 1) managing more effectively; 2) addressing Biological Opinion Tier 1, 2, and 3 questions for listed species research, monitoring, and evaluation; 3) understanding mechanisms that affect freshwater survival; 4) relating fish population data to current habitat conditions and proposed rehabilitation measures; and 5) providing unbiased and precise estimators of interim abundance and productivity delisting targets.

Basic egg to fry, parr, presmolt and smolt survival information for focal species is poorly understood in the Salmon subbasin. Information needs to be collected to quantify survival, and the natural variation in survival within spectrum of degraded to high quality habitat conditions. Understanding more refined life stage specific survival may allow an understanding of the mechanisms that affect survival in freshwater habitats. It also may allow an understanding of the improvements in survival that may result from various types of habitat rehabilitation activities. Similarly, accurate quantification of the juvenile or smolt per female productivity measure may provide a useful measure that allows comparison of pre- and post-habitat rehabilitation activities. Application of these performance measures within a statistical framework, similar to that presented in Hesse and Harbeck (2004) and Hesse et al. (*in review*), will provide a solid, statistically-based foundation from which project-specific M&E plans can be derived, and will enable determinations of habitat restoration/protection effectiveness on focal populations.

NMFS (2002) identified interim abundance and productivity targets as delisting criteria for Interior Columbia basin salmon and steelhead listed under the Endangered Species Act. The Technical Recovery Team is currently in the process of evaluating and making recommendations based on these interim guidelines. Population specific adult abundance and productivity key performance data were identified as data gaps (see above), which are consistent with and necessary to collect as a direct measure of the NMFS (2002) delisting metric.

Several regional research, monitoring and evaluation (RM&E) planning efforts are currently underway that are at various stages of completion. The federal RM&E plan, Collaborative Systemwide Monitoring and Evaluation Project (CSMEP; CBFWA 2004), and the Pacific Northwest Aquatic Monitoring Partnership (PNAMP; 2004) are examples of the efforts underway. To some degree, most lend themselves to addressing questions associated with identifying hypotheses, monitoring approaches, key performance measures, discussion of spatial scales, required replication, etc., necessary to provide RM&E for listed species. Research, monitoring and evaluation data gaps and needs identified within the context of this subbasin plan need to be further coordinated with these planning efforts.

Problem 4. Predation, hybridization, and competition between non-native species and juvenile resident and anadromous salmonids are occurring throughout the subbasin, but the extent and severity of these interactions as well as treatment actions are poorly understood.

Aquatic Objective 4A: Determine predation-associated mortality rates on juvenile focal species and, if significant, prescribe appropriate management actions.

Strategies:

4A1. Use methods such as those described in Nelle (1999) to collect data on smallmouth bass feeding habits in the lower Salmon River.

4A2. Examine feasibility of expanding results from previous smallmouth predation studies to apply throughout the Salmon.

4A3. Evaluate predation rates of non-native species on juvenile focal species at the subbasin scale.

4A4. If predation rates of non-native predators on juvenile salmonids prove significant, investigate and implement appropriate management actions (i.e., sport reward programs, eradication, etc.).

4A5. Monitor and evaluate outmigrant survival of anadromous species and population size of non-native predators during, and following management prescriptions. Integrate results with SAR and egg:smolt survivorship investigations (problem statements 1 and 4).

Aquatic Objective 4B: Reduce and prevent impacts of brook trout × bull trout hybridization. In the next 10 years, establish the degree of bull × brook trout hybridization and determine the potential to diminish future brook × bull trout hybridization.

Strategies:

4B1. Continue and expand ongoing distribution surveys of both brook and bull trout, including standardized genetic sampling to determine levels of hybridization.

4B2. Use results from strategy 1, the bull trout recovery plan (*in press*), and the watershed-specific limiting factors analysis (assessment Section 3.1) to identify and prioritize areas where exotic species pose a hybridization threat to bull trout.

4B3. Define management actions directed towards the minimization of hybridization.

4B4. Develop management actions designed to reduce brook trout impacts on bull trout—Continue to implement ongoing projects and evaluate the effectiveness of brook trout removal efforts, including harvest regulations/incentives and brook trout removal and suppression projects in mountain lake and tributary areas where both species currently occur.

4B5. Prevent spread of exotic species—Develop and test methods to prevent the spread of brook trout, thereby reducing the spread of impacts of hybridization on bull trout and other species.

4B6. Monitor and evaluate outcomes of strategies 4B4 and 4B5. Integrate data into next iteration of strategies 4B1, 4B2, and 4B3, along with other new data developed for objectives. Revise strategies as necessary to reflect new information and repeat strategies for subsequent iterations.

Aquatic Objective 4C: Assess the effects of competition between introduced species and native anadromous and resident salmonids.

Strategies:

4C1. Continue and expand ongoing distribution surveys of introduced species and native species. Integrate research with that pertaining to egg:smolt survivorship (objective 2A) to address effects of density dependence.

4C2. Use results from strategy 4C1 to identify and prioritize areas where exotic species pose a competitive threat to native salmonids.

4C3. Define management actions directed towards the minimization of competition.

4C4. Implement management actions designed to reduce competitive impacts of non-native species on native species—Continue to implement ongoing projects and evaluate the effectiveness of exotic species removal efforts, including harvest regulations/incentives, and removal and suppression projects.

4C5. Prevent spread of exotic species—Develop and test methods to prevent the spread of introduced species on native species.

4C6. Monitor and evaluate outcomes of strategy 4C5. Integrate data into next iteration of strategies 4C1 through 4C4, along with other new data developed for objectives. Revise strategies as necessary to reflect new information and repeat strategies for subsequent iterations.

Discussion: Exotic species pose a potential threat to focal species in the Salmon subbasin; however the magnitude of this threat is currently unknown. Predation by non-native species (e.g., smallmouth bass) may limit all juvenile anadromous fish in the lower Salmon, although fall chinook have been the focus of studies related to this factor. Obtaining a better understanding of in-basin predation rates on juvenile outmigrants would refine our survival estimates (see objective 3C) and allow managers to address this potential limiting factor.

Addressing brook x bull trout hybridization is identified as a critical limiting factor in Valley Creek and in the Little Salmon River, as is addressing brook x cutthroat trout competitive interactions in the Secesh River. Preliminary review of ongoing brook trout removal efforts have shown some potential, but will be costly if applied at the subbasin scale. Ongoing research and experimentation into alternative methods is necessary to find more cost-effective methods, or a combination of methods that will succeed in meeting long-term objectives.

Existing data relative to bull × brook trout hybridization is incomplete, or simply does not exist, thereby precluding a scientifically-based determination of its extent and location throughout the Salmon subbasin. Existing surveys are not proceeding at a rate to provide the necessary information. An additional problem is the lack of standardization in genetic sampling protocols used in the subbasin. Standardization would allow the various survey efforts to be integrated into a subbasinwide assessment of these populations and problems of hybridization.

3.2.1.2 Terrestrial Species

Problem 5: Limited understanding of historic[2] and existing terrestrial species composition, recent population trends, and habitat conditions and trends, inhibits the ability to effectively manage or conserve these species (see assessment section 2.3 for presentation of available data related to terrestrial communities and assessment appendix 2-1 for presentation of data limitations related to terrestrial communities).

Terrestrial Objective 5A: Increase understanding of existing and historic composition, recent population trends, habitat conditions and trends, and limiting factors of the terrestrial species of the Salmon subbasin (see sections 4.1: Data Gaps, 4.2: Research Needs, and 4.3: Monitoring and Evaluation Plan).

Strategies:

5A1. Identify existing information and data gaps. Develop a subbasin-wide survey program and database for terrestrial communities, including focal plants and animals, ESA listed, neotropical migrant, and culturally important species (see section 4.1: Data Gaps).

5A2. Integrate protocols, data collection, and data access between agencies to maximize funds, avoid duplication of efforts, and maintain consistency of information. (ex. Fauna database shared by IDCDC and Forest Service).

5A3. Increase documentation--support the efforts of the Idaho Conservation Data Center (IDCDC) to document the occurrence of rare species and work toward increased reporting of sightings (see section 4.1: Data Gaps).

5A4. Continue to monitor and evaluate the habitat conditions for terrestrial species of the Salmon subbasin. Focus efforts on focal, ESA listed and culturally important species.

5A5. Describe historic terrestrial species occurrence in the subbasin (see section 4.1: Data Gaps).

[2] The Salmon Terrestrial Technical Teams' use of the term 'Historic' is analogous to the definition given by Quigley and Arbelbide 1997a.

5A6. Monitor and evaluate the effectiveness of data collection and research efforts to increase understanding of terrestrial species. Modify strategies as necessary based on new information and priorities.

Discussion: Identifying existing information and collecting additional data focused on terrestrial species and habitats will improve our understanding and ability to manage these species. Establishing a baseline understanding of current and historic habitat conditions, ecosystem functions and population numbers will allow managers to evaluate the affects of future management activities and swiftly adapt them if necessary. In general, we tend to know what species require as well as their distribution, but we have limited understanding of what is happening to habitats and how it compares with historic conditions species evolved with.

The IDCDC (2004) is the central repository for all terrestrial and aquatic data on population information and sightings of rare species. It provides an accessible vehicle for making data available to managers and the public. The mission of the IDCDC is to collect, analyze, maintain, and disseminate scientific information necessary for the management and conservation of Idaho's biological diversity (IDCDC 2004). As stated in strategy 5A2, the efforts of the IDCDC should be supported as one way to increase understanding of the composition, population trends, habitat conditions and trends, and limiting factors of the terrestrial species of the Salmon. An effort should be made to interface research efforts (stressed in strategy 5A2 and 5A3) and management efforts in the subbasin to address the most significant impacts on species. Interagency collaboration and communication should be stressed to insure timely, comprehensive data collection and dissemination.

Current data gaps include amphibians, bats, and most other species that are not big game species. For example, to manage lynx and other important species, current necessary information on prey species is a complete data gap (i.e. information on current distribution, abundance, and trend information for snowshoe hare, red squirrel and other prey species in Idaho, is in many instances non-existent). Management of non-game species, including some plants, is of unknown effectiveness due to almost complete data gaps for most species.

Problem 6: Human alteration of ecosystem composition, structure, and function[3] has had varying levels of impacts on terrestrial species composition, population trends and habitat quality in the Salmon subbasin (see assessment sections 2.3, 3.1, and 3.2.2)

Terrestrial Objective 6A: Sustain viable populations[4] of terrestrial species

[3] The Salmon Terrestrial Technical Teams' use of the terms 'composition', 'structure', and 'function' is analogous to the definition given by Quigley and Arelbide 1997a.

[4] The Salmon Terrestrial Technical Teams' use of the term 'viable population' is analogous to the following definition given by Quigley and Arbelbide (1997b)—The likelihood of continued existence of a well-distributed population or species to a specified time period; relative measure of the estimated numbers and distribution of reproductive individuals in a species population necessary for that species' continued existence; a minimum number of reproductive individuals in a habitat that will both support them and enable them to interact is necessary for a species maintenance.

Strategies:

6A1. In accord with established agency plans, ESA, recovery plans, CWA, and other decision matrices, restore and maintain viable populations of all federally listed terrestrial species in the subbasin.

6A2. In accord with established agency plans and decisions, restore and maintain viable populations of terrestrial species including neo-tropical migrant bird populations, cavity nesting species, amphibian, reptile, invertebrate, and rare, sensitive, and culturally important species.

6A3. Conserve, restore, and sustain populations of big game species to support traditional levels of cultural, subsistence, and recreational use. Target species include elk, moose, mule deer, antelope and bighorn sheep.

6A4. Conserve, restore, and sustain populations of harvestable species, waterfowl, upland game, and furbearers under traditional levels of recreation and subsistence use.

6A5. Enforce conservation practices and laws and regulations applicable to protecting and restoring fish and wildlife populations and habitats.

6A5. Monitor and evaluate effectiveness of efforts to sustain viable populations of focal terrestrial species. Integrate new information and modify strategies as necessary based on new information and priorities.

<u>Discussion:</u> Human impacts on terrestrial species and habitats have been accelerated in the subbasin as a result of development of federal hydropower projects. A reliable and affordable power source, irrigation water supply, and employment opportunities provided impetus for development of agriculture, timber management, and other industry, leading to increased human disturbance levels and human use of wildlife. The significant reduction of anadromous fishes has contributed at varying levels to direct and indirect levels of increased harvest pressure on wildlife for subsistence, cultural, and recreational uses. Mitigation action is necessary to meet the obligation of the hydropower system to the Tribal and non-tribal communities of the upper Columbia River basin.

Bonneville Power Administration has invested significant funding in protecting and restoring aquatic and terrestrial species and habitat in the Salmon subbasin. Enforcement of existing conservation practices, laws, and regulations is necessary to protect this investment and to strengthen the overall protection and restoration effort in the subbasin.

Viable populations represent a minimum goal for abundance of wildlife species; the long-term goal is species abundance at a level that supports harvest and other cultural uses, if applicable.

Terrestrial Objective 6B: Evaluate and quantify terrestrial losses associated with continued operation and secondary impacts of Lower Snake River Projects (see assessment sections 3.1 and 3.2.2.1).

Strategies:

6B1. Assess impacts of Lower Snake River Projects on terrestrial species--develop methods to assess continued operational and secondary losses associated with Lower Snake River Projects including literature reviews, modeling, and/or data analysis.

6B2. Assess impacts to terrestrial species from loss of anadromous stocks--quantify the ecological process and population impacts associated with the loss of anadromous fish species.

6B3. Mitigate terrestrial impacts related to Lower Snake River Projects -- Develop a program to mitigate for operational and secondary terrestrial losses in the Salmon subbasin.

6B4. Implement the strategies under problem statement 51 and 52 about addressing the loss and degradation of riparian and wetland habitats and under problem statement 62 about the need to restore nutrients, reduce impacts of reductions in salmon populations to the wildlife of the subbasin, and mitigate for impacts of the hydropower system to riparian and wetland habitats.

6B5. Monitor and evaluate efforts to mitigate for losses associated with Lower Snake River Projects. Integrate new information into strategies 6B1 and 6B2 as necessary in order to assure appropriate mitigation for losses as described in strategy 6B3.

<u>Discussion:</u> The operation of Lower Snake River dams and reduced nutrient inputs due to the loss of anadromous fish continue to impact the wildlife species of the subbasin. Historic large returns that have been reduced by past fisheries and development of the hydrosystem provided an important component of the natural food web. Continued low returns of anadromous fish, even to pristine landscapes within the Salmon subbasin, continue to affect species that would otherwise benefit from the energy and nutrients these fish import from the marine environment (see Draft Salmon Subbasin Summary, 2001, section 4.4.2.b). This strategy seeks to quantify these losses so that they can be appropriately mitigated.

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3.2.2 Environmental Components

The environmental objectives and strategies developed to address problems in the Salmon subbasin are listed in Table 7. These problem statements, objectives, and strategies are generally meant to address habitat for fish and wildlife populations.

Table 7. Environmental problem statements and objectives for the Salmon subbasin. These must be taken in context with associated strategies and discussion comments in this section about environmental components.

Environmental Problem Statements	Environmental Objectives	Assessment Link (Section)[1]
Aquatics		
Problem 7: A loss of marine-derived nutrients (i.e., carbon, nitrogen, and phosphorus) through significant reductions in returning adult salmon and steelhead is limiting the food base in the Salmon ecosystem. This problem is pertinent to anadromous, resident, and terrestrial populations	Aquatic Objective 7A: Spatially assess the impacts of carcass-related nutrient reductions on the aquatic and terrestrial biota. If appropriate, prescribe management actions to offset impacts	2.0, 3.2.2.1
Problem 8: A reduction in riparian vegetation has resulted in a loss of recruitable LWD, poor pool:riffle ratios, a decrease in streambank stability, and a decrease in stream shading. These changes have resulted in oversimplified channels, higher erosion rates, more severe flooding, and excessive stream temperatures.	Aquatic Objective 8A: Increase the number of pieces of LWD in reaches currently deficient, to volumes consistent with PFC ratings (Appendix F)	1.7.2, 1.7.4, 2.1.2, 2.2.4, 2.3.1, 2.3.9.1, 3.1.1, 3.1.2, 3.1.3, 3.1.7, 3.1.8
Problem 9: Streamflow diversion, changes to upland and riparian vegetation, modifications to floodplain function, and increases in drainage density have altered natural hydrographs in mainstem and tributary habitats	Aquatic Objective 9A: By 2010, complete stream reach-specific designations (and maintenance) of streamflows that are adequate for life history stages of focal species and that are sufficient for providing channel maintenance. Aquatic Objective 9B: Improve pool:riffle ratios to properly functioning conditions Aquatic Objective 9C: Improve bank stability to properly functioning conditions Aquatic Objective 9D: Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria	9A: 2.2.4.3, 2.3.9.2, 2.3.9.3, 3.1.1, 3.1.2, 3.1.3, 3.1.6, 3.1.8 8B: 3.1.1, 3.1.6 8C: 2.3.9.3, 3.1.1, 3.1.2, 3.1.3, 3.1.6, 3.1.7, 3.1.8 8D: 2.2.4.3, 2.3.9.1, 2.3.9.3, 3.1.1, 3.1.2, 3.1.3, 3.1.5, 3.1.8
Problem 10: Sedimentation from human activities limits the production potential of focal species throughout the Salmon subbasin, and particularly within batholith watersheds.	Aquatic Objective 10A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards (e.g., TMDLs) and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019	2.2.4.3, 2.3.9.1, 2.3.9.3, 2.3.9.4, 2.3.9.7, 2.3.9.8, 3.1.1
Problem 11: Mining activities are limiting distribution of focal species	Aquatic Objective 11A: Reduce concentrations of non-organic chemicals to levels consistent with IDEQ beneficial use criteria	3.1.1, 3.1.6
Problem 12: Anthropogenic migration barriers are affecting distribution, population connectivity and genetic integrity of all focal populations	Aquatic Objective 12A: Rehabilitate connectivity where it will benefit native fish populations, with an emphasis on bull trout. Aquatic Objective 12B. Implement fish screening in tributaries after dewatering and passage issues are resolved	12A: 2.2.1.3.3, 2.2.4.3, 2.3.9.4, 2.3.9.7, 3.1.1, 3.1.2, 3.1.3, 3.1.6 12B: 3.1.3

Environmental Problem Statements	Environmental Objectives	Assessment Link (Section)[1]
Problem 13: The natural hydrologic regime in the Upper Mainstem Salmon (from the East Fork confluence to the headwaters) has been altered by streamflow withdrawals. The effects from these pressures include a reduction in base flow conditions and some modifications to flow timing.	Aquatic Objective 13A: Mimic the shape and timing of the natural hydrograph in the mainstem Salmon (from the East Fork confluence to the headwaters)	2.2.4.3, 2.3.9.2, 2.3.9.3, 3.1.1
Problem 14: Fish are entering irrigation systems through irrigation turn on before screens are in place, operation of diversions and control structures, wastewater return flows and breeched (those that have structurally failed or are undersized relative to the volume of water they convey) ditches (a.k.a. 'backdoor' access). Upon entering the hydrologically unstable irrigation system, fish are subject to threats from dewatering (i.e., temperatures, reduced forage, increased predation, etc.).	Aquatic Objective 14A: Reduce potential losses of fishes that enter screened irrigation complexes Aquatic Objective 14B: Improve connectivity of tributaries that are currently intercepted by irrigation complexes	14B: 2.2.1.3.3, 2.2.4.3, 2.3.9.4, 2.3.9.7, 3.1.1
Problem 15: Sedimentation from various land-use activities has impacted focal species habitat quality and quantity in the mainstem from the East Fork confluence to the headwaters	Aquatic Objective 15A: Reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019	2.2.4.3, 2.3.9.1, 2.3.9.3, 2.3.9.4, 2.3.9.7, 2.3.9.8, 3.1.1
Problem 16: The diversion of water for irrigation and its subsequent return, combined with reductions in riparian shading represent the primary factors contributing to increased temperatures in the mainstem Salmon from the 12-mile section upstream to Challis	Aquatic Objective 16A: In Upper Mainstem reaches where stream temperatures have been defined a high priority limiting factor (i.e., from the 12-mile section to the headwaters), rehabilitate instream temperatures to levels that support designated beneficial use criteria	2.2.4.3, 2.3.9.1, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.7,
Problem 17: Channel confinement and development of riparian areas, from the 12-mile section upstream to the headwaters, has caused a reduction in the pool:riffle ratio, a reduction in streambank stability, a reduction in shade, and has limited salmonid access to side channel habitat	Aquatic Objective 17A: Improve pool:riffle ratios to properly functioning conditions Aquatic Objective 17B: Improve bank stability to properly functioning conditions Aquatic Objective 17C: Improve floodplain connectivity and access to side channel habitat to help offset losses of pool habitat	17A: 3.1.1 17B: 3.1.1 17C: 3.1.1
Problem 18: Historic dredge mining has left unconsolidated dredge tailings in the lower Yankee Fork River. These tailings, as well as other mining waste, may contribute toxic chemicals to the Yankee Fork and other downstream reaches, and constrict the stream channel from interacting with adjoining floodplain areas. These problems thereby limit habitat suitability for spring chinook (SRYFS), summer steelhead (SRUMA-s) and bull trout (UPS) populations	Aquatic Objective 18A: Rehabilitate water quality in affected reaches to conditions suitable to support designated beneficial use criteria Aquatic Objective 18B: Reconnect the mainstem Yankee Fork with adjoining floodplain	18A: 2.3.9.1, 3.1.1 18B: 2.3.9.1, 3.1.1
Problem 19: Brook trout, which occur throughout the majority of Valley Creek and occupy habitat shared by bull trout, represent a potential threat to bull trout due to displacement and/or predation	Aquatic Objective 19A: In the next 10 years, reduce and prevent impacts of brook trout x bull trout interaction	2.2.5, 3.1.1

Environmental Problem Statements	Environmental Objectives	Assessment Link (Section)[1]
Problem 20: Reductions in riparian shading combined with irrigation return flows, represent the primary factors contributing to increased temperatures in middle- and lower-elevation reaches.	Aquatic Objective 20A:Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria	2.2.4.3, 2.3.9.1, 3.1.1
Problem 21: Reductions in riparian vegetation combined with the inherent geologic instability in the East Fork, has resulted in a decrease in streambank stability.	Aquatic Objective 21A: Improve bank stability to properly functioning conditions	3.1.1
Problem 22: Naturally high background sediment levels in the uplands combined with roads and grazing of domestic stocks are contributing to increased deposition in Herd Creek	Aquatic Objective 22A: Reduce grazing related sedimentation in Herd Creek to levels that are suitable for spawning and rearing	2.3.9.1, 3.1.1
Problem 23: Reductions in riparian shading combined with irrigation return flows, represent the primary factors contributing to increased temperatures	Aquatic Objective 23A: Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria	2.3.9.1, 3.1.1
Problem 24: A reduction in riparian vegetation and conversion of floodplain areas has resulted in a decrease in streambank stability throughout much of Herd Creek	Aquatic Objective 24A: Stabilize 10,000 feet of streambank in Herd Creek focusing on areas where the stream exhibits excessive width:depth ratios	3.1.1
Problem 25: Water diversions in the lower portion of Herd Creek are creating migration barriers to otherwise usable habitat	Aquatic Objective 25A: Improve connectivity and access to habitat currently blocked by manmade barriers	2.2.1.3, 3.1.1
Problem 26: Tributaries to the upper Salmon River are impacted by water withdrawals that alter the hydrologic regimes (primarily low flow) of the small systems	Aquatic Objective 26A: Rehabilitate or mimic natural hydrographs of tributaries to the Upper Salmon River (from Pahsimeroi to headwaters)	2.2.4.3, 2.3.9.2, 3.1.2
Problem 27: Roads, timber harvest, grazing, and changes to the hydrologic regime of the small Upper Salmon tributaries have acted alone or cumulatively to contribute excessive amounts of fine sediment to channels	Aquatic Objective 27A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019	3.1.2
Problem 28: To a limited extent, fish habitat in the Salmon River watershed upstream of the Yankee Fork is affected by migration barriers that water diversions create on tributary streams. This is a concern because fish use the tributaries as thermal refuge when water temperatures in the main river increase.	Aquatic Objective 28A: Within the next ten years (by 2014) improve connectivity of at least half of all tributaries that are currently considered to be disconnected from the mainstem Salmon (upstream of the Yankee Fork) due to water diversions	2.2.1.3, 2.3.9.2, 3.1.2
Problem 29: In the Pahsimeroi River Valley, all mainstem tributaries are disconnected throughout the year because of water diversions and the geology of the valley. The disconnection has resulted in alterations to the mainstem Pahsimeroi's (mouth to Hooper Lane) hydrologic regime (i.e., peak and base flows and flow timing) and has created barriers to migration.	Aquatic Objective 29A: Mimic or rehabilitate the natural hydrographs of streams in the Pahsimeroi watershed Aquatic Objective 29B: Reconnect mainstem tributaries and modify diversion structures as needed to provide for chinook and steelhead migration	29A: 2.3.9.2, 3.1.2 29B: 2.3.9.2, 3.1.2

Environmental Problem Statements	Environmental Objectives	Assessment Link (Section)[1]
Problem 30: Over a century of livestock grazing and instream flow alterations have substantially altered the species diversity, structure, composition, and connectivity of riparian zones in the Pahsimeroi watershed. These changes have resulted in excessive sedimentation, high stream temperatures, reduced shading and bank instability each of which may act cumulatively or independently to adversely affect chinook (SRPAH) and steelhead (SRPAH-s) populations.	Aquatic Objective 30A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019 Aquatic Objective 30B: Starting in the lower reaches of the mainstem, or where there are overlapping areas of occupied Chinook and steelhead habitat, rehabilitate and enhance riparian vegetation to levels that are within the historic range of natural variability	30A: 3.1.2 30B: 2.3.9.2, 3.1.2
Problem 31: Instream flow diversions have substantially altered the species diversity, structure, composition, and connectivity of riparian zones in the Pahsimeroi watershed. These changes have resulted in excessive sedimentation, high stream temperatures, reduced shading and bank instability each of which may act cumulatively or independently to adversely affect chinook (SRPAH) and steelhead (SRPAH-s) populations.	Aquatic Objective 31A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019 Aquatic Objective 31B: Starting in the lower reaches of the mainstem, or where there are overlapping areas of occupied Chinook and steelhead habitat, rehabilitate and enhance riparian vegetation (in areas not already fenced) to levels that are within the historic range of natural variability.	31A: 3.1.2 31B: 2.3.9.2, 3.1.2
Problem 32: The high number of irrigation diversions in the mainstem Pahsimeroi, from Patterson Creek to Big Springs Creek, has created numerous barriers to fish migration	Aquatic Objective 32A: Reconnect mainstem tributaries and modify diversion structures as needed to provide for chinook and steelhead migration	3.1.2
Problem 33: Streamflow withdrawals and the geology of the valley act to disconnect virtually all of the Pahsimeroi tributaries from the mainstem, year-round. The loss of water affects base flow conditions and subsequently migration, but also may alter flow timing and to a lesser degree, peak flows.	Aquatic Objective 33A: Mimic or rehabilitate the natural hydrographs of streams in the Pahsimeroi watershed Aquatic Objective 33B: Reconnect mainstem tributaries and modify diversion structures as needed to provide for chinook and steelhead migration	33A: 2.3.9.2, 3.1.2 33B: 2.3.9.2, 3.1.2
Problem 34: Connection of intermittent, disconnected tributaries to mainstem reaches only occurs in instances of extreme high water, which is likely contributing to the absence of a functional, and connected riparian corridor (B. Loucks, USBWP, personal communication, May, 2004). The absence of vegetation along these channels facilitates sediment transport to perennial channels, which has been identified by the technical team as a factor adversely affecting chinook (SRPAH) and steelhead (SRPAH-s) populations.	Aquatic Objective 34A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019 Aquatic Objective 34B: Rehabilitate and enhance riparian vegetation along Pahsimeroi tributaries to levels that are within the historic range of natural variability	34A: 3.1.2 34B: 2.3.9.2, 3.1.2

Environmental Problem Statements	Environmental Objectives	Assessment Link (Section)[1]
Problem 35: The hydrologic regime (peak flows, base flows, flow timing) and connectivity of most Lemhi tributaries has been altered by irrigation withdrawals. Only 7% of all tributaries remain connected to the mainstem. These changes limit resident and anadromous populations' access to potentially available habitat and delay anadromous smolt and adult migration in the lower reaches of the mainstem Lemhi, which may contribute to increased mortality rates, although no evidence has been offered to date.	Aquatic Objective 35A: Rehabilitate natural hydrographs in key anadromous and resident tributaries to ensure adequate base flows are available in lower, mainstem reaches (i.e., mouth to Agency Creek) Aquatic Objective 35B: Provided there is adequate funding, personnel, and landowner participation, reconnect a minimum of one tributary every three years that are currently defined as partially or seasonally inaccessible to anadromous and/or resident focal species Aquatic Objective 35C: Improve irrigation efficiency below diversion L-7	35A: 2.3.9.3, 3.1.3 35B: 3.1.3
Problem36: Riparian function and channel morphology on the mainstem Lemhi has been compromised by road construction and floodplain development. The effects from these activities include excessive sedimentation, high stream temperatures, and changes to hydrologic processes and are most pronounced from Agency Creek to Leadore, and in the Big Springs Creek drainage.	Aquatic Objective 36A: Improve riparian function and natural hydrologic processes	2.3.9.3, 3.1.3
Problem37: Riparian function and channel morphology on the mainstem Lemhi has been compromised by road construction and floodplain development. The most pronounced effects from these activities include excessive sedimentation due to streambank destabilization, and high stream temperatures due to decreased shade. The problems are most pronounced from Agency Creek to Leadore, and in the Big Springs Creek drainage.	Aquatic Objective 37A: Maintain and enhance the riparian corridor along the upper 10 miles of the Hayden Creek-to-Leadore reach	2.3.9.3, 3.1.3.
Problem 38: Floodplain development in the Big Springs Creek drainage has destabilized streambanks and reduced riparian function which has contributed to excessive sedimentation, high stream temperatures, and a reduction in cover	Aquatic Objective 38A: Establish riparian vegetation along critical areas in Big Springs Creek to provide cover and reduce stream temperatures Aquatic Objective 38B: Reduce the sediment levels within spawning gravels	38A: 2.3.9.3, 3.1.3 38B: 2.3.9.3, 3.1.3
Problem 39: Due to the geography of the channel, the placement of diversion screens often occurs a considerable distance from the point of diversion (e.g., Hayden Creek 11) creating excessively long ditches, ditch instability, fish stranding, and high conveyance losses. Also, within the drainage, there are potentially numerous barrier issues combined with inadequate riparian vegetation, especially in the lower reaches.	Aquatic Objective 39A: Improve migration at water diversions in Hayden Creek Aquatic Objective 39B: Improve conveyance in Hayden Creek diversions to improve bank stability, decrease fish stranding, and shorten overall ditch lengths.	39A: 2.3.9.3, 3.1.3 39B:

Environmental Problem Statements	Environmental Objectives	Assessment Link (Section)[1]
Problem 40: Except for Big Springs Creek, tributaries of the upper Lemhi above Hayden Creek are no longer available to anadromous production because of low flows and diversions. Migration problems can possibly occur year-round, irrespective of irrigation needs. This may be due to the physical obstacle created by the diversion structure and/or the non-removal of the diversion during non-irrigation periods.	Aquatic Objective 40A: Reconnect mainstem tributaries and modify diversion structures as needed to provide for anadromous and resident migration	2.3.9.3, 3.1.3
Problem 41: Focal species habitat occurring in tributaries entering the mainstem, between the confluences of the North Fork Salmon and Pahsimeroi Rivers, are limited by a modified hydrologic regime, inadequate pool:riffle ratios, and structural migration barriers.	Aquatic Objective 41A: Rehabilitate natural hydrographs in key anadromous and resident tributaries to ensure for adequate base flows, channel-maintaining peak flows, and normal flow timing. Aquatic Objective 41B: Improve connectivity and access to habitat currently blocked by manmade barriers	41A: 3.1.6 41B: 3.1.6
Problem 42: Elevated stream temperatures are of primary concern in the Middle Salmon–Chamberlain Watershed, and specifically within the area west of Wind River (including Meadow Creek).	Aquatic Objective 42A: In stream reaches occurring in the Middle Salmon–Chamberlain Watershed, and specifically those occurring west of Wind River (including Meadow Creek), rehabilitate instream temperatures to levels that support designated beneficial use criteria	3.1.5
Problem 43: Localized riparian issues exist in the South Fork watershed. Areas where riparian function is most limited include those in which roadbeds have been constructed adjacent to or within the immediate floodplain.	Aquatic Objective 43A: Revegetate tributary reaches in areas not dominated by rip-rap or road beds and improve bank stability along the mainstem	3.1.7
Problem 44: High numbers of brook trout occur in the Secesh drainage, and pose a potential displacement threat to westslope cutthroat trout, and a hybridization threat to bull trout. The extent and severity of the problem is currently unknown.	Aquatic Objective 44A: Decrease or extirpate brook trout populations in the watershed	2.2.5, 3.1.7
Problem 45: A lack of functioning LWD is affecting channel structure in Johnson Creek and is reducing habitat quality for focal salmonids	Aquatic Objective 45A: Improve riparian function to increase LWD recruitment	3.1.7
Problem 46: Fine sediments in the South Fork mainstem are currently high due to the geologically unstable nature of the watershed and legacy effects from land management	Aquatic Objective 46A: Promote landscape management activities that minimize the threat of chronic sediment inputs Aquatic Objective 46B: Gain an understanding of how fine sediments are affecting secondary production, habitat availability and use by focal species	46A: 2.3.9.7, 3.1.7 46B: 2.3.9.7, 3.1.7
Problem 47: A common factor limiting the condition of salmonid rearing habitat throughout the Little Samon, Lower Salmon mainstem and on some specific associated tributaries of the Lower Salmon/Little Salmon is the inadequacy of shade-providing, bank-stabilizing riparian vegetation	Aquatic Objective 47A: Using riparian area revegetation actions, stabilize 25 MILES of streambank along the mainstem Little Salmon River	2.3.9.8, 3.1.8

Environmental Problem Statements	Environmental Objectives	Assessment Link (Section)[1]
Problem 48: High numbers of brook trout occur in lower Salmon tributaries (e.g., French Creek, Elkhorn Creek, Slate Creek) and pose a potential hybridization threat to bull trout where they coexist. The extent and severity of the problem is currently unknown.	Aquatic Objective 48A: Decrease or extirpate brook trout populations in the watershed	2.2.5, 3.1.8
Problem 49: The lack of properly functioning riparian corridor, floodplain/channel encroachment, and upper meadow water diversions have adversely impacted water temperature, flow regimes, and channel morphology	Aquatic Objective 49A: Improve riparian condition to decrease stream temperatures Aquatic Objective 49B: Increase the number of pieces of LWD in reaches currently deficient, to volumes consistent with PFC ratings (Appendix F) Aquatic Objective 49C: Reduce floodplain/channel encroachment (e.g., roads, development, etc.)	49A: 2.3.9.9, 3.1.9 49B: 3.1.9 49C: 3.1.9
Terrestrial		
Problem 50: The quantity and quality of functioning wetland habitats has been reduced. Determining the extent of the problem is difficult due to lack of information.	Terrestrial Objective 50A: Conserve wetland resources and assess wetland habitat conditions. Terrestrial Objective 50B: Restore historic wetlands to proper functioning condition.	2.0, 2.3.1, 2.3.9, 3.1, 4.2.3.2
Problem 51: The quantity and quality of lowland riparian habitat has decreased.	Terrestrial Objective 51A: Conserve riparian habitats. Terrestrial Objective 51B: Restore 50% of degraded riparian areas to proper functioning condition by 2019.	2.0, 2.3.1, 2.3.9, 3.0, 3.1, 3.2.2.1, 4.2.3.2
Problem 52: Reductions in the extent and declines in the condition of warm/dry old growth and mature ponderosa pine/Douglas-fir forest habitats in the subbasin have negatively impacted the numerous wildlife species that utilize these habitats.	Terrestrial Objective 52A: Conserve and maintain mature/old growth "open" stands of ponderosa pine and Douglas fir forest habitats (warm/dry habitats). Terrestrial Objective 52B: Manage for mature/old growth "open" stands of ponderosa pine and Douglas-fir in warm/dry- ponderosa pine, Douglas-fir, and grand fir habitat groups within historic range of variability (HRV) by vegetation response units (VRU)	2.3.3, 2.3.9, 3.0, 3.1, 3.2.2.3, 4.2.2.3, 4.2.3.5
Problem 53: The excessive loss and degradation of shrub-steppe habitat in the Salmon subbasin has negatively impacted numerous native plant and animal species dependent on these habitats, such as sage grouse.	Terrestrial Objective 53A: Conserve ecological integrity of shrub-steppe habitat. Terrestrial Objective 53B: Restore ecological integrity and increase stand density and diversity for 5% of degraded shrub-steppe habitat by 2019.	2.0, 2.3.2, 2.3.9, 3.0, 3.1, 3.2.2.8, 4.2.3.3
Problem 54: The extensive loss and degradation of native grassland habitats of the Salmon subbasin has negatively impacted native plant communities and animal species dependent on these habitats.	Terrestrial Objective 54A: Conserve ecological integrity of remaining native grassland remnants. Terrestrial Objective 54B: Restore ecological integrity of 5-15% of degraded grasslands by 2019.	2.0, 2.3.4, 2.3.9, 3.0, 3.1, 4.2.3.4
Problem 55: The extensive loss and degradation of aspen habitats of the Salmon subbasin has negatively impacted native plant communities and animal species dependent on these habitats	Terrestrial Objective 55A: Conserve ecological integrity of aspen habitat Terrestrial Objective 55B: Restore ecological integrity of aspen habitat	2.0, 2.3.5

Environmental Problem Statements	Environmental Objectives	Assessment Link (Section)[1]
Problem 56: Exotic invasive plant species have negatively impacted native terrestrial focal habitats and species.	Terrestrial Objective 56A: Prevent the introduction of exotic invasive plant species into native habitats to conserve quality, quantity, and diversity of native plant communities providing habitat to native wildlife species. Terrestrial Objective 56B: Reduce the extent and density of established exotic invasive plant species.	1.7.5, 2.0, 2.3, 2.3.9, 3.0, 3.1, 3.2.2.2, 3.2.2.3, 3.2.2.4, 4.2.3, 4.2.4.1
Problem 57: Historic and current livestock grazing has impacted fish and wildlife habitats and populations in some portions of the subbasin.	Terrestrial Objective 57A: Restore ecological integrity in upland grasslands, riparian areas, and forest habitats. Terrestrial Objective 57B: Reduce impacts of livestock interactions with vulnerable terrestrial species populations. Terrestrial Objective 57C: Eliminate Domestic Sheep and goat grazing in areas likely to transmit disease to bighorn sheep.	2.0, 2.3, 2.3.9, 3.0, 3.1, 3.2.2.7, 4.2.3.4, 4.2.3.2
Problem 58: The expansion of urban and rural human development has impacted native terrestrial species and their habitats.	Terrestrial Objective 58A: Minimize the negative impact of current and future development on native terrestrial species and their habitats in the subbasin.	2.0, 2.3, 2.3.9, 3.0, 3.1, 3.2.2.7
Problem 59: Roads (dependant on density/location), associated human use, and motorized access have altered the size, quality, distribution and connectivity in and between habitat patches in the subbasin	Terrestrial Objective 59A: Reduce the impact of the transportation system and motorized access on wildlife and fish populations and habitats.	2.0, 2.3, 2.3.9, 3.0, 3.1, 3.2.2.7, 4.2.3.2
Problem 60: Alteration of the natural fire regime in the Salmon subbasin has negatively impacted native terrestrial focal habitats and species.	Terrestrial Objective 60A: Restore and conserve ecosystem integrity across the landscape through restoration of natural processes, using methods including prescribed fire, wildfire use for resource benefit (WFURB), and mechanical methods (thinning and harvest).	2.0, 2.3, 2.3.9, 3.0, 3.1, 4.2.2.4, 4.2.3, 4.2.3.1, 4.2.3.2, 4.2.3.3, 4.2.3.4, 4.2.3.5, 4.2.4.2
Problem 61: Timber harvest has affected stand structure of forest habitats.	Terrestrial Objective 61A: Restore forest ecological integrity, including structure, function, and composition.	2.0, 2.3, 2.3.9, 3.0, 3.1, 3.2.2.7, 4.2.3.5
Problem 62: The loss or dramatic reduction in anadromous fish runs throughout the subbasin has reduced nutrient inputs and reduced habitat suitability for salmon-dependent wildlife.	Terrestrial Objective 62A: Restore natural nutrient input cycles and mitigate for damages to aquatic and terrestrial populations due to the loss of these nutrients.	2.0, 2.3, 2.3.9, 3.0, 3.1, 3.2.2.1

[1/] Assessment links to limiting factors (3.1.1) shown are only those receiving a rank of 3.

3.2.2.1 Subbasin-Level Problem Statements, Objectives, and Strategies

The second of the three aquatic subsections addresses environmental problems, objectives, and strategies at the subbasin level. This list is based on the limiting factors (section 3.1) that are problematic throughout the subbasin (e.g., sedimentation), and which have a common set of treatment strategies. The Fisheries Technical Team agreed that development of this section would effectively reduce the redundancy (e.g., listing of strategies) in the document, while providing the necessary level of detail to address limiting factors.

The underlying goal of the objectives and strategies presented in this and the subsequent section is to improve freshwater **survival-productivity** of focal species so as to enable species recovery. The problems presented below are considered by local biologists to be the primary issues in the subbasin that are limiting in-basin **survival-productivity, abundance, distribution, and life history diversity**. Lack of functional riparian areas, disconnected tributary habitats, excessive sediment, and structural barriers impeding migration are among the primary limiting factors inhibiting species recovery. The problems alone are, for the most part, insignificant; however, they can act cumulatively to decrease population persistence.

There is very little research that currently establishes the effect that habitat rehabilitation will have on fish populations. It will therefore be very important to conduct rehabilitation activities in a manner that enables biologists to assess effectiveness relative to biological response. Quantifiable measures that will describe structural and functional attributes of interest as well as progress toward meeting the objective are presented in Appendix E (Appendix Table 5 and Appendix Table 6). The products from quantified performance measures are diverse. Taken together, these performance measures will provide indicators of change or difference between and among salmon and steelhead populations in the Salmon subbasin.

As mentioned above, the following objectives and strategies were developed to address the highest priority limiting factors within the subbasin/watershed in which they occur. The Fisheries Technical Team recognized the need for prioritization of activities addressing limiting factors between watersheds, and made attempts at doing so. However, key data gaps (e.g., definition of **survival-productivity**) prohibited the Technical Team from making scientifically based prioritization of actions between watersheds and species (see section 6.1).

Rehabilitation or protection actions that contribute to the enhancement of multiple focal species (aquatic and terrestrial) represent those of highest importance within the respective watersheds. This includes 1) actions that promote the enhancement or maintenance of riparian function, 2) actions that improve or sustain population connectivity, 3) actions that rehabilitate or protect natural hydrologic processes, 4) actions that reduce sedimentation, and 5) actions that address management uncertainties.

One of the tools that will allow us to gauge the relative effectiveness of rehabilitation and protection actions is the use of NOAA Fisheries "Habitat Approach" (*Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids*, available at http://www.nwr.noaa.gov/1habcon/habweb/habguide/habpub.htm). The Habitat Approach (NMFS 1999) provides guidance relative to the effects of proposed actions on the freshwater habitat of listed salmonids and employs the "properly functioning condition" (PFC) concept. Properly functioning condition is the sustained presence of natural, habitat forming processes in a watershed (e.g., riparian community succession, bedload transport, precipitation runoff pattern, channel migration) that are necessary for the long-term survival of the species through the full range of environmental variation. PFC, then, constitutes the habitat component of a species' biological requirements. See Appendix F (Appendix Table 7) for the matrix of pathways and indicators used in the PFC ratings.

The limiting factors used to develop the watershed-specific problems, objectives, and strategies, come from information presented in tables in Section 3.1 of the assessment. Within each table is a common list of ecosystem components that are rated in terms of their level of alteration relative to population production potential. Components in the assessment were ranked from 3 (greatest influence on ecosystem or population) to 1 (least influence on ecosystem or populations). The problems, objectives, and strategies section is based on *only* those limiting factors of highest priority (i.e., those receiving a rank of 3). Lower ranking components were not used in the development of the objectives and strategies due to their interrelatedness with the highest ranking components (i.e., if the highest ranking component is addressed, it is likely that the lower ranking component(s) will in turn be addressed). A summary of the limiting factors used in the development of the problems, objectives, and strategies is provided in Table 8.

Problem 7. A loss of marine-derived nutrients (i.e., carbon, nitrogen, and phosphorus) through significant reductions in returning adult salmon and steelhead is limiting the food base in the Salmon ecosystem. This problem is pertinent to anadromous, resident, and terrestrial populations.

Aquatic Objective 7A: Spatially assess the impacts of carcass-related nutrient reductions on the aquatic and terrestrial biota. If appropriate, prescribe management actions to offset impacts

Strategies:

7A1. Continue and expand ongoing research. Use ongoing research (Shoshone-Bannock Tribe Fertilization Project; NOAA Science Center research in the Middle Fork) to help define ecosystem impacts associated with anadromous carcass reductions. Determine nutrient source and sink areas.

7A2. Use results from strategy 7A1 to prioritize if and where management actions may best benefit anadromous and terrestrial focal species.

Table 8. Summarization of limiting factors used to derive environmental problem, objective, and strategy statements. Environmental limiting factors are defined by an X, which indicates the presence of a limiting factor that has been assessed by the Fisheries Technical Team to be of greatest importance to the given assessment unit (limiting factor rating = 3). Header acronyms include FP (floodplain), P:R (pool:riffle ratio), LWD (large woody debris), Q (discharge), Low (low flows), Peak (peak flows), Stab. (streambank stability), Chem. (chemicals).

Corresponding Objective Number(s)	Watershed (HUC_4)	Reach	Bio. LF	Channel Structure			Hydrology			Sediment	Water Quality	Riparian		Exogenous		
				FP	P:R	LWD	Q	Low	Peak			Shade	Stab.	Exotics	Chem.	Barriers
26A, 27A, 28A	UPS	MS tribs.[a]					X	X	X	X						X
4C (bio.), 19A	UPS	Valley												X		
18A, 18B	UPS	Yankee Fork		X	X	X									X	
	UPS	MS[b]														
16A	UPS	MS[c]		X	X							X	X			X
13A, 15A, 16A, 17A, 17B	UPS	MS[d]					X	X	X	X	X	X	X			
	UPS	EF MS[e]														
20A, 21A	UPS	EF MS[f]									X	X	X			
22A, 23A, 24A, 25A	UPS	Herd[g]								X	X	X	X			X
	UPS	EF Tribs[h]														
29A, 29B, 30A, 30B	PAH	Pah. MS[i]					X	X	X	X	X	X	X			X
31A, 31B, 32A	PAH	Pah. MS[j]								X	X	X	X			X
33A, 33B, 34A, 34B	PAH	Pah. Tribs[k]					X	X	X	X	X	X	X			X
35A, 35B, 35C	LEM	Lemhi MS[l]														X
36A	LEM	Lemhi MS[m]									X	X	X			
37A	LEM	Lemhi MS[n]								X		X	X			
38A	LEM	Big Springs[o]								X	X	X	X			X
39A, 39B	LEM	Hayden[p]														X
40A	LEM	Tribs.[q]						X	X							X
	MFS	Up. MF[r]														

Corresponding Objective Number(s)	Watershed (HUC_4)	Reach	Bio. LF	Channel Structure			Hydrology			Sediment	Water Quality	Riparian		Exogenous		
				FP	P:R	LWD	Q	Low	Peak			Shade	Stab.	Exotics	Chem.	Barriers
	MFS	L. MF[s]														
	MSC	M. Salm Wild.[t]														
42A	MSC	M. Salm Wind[u]									X					
	MSP	M. Salm MS[v]														
	MSP	NF Salmon[w]														
41A, 41B	MSP	M. Salm Tribs[x]			X		X	X	X							X
	MSP	M. Salm Panther[y]														
(not addressed due to pending lawsuit)	MSP	M. Salm Panther[z]													X	
4C (bio.), 43A, 44A	SFS	Secesh[aa]										X		X		
43A	SFS	EFSF[ab]										X	X			
43A, 45A	SFS	Johnson[ac]				X						X				
43A, 46A, 46B	SFS	MS SF[ad]								X		X				
4C (bio.), 47A, 48A	LOS	L. Salm. Tribs[ae]										X		X		
47A	LOS	L. Salm. MS[af]										X	X			
49A	LSA	Little Salm.[ag]				X		X			X					

a/ Defined UPS reach includes tributaries to the mainstem Salmon from the Pahsimeroi to the headwaters
b/ Defined UPS reach includes the mainstem from the Pahsimeroi confluence upstream to the EF Salmon confluence (excludes 12—Mile Section)
c/ Defined UPS reach is the '12-Mile' Section of the mainstem Salmon
d/ Defined UPS reach includes the mainstem from the East Fork confluence upstream to the headwaters
e/ Defined UPS reach includes the mainstem EF Salmon River, from its confluence with the Salmon River upstream to the Herd Creek confluence
f/ Defined UPS reach includes the mainstem EF Salmon River, from the Herd Creek confluence upstream to Germania Creek
g/ Defined UPS reach includes Herd Creek
h/ Defined UPS reach includes all other EF Salmon tributaries

i/ Defined PAH reach includes the mainstem Pahsimeroi, from the confluence with the Salmon up to Hooper Lane
j/ Defined PAH reach includes Pahsimeroi mainstem occurring from Patterson Creek to Big Springs Creek
k/ Defined PAH reach includes all other Pahsimeroi tributaries & headwater reaches
l/ Defined LEM reach includes the mainstem from its confluence with the Salmon up to Agency Creek
m/ Defined LEM reach includes the mainstem from Agency Creek to Hayden Creek
n/ Defined LEM reach includes the mainstem from Hayden Creek upstream to Leadore
o/ Defined LEM reach includes Big Springs Creek
p/ Defined LEM reach includes Hayden Creek
q/ Defined LEM reach includes all other Lemhi tributaries and headwater reaches
r/ Defined MFS reach includes the Upper Middle Fork Salmon
s/ Defined MFS reach includes the Lower Middle Fork Salmon
t/ Defined MSC reach includes the Wilderness Section
u/ Defined MSC reach includes the area west of Wind River (including Meadow Creek)
v/ Defined MSP reach includes the mainstem Salmon River, from the Middle Fork confluence to the Pahsimeroi confluence
w/ Defined MSP reach includes the North Fork Salmon River
x/ Defined MSP reach includes the tributaries to the mainstem Salmon River occurring from the Middle Fork confluence to the Pahsimeroi confluence
y/ Defined MSP reach includes Panther Creek, from Blackbird Creek to its headwaters
z/ Defined MSP reach includes Panther Creek, from its confluence with the Salmon upstream to Blackbird Creek
aa/ Defined SFS reach includes the Secesh River
ab/ Defined SFS reach includes the East Fork South Fork Salmon River
ac/ Defined SFS reach includes Johnson Creek
ad/ Defined SFS reach includes the mainstem South Fork
ae/ Defined LOS reach includes tributaries to the Lower Salmon River
af/ Defined LOS reach includes the mainstem of the Lower Salmon River
ag/ Defined LSA reach includes mainstem and tributary reaches of the Little Salmon River

7A3. Implement appropriate management actions (i.e., carcass recruitment or artificial nutrient enrichment using marine-derived) in key areas defined from strategy 7A2.

7A4. Monitor and evaluate outcomes from management actions implemented in strategy 7A3.

Discussion: This problem affects all aquatic focal populations throughout the subbasin. The decline of anadromous fish runs to the Salmon subbasin have impacted both aquatic and terrestrial food webs due to the loss of marine-derived nutrients (and associated organic materials) to the system (Cederholm et al. 1999, Gresh et al. 2000, Bilby et al. 2001). These watershed disturbances have acted to reduce biodiversity and threaten riparian-associated species across broad geographic areas.

Ongoing research that provides answers regarding food limitations as a density dependent limiting factor to juvenile salmonids needs to continue. It is likely the research currently being conducted in the Salmon subbasin will establish ecologically beneficial alternatives to naturally spawned-out salmon and steelhead. This information will be critical in addressing the effects from the loss of marine-derived nutrients (and associated organic materials) to the system.

Problem 8: A reduction in riparian vegetation has resulted in a loss of recruitable LWD, poor pool:riffle ratios, a decrease in streambank stability, and a decrease in stream shading. These changes have resulted in oversimplified channels, higher erosion rates, more severe flooding, and excessive stream temperatures.

Aquatic Objective 8A: Increase the number of pieces of LWD in reaches currently deficient, to volumes consistent with PFC ratings (see Appendix F; Appendix Table 7).

Strategies:

8A1. Protect existing riparian ecosystems that are currently classified as properly functioning.

8A2. Enhance and rehabilitate riparian ecosystems that are currently classified as functioning at risk or not functioning.

8A3. If situations warrant, artificially recruit LWD to the stream channel.

8A4. Monitor and evaluate passive and active protection and rehabilitation efforts.

Aquatic Objective 8B: Improve pool:riffle ratios to properly functioning conditions (see Appendix Table 7).

Strategies:

8B1. Return the channel to the floodplain so as to increase channel sinuosity to levels consistent with the historic natural range of variability.

8B2. Investigate feasibility and effectiveness of bio-engineering (i.e., recruitment of LWD and large boulder substrate).

8B3. Monitor and evaluate management actions.

8B4. Compensate for transportation corridor encroachment on streams.

Aquatic Objective 8C: Improve bank stability to properly functioning conditions.

Strategies:

8C1. Stabilize known problem areas through riparian plantings.

8C2. Ensure revegetation efforts succeed by protecting them from grazing or development.

8C3. Monitor and evaluate management actions.

Aquatic Objective 8D: Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria

Strategies:

8D1. Focus rehabilitation efforts on reestablishing properly functioning riparian areas.

8D2. Where appropriate, investigate wastewater management.

8D3. Rehabilitate floodplain connectivity to provide thermal refugia.

8D4. Riparian corridor exclusion, riparian pastures.

8D5. Reconnect tributaries to provide thermal refugia.

8D6. Ensure adequate temperature protection for bull trout at all life stages under Idaho Water Quality Standards. The completion of regional temperature criteria would allow for an implementation schedule for the time of year the standards are applied and ensure adequate protection for all bull trout life stages.

Discussion: Improving functional riparian corridors is one of the top priorities identified in the assessment (sections 1 through 3) by the Fisheries and Terrestrial Technical Teams. Significant riparian improvement efforts have occurred throughout the subbasin (see assessment section 4), the majority of which have had a demonstrably positive impact on aquatic resources, although biological response by focal species has not been quantified. The benefits provided by a healthy riparian area extend throughout the aquatic and terrestrial ecosystem, including their effect on channel form, erosion processes, nutrient and water retention, shade, cover, and habitat.

An effective means of riparian rehabilitation is to return the stream channel to its floodplain. Nutrient and sediment dispersal processes are facilitated by the interaction of the channel with its floodplain, which can't occur if the stream is channelized. Ensuring that channel straightening, channel relocation, undersized bridges and railroad encroachment in stream channels does not occur will protect these vital processes, as well as provide habitat for key focal species. Final project designs should incorporate river morphology and river flow dynamics concepts and U.S. Fish and Wildlife Service assessment of fish habitat needs and should provide for innovative project designs that allow for minimum floodplain and riparian habitat loss for streams adjacent to road construction projects. For example, avoid highway turnouts in areas that are needed for floodplain expansion of adjacent or tributary streams. When highway/railway improvement projects are planned where historical stream encroachments occurred, aim to mitigate for past impacts to streams. Initial areas to focus efforts include the mainstem Salmon River corridor from Alturas Lake Creek to the North Fork (Highway 93), the mainstem Salmon River downstream of Riggins (Highway 95), and along the Little Salmon River (Highway 95), and roads along Warren Creek, Pine and Indian creek.

The importance of LWD to salmonid habitat has been well documented. It is therefore reasonable to include the reintroduction of in-channel organic debris as a high priority rehabilitation objective. Specific actions to rehabilitate in-channel wood include passive (e.g., protection of existing riparian areas) or active (e.g., bioengineering approaches at installing in-channel LWD), both of which have their merits and drawbacks. Site specific prescriptions should occur, in terms of returning adequate (achieve PFC) volumes of large organic matter to the channel (*refer to* Appendix F). Active rehabilitation work should be coordinated with experienced hydrologists and geomorphologists. Passive approaches will be preferable, as they will provide riparian as well as instream habitat benefits.

Problem 9: Streamflow diversion, changes to upland and riparian vegetation, modifications to floodplain function, and increases in drainage density have altered natural hydrographs in mainstem and tributary habitats.

Aquatic Objective 9A: By 2010, complete stream reach-specific designations (and maintenance) of streamflows that are adequate for life history stages of focal species and that are sufficient for providing channel maintenance.

Strategies:

9A1. Improve water conveyance systems.

9A2. Lease or acquire water rights.

9A3. Improve the irrigation efficiency.

9A4. Ensure that riparian vegetation meets PFC standards (see Appendix F [Appendix Table 7]).

9A5. Use existing water banks in the subbasin and the State (WRB) water bank to secure flows in appropriate areas

9A6. Provide adequate flows to support spawning and rearing life history stages of focal salmonid species in river or stream reaches that support these life history stages.

9A7. Develop irrigation management plans with irrigators to create more efficient programs based on crop needs, soil types, and economics of operation, considering the entire water budget for the drainage of interest.

9A8. Implement agricultural demonstration project using regionally adapted crops to investigate potential water savings and economically optimize crop yields

9A9. If strategy 9A8 demonstrates positive results, where opportunities exist, implement alternative agriculture in areas defined critical for both agricultural interests and fisheries interests.

9A10. Work with irrigation districts to ensure that diverted water is returned to the natural channel at the end of the irrigation season.

9A11. Monitor and evaluate all mitigation activities. Integrate results with appropriate implementation strategies.

9A12. Ensure that BMPs are implemented and enforced in agricultural and forested landscapes.

9A13. Create public awareness over the importance of maintaining an active floodplain, diverse riparian areas, and instream large woody debris, as well as when to consult local agencies for flood mitigation needs.

9A14. Work with landowners to return stream channel to the floodplain.

Discussion: Achieving this objective is one of the most important issues for bull trout recovery in the Upper Salmon River, Lemhi River, Pahsimeroi River, Middle Salmon River–Panther, and Little–Lower Salmon River core areas. Improving base flows is equally critical for improving chinook and steelhead population connectivity and juvenile survival.

It is important to emphasize that flow manipulations (*e.g.,* improvements to water delivery, sustenance of baseflows) to the current hydrograph will only benefit baseflow conditions provided there are adequate water storage mechanisms (e.g. wetlands, functional riparian areas, side channels, groundwater recharge, etc.) in place. Otherwise, attempts to restore a more natural hydrograph will result in more water leaving the system during peak flows, and less water available during periods that are critical to sustain focal species.

To implement strategy 9A6, it will be necessary to conduct instream flow assessments for most focal species. Water conservation measures are one means by which to achieve the objective, but they will only be possible with landowner involvement.

Problem 10. Sedimentation from human activities limits the production potential of focal species throughout the Salmon subbasin, and particularly within batholith watersheds.

Aquatic Objective 10A: Starting in important habitats, reduce instream sedimentation to levels meeting applicable water quality standards (e.g., TMDLs) and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019.

Strategies:

10A1. Riparian management—Use approaches designed to reduce, prevent, or ameliorate sedimentation such as riparian corridor exclusion, riparian pastures.

10A2. Upland management—Focus range and timber management on sediment reduction. Management strategies include (but are not exclusive of) rest rotation, adjusting frequency and timing, low-impact harvesting, etc.

10A3. Access management—Focus transportation system management on sediment reduction. Management alternatives include moving roads, closing roads, decommissioning roads, etc. Use existing roads inventory databases to identify and treat roads that contribute chronic amounts of fine sediment to salmonid habitat, and to identify roads that pose a high potential risk of failure and threat of adding catastrophic volumes of fine sediment to critical spawning and rearing habitat.

10A4. Identify and treat legacy effects from mining-related sedimentation.

10A5. Rehabilitate floodplain connectivity and riparian function as they affect sediment transport processes.

10A6. Mimic the shape and timing of the natural hydrograph so as to ensure the proper transport and deposition of sediment.

10A7. Continue development of TMDLs, EAWSs, and other watershed scale assessments designed to define localized sediment sources and opportunities to ameliorate impacts.

10A8. Continue to conduct implementation and effectiveness monitoring of projects designed to reduce sediment delivery to streams.

10A9. Critically evaluate where sediment reduction efforts are both biologically effective and cost effective.

Discussion: Stabilization of roads, road stream crossings, and other known sources of sediment delivery is a subbasinwide need for all aquatic focal species. Implementation of sediment reduction strategies should follow recommendations from U.S. Forest Service and Bureau of Land Management Watershed Analysis and other plans that reduce sediment production. Where problem roads are identified, efforts should be made to improve maintenance of U.S. Forest Service, Bureau of Land Management, private, and state land road systems by addressing sediment producing hotspots. Other key sediment production areas, such as bridges, culverts, and crossings should be managed to reduce sediment delivery. Decommissioning of surplus roads; especially those that are chronic sources of sediment and/or those located in areas of highly erodible or unstable geological formations, is needed, as is removal of culverts and/or bridges on closed roads or those that are no longer maintained. Other sources of sediment from closed roads should be remedied. Paving or graveling portions of roads to reduce sediment delivery may be appropriate, but must be considered on a case-by-case basis with other factors such as the impacts of increased ease of angler access. Address impacts made by all-terrain vehicles on roads and trails.

It is important to emphasize that flow manipulations (*e.g.,* improvements to water delivery, sustenance of baseflows) to the current hydrograph will only benefit baseflow conditions provided there are adequate water storage mechanisms (e.g. wetlands, functional riparian areas, side channels, groundwater recharge, etc.) in place. Otherwise, attempts to restore a more natural hydrograph will result in more water leaving the system during peak flows, and less water available during periods that are critical to sustain focal species.

Priority areas include the following: (The priority areas in *italics* are names of watersheds identified in the Inland West Watershed Initiative at the 5th or 6th field HUC level and Table I-3, Appendix I of the *Draft Salmon Subbasin Summary* [NPPC 2001b]. Streams were also included below that are on the 1998, Idaho DEQ 303(d) list of water bodies for sediment impairment; these are listed in **bold letters** [NPPC 2001b, Table C-1]).

Upper Salmon River Core Area: *Morgan Creek watershed,* Salmon River headwaters, Yellowbelly Lake, Redfish Lake and **Valley Creek (Stanley to Salmon River**, **Challis**, **Garden**, **Thompson, Warm Springs,** Big Lake, Boulder, and Warm Springs Creeks, **Yankee Fork Salmon River** (Yankee Fork and Jordan Creek roads), and mainstem East Fork Salmon River.

Pahsimeroi River Core Area: **Pahsimeroi River, Big, Morse, Patterson creek (Forest boundary to Pahsimeroi River)**.

Lemhi River Core Area: **Big Eightmile, Big Timber, Eighteenmile, Hawley, and Little Eightmile Creeks (all from the U.S. Forest Service boundary downstream to the Lemhi River)**; **Bohannon, Geertson, Wimpey, and Kenney Creeks (all from the Bureau of Land Management boundary downstream to the Lemhi River)**.

Middle Salmon River–Panther Creek Core Area: ***Big Deer,*** **Hughes,** *McKim*, Upper Panther (*Musgrove), Moose, Hull, Hughes, Lick, and Moccasin Creeks;* Upper Horse, Squaw, Pine, Opal (downstream of Opal Lake), Porphyry, Dahlonega Creeks, and the mainstem Salmon River from North Fork to Corn Creek.

Middle Salmon River–Chamberlain Core Area: Warren (replace fords of Warren Creek and other actions), Upper Horse, *Wind, Big Mallard, Witsher, Upper Meadow, and Upper Crooked Creeks.*

South Fork Salmon River Core Area: **South Fork Salmon River, Upper East Fork South Fork Salmon River**, **Secesh River (Lake Creek to Loon Creek)**, **Sugar**, Krassel-Indian, Curtis, **Johnson (Headwaters to mouth)**, and Cow-Oompaul Creeks. Repair the Elk Summit road, Davis/Wiesel road, and Lick Creek road.

Little-Lower Salmon River Core Area: *Middle Little Salmon River*, Slate Creek, **Little Slate Creek**, John Day, *White Bird, Howard, Skookumchuck, and Goose Creeks.*

Middle Fork Salmon River Core Area: **Elkhorn (Headwaters to Salmon River),** and **Monumental (Headwaters to Fall Creek), Bear Valley**, (Bear Valley and Bearskin Roads), Elk, and Lower Camas Creeks (*Lower Silver Creek*),

Problem 11. Mining activities are limiting distribution of focal species.

Aquatic Objective 11A. Reduce concentrations of non-organic chemicals to levels consistent with IDEQ beneficial use criteria.

Strategies:

11A1. Clean up and stabilize (through planting) unconsolidated tailings piles at active, inactive, and orphan sites.

11A2. If reestablishment of vegetation on mining waste is not possible, implement alternative mitigation approaches such as slope recontouring, drainage rerouting, or export of waste material.

11A3. Ensure adequate riparian areas exist both upstream and downstream of the affected site.

11A4. Monitor and evaluate all mitigation activities. Integrate results with ongoing or completed TMDLs to assess effectiveness of addressing objective.

Discussion: Mining runoff from roads, dumps, processing facilities, and ponds is a problem in several of the watersheds in the subbasin. Mitigation efforts should include continued cleanup, removal and stabilization of mine tailings and waste rock deposited in the stream channel and floodplains, and stream channel rehabilitation. Areas identified for remediation efforts (as they affect bull trout) are shown below, although this list is not exhaustive. This task applies to areas with the potential to affect bull trout or their habitat. Priority areas include the following:

Upper Salmon River Core Area: Upper Salmon River Headwaters, Yankee Fork Salmon River, Slate Creek (Hoodoo and Thompson creek mines) and East Fork Salmon (Livingston Mine), Thompson Creek, Squaw Creek.

Lemhi River Core Area: Withington, Kirtley and Bohannon Creeks.

Pahsimeroi River Core Area: Patterson Creek (Historic Bluewing Mining District).

Middle Salmon–Panther Core Area: Blackbird Creek (Blackbird Mine), Napias (Bear Track Mine), Deer, Panther, and Big Deer Creeks.

Middle Fork Salmon River Core Area: Bear Valley, Upper Monumental, Big, and Cabin Creeks.

Middle Salmon River–Chamberlain Core Area: Warren, Falls, Lake, and Upper Crooked Creeks.

South Fork Salmon River Core Area: East Fork South Fork Salmon River, and Sugar (Cinnibar Mine and Stibnite Mine), Meadow, and Blowout Creeks.

Lower Salmon/Little Salmon Core Area: Upper Slate Creek and Mainstem Salmon River.

Problem 12: Anthropogenic migration barriers are affecting distribution, population connectivity, and genetic integrity of all focal populations.

Aquatic Objective 12A: Rehabilitate connectivity where it will benefit native fish populations, with emphasis on bull trout.

Strategies:

12A1. Reconnect waterways—Use the SHIPUSS document and ongoing work by IDFG to define which structural barriers should be removed or modified first.

12A2. Use information obtained from implementation to assist in obtaining a better understanding of the ecological effects the barrier(s) are having on focal populations. Establish, where possible, if the barrier has eliminated historically accessible habitat and estimate the degree to which the population has been, or currently is affected. Provide results from all implementation activities. Integrate new data and information into strategy 12A1. Revise and repeat implementation strategies until problem is adequately addressed.

Aquatic Objective 12B. Implement fish screening in tributaries after dewatering and passage issues are resolved

12B1. Increase instream flows through irrigation improvement projects where necessary and feasible.

12B2. Develop experimental screen designs to be used in tributary screening (i.e., bull trout screens, resident fish screens, etc.).

Discussion: Disconnection of tributaries from mainstem reaches was identified by the Fisheries Technical Team as one of the most important factors limiting bull trout recovery and restricting anadromous salmonid use of potential habitat. Salmon tributaries become disconnected from the mainstem either by structural barriers or loss of flow. The structural barriers include culverts, diversions, or dams. Reductions in streamflow cause direct (e.g., dry channel) and indirect barriers. Indirect barriers render stream conditions unsuitable for passage either by creating thermal barriers or other types of barriers at low flows.

Based on information provided in the assessment and in Figure 1, the Upper Salmon, and Middle Salmon–Panther watersheds are among those with the highest number of structural barriers to fish [bull trout] migration. In general, the South Fork Salmon River on the Payette National Forest is not highly fragmented and represents a bull trout stronghold with high numbers of migratory individuals

(R. Nelson, USFS, personal communication, May, 2004). Passage at other barriers such as reservoirs/dams, small hydroelectric dams, fish acclimation facilities, and others should be evaluated. Data should be compiled into a commonly shared, geospatial database.

Areas to initially focus efforts include: Lemhi River, Pahsimeroi River, Upper Salmon River and Middle Salmon River–Panther Creek core areas. A barrier in Silver Creek, Camas Creek local population, Middle Fork Salmon River core area has a barrier dam on private land. The mainstem Lemhi River contains fluvial bull trout, although connectivity between the tributaries and the Lemhi River is reduced because of migration barriers (BLM and USFS 1998). Connectivity to Panther Creek and interactions between resident populations in Napias and upper Deep creeks have been reduced or eliminated by migration barriers. Connectivity among resident populations is unobstructed in other portions of the Panther Creek drainage, including Woodtick, Porphyry, and Moyer creeks and the headwaters of Panther Creek (USFWS 1999a). Also, in the Silver Creek drainage (a tributary to Camas Creek), an earthen dam above Rams Creek is a barrier and isolates fish in upper Silver Creek (USFS 1999). This isolation reduces habitat available for bull trout in this area and reduces genetic exchange with other local populations in the area.

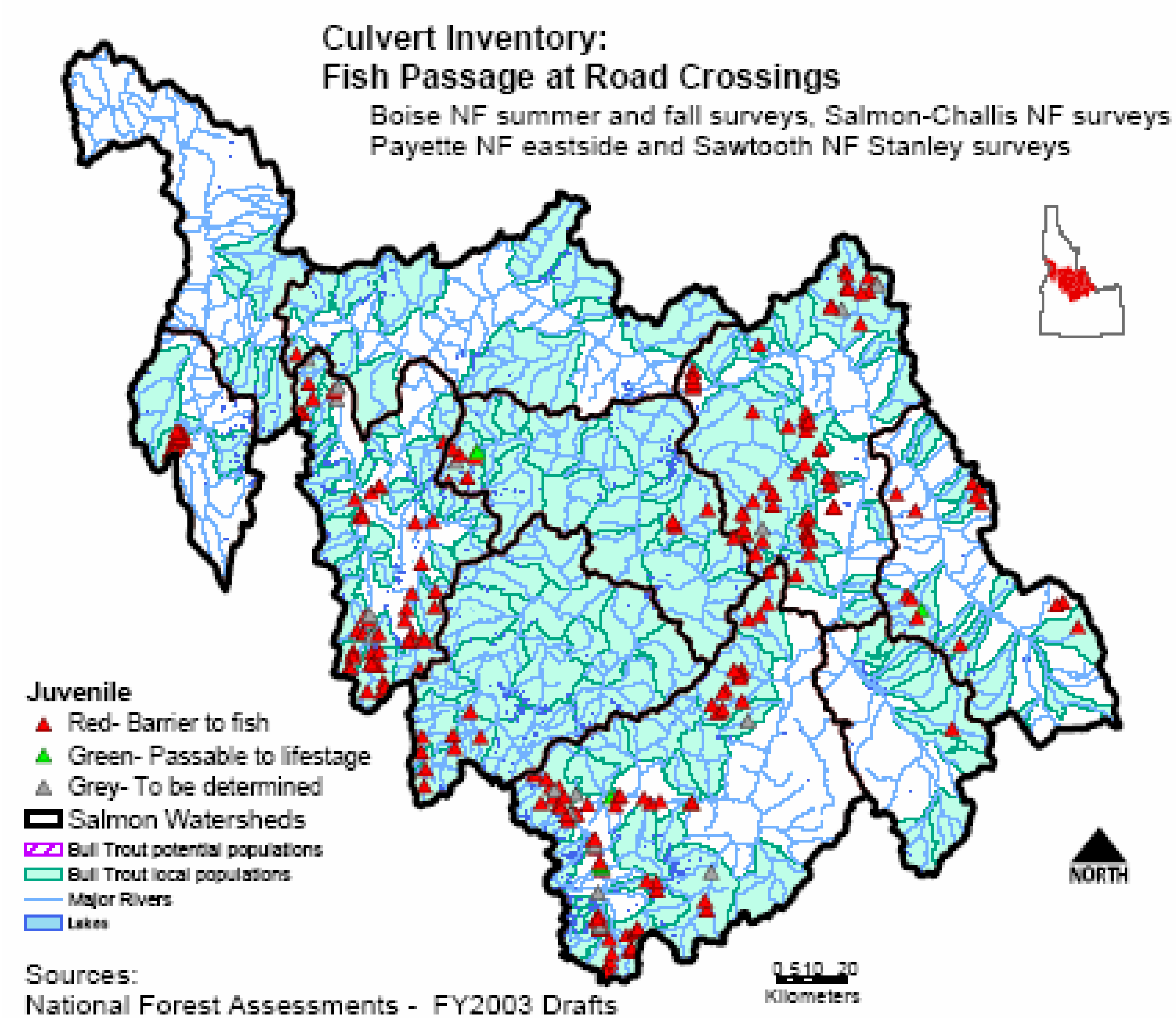

Figure 1. Salmon subbasin barrier inventory (USFWS 2004).

Watershed-Level Problems, Objectives, and Strategies

The final subsection provides information on environmental problems, objectives, and strategies at the watershed[5] and population-specific level. The watershed and population-specific context provides planners with a higher level of resolution on which to formulate more detailed plans to address a defined set of limiting factors known to be influencing a given population in a given area. A brief discussion of which specific populations (NOAA TRT defined) occur in the watershed precedes the respective sections and associated objectives and strategies.

Aquatic problems, objectives, and strategies are identified for specific watersheds (4th field hydrologic units; Figure 2) throughout the subbasin. Watersheds are further subdivided by drainage or tributary where necessary (see Table 7).

Because many of the limiting factors defined for each watershed are similar, the objectives and strategies used to address them are also similar. The Fisheries Technical Team agreed that, to reduce redundancy, the presentation of a master list of common objectives and associated strategies was warranted. Refer back to the master list whenever the set of objectives and strategies are not unique to the given watershed.

Unlike the preceding sections, watershed-level discussion sections (i.e., those that follow respective problem statements) are not included. This omission is due to time constraints rather than lack of importance and currently represents a data gap in the plan that needs to be addressed on the next iteration of the document.

[5] The Salmon Fisheries Technical Team's use of the term "watershed" is analogous to the USGS-defined 4th field hydrologic unit.

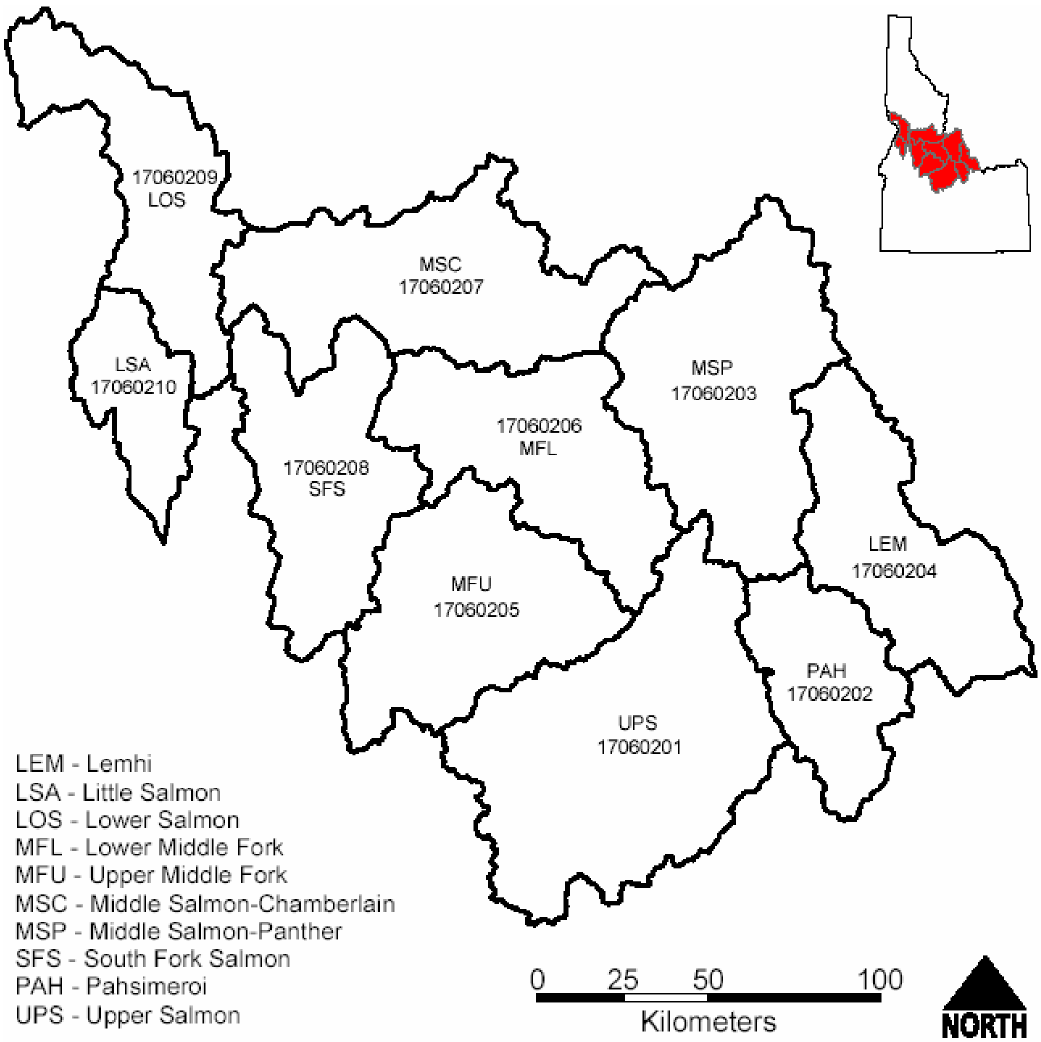

Figure 2. Fourth field hydrologic units in the Salmon subbasin used to stratify problems, objectives, and strategies discussions.

Upper Salmon

The Upper Salmon watershed is a 4th field HUC extending from the confluence of the Pahsimeroi River to the headwaters above Redfish Lake (Figure 2). The watershed encompasses a total of five chinook populations (see Appendix G [Appendix Figure 1]), two steelhead populations (see Appendix G [Appendix Figure 2]), one sockeye population, and one bull trout population.

The five individual chinook populations identified by the TRT in the UPS include Valley Creek (SRVAL), West Fork/Yankee Fork (SRYFS), East Fork (SREFS), and upper Main (SRUMA). These populations are located entirely within the Upper Salmon Watershed. The Lower Main population (SRLMA) includes waters in the Middle Salmon Panther watershed.

The two steelhead populations occurring within the UPS, as defined by the TRT (2003), occur in the SREFS-s and SRUMA-s (see Appendix G [Appendix Figure 2]). These populations occur entirely within the 4th field HUC boundaries but differ somewhat from the chinook population boundary delineation. The SRUMA-s population of steelhead includes the SRUMA, SVAL, SRYFS, and a portion of the SRLMA as defined for chinook, while the SREFS-s population encompasses all of the SREFS and a portion of the SRLMA chinook population units.

The only sockeye population in the UPS, as defined by the TRT (2003), is the Redfish Lake population. This population roughly corresponds to the SRUMA chinook population.

Only one bull trout population, as defined by the Bull Trout Technical Recovery Team, occurs in the UPS and encompasses the entire watershed.

Upper Mainstem Salmon River (from Pahsimeroi Confluence to Headwaters)

Problem 13: The natural hydrologic regime in the Upper Mainstem Salmon (from the East Fork confluence to the headwaters) has been altered by streamflow withdrawals. The effects from these pressures include a reduction in base flow conditions and some modifications to flow timing. See Appendix Figure 1 and Appendix Figure 2 in Appendix G to review affected focal species population units.

Aquatic Objective 13A: Mimic the shape and timing of the natural hydrograph in the mainstem Salmon (from the East Fork confluence to the headwaters).

Strategies (in addition to strategies defined for objective 9A):

13A1. Modify operations: Sequence the timing (stagger) of diversion operations.

13A2. Hydrologic modeling: Develop and implement tools, such as MIKE BASIN to aid in the definition of the historic hydrograph (*e.g.,* DHI 2003a; DHI 2003b).

Discussion: It is important to emphasize that flow manipulations (*e.g.,* improvements to water delivery, sustenance of baseflows) to the current hydrograph will only benefit baseflow conditions provided there are adequate water storage mechanisms (e.g. wetlands, functional riparian areas, side channels, groundwater recharge, etc.) in place. Otherwise, attempts to restore a more natural hydrograph will result in more water leaving the system during peak flows, and less water available during periods that are critical to sustain focal species.

Problem 14: Fish are entering irrigation systems through irrigation turn on before screens are in place, operation of diversions and control structures, wastewater return flows, and breeched (*e.g.,* those that have structurally failed or are undersized relative to the volume of water they convey) ditches (a.k.a. 'backdoor' access). Upon entering the hydrologically unstable irrigation system, fish are subject to threats from dewatering (i.e., temperatures, reduced forage, increased predation, etc.).

Aquatic Objective 14A: Reduce potential losses of fishes that enter screened irrigation complexes.

Strategies:

14A1. Improve structural integrity of irrigation conveyance systems.

14A2. Explore opportunities that expand rearing habitat by converting problem areas into rearing habitat. If circumstances are appropriate, investigate the potential to enhance ditch habitat to serve as an artificial side channel.

14A3. Improve habitat conditions in the stream so fish are less likely to seek refuge in irrigation ditches.

14A4. Annually meet with irrigation districts to define and refine management strategies for water control structures that benefit fish. Implement a program where water managers meet with irrigators to ensure that ditches are managed to help fish.

14A5. Until the appropriate preventative measures are implemented, continue fish salvage operations (where warranted) that remove stranded focal species from irrigation ditches.

14A6. Evaluate bull trout entrainment at water diversions. Where the entrainment status is unknown, conduct evaluations to identify whether problems exist. Compile information in a database that is useable by all public and private parties. (Much of this work is already underway for anadromous fish.)

Aquatic Objective 14B: Improve connectivity of tributaries that are currently intercepted by irrigation complexes.

14B1. Construct bypass structures, siphons, consolidations, or other infrastructure that is designed to convey natural tributary flow to the mainstem river while screening access by salmonids.

14B2. Improve water conveyance systems and put water back into the channel in flow impaired reaches.

14B3. On flow impaired stream reaches, permanently secure water through water transactions – conservation agreements, leases, or purchases – that put flows into water banks (there are currently two water banks in the Salmon basin; the statewide WRB Water Bank and the Lemhi Water Bank which operates solely within the Lemhi Basin.)

14B4. Conduct effectiveness/implementation monitoring and evaluation. Integrate results back into relevant strategies until problem is addressed.

Problem 15: Sedimentation from various land-use activities has impacted focal species habitat quality and quantity in the mainstem from the East Fork confluence to the headwaters.

Aquatic Objective 15A: Reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019.

Strategies: (see strategies 10A1–10A9)

Problem 16: The diversion of water for irrigation and its subsequent return, combined with reductions in riparian shading represent the primary factors contributing to increased temperatures in the mainstem Salmon from the 12-mile section upstream to Challis.

Aquatic Objective 16A: In Upper Mainstem reaches where stream temperatures have been defined a high priority limiting factor (i.e., from the 12-mile section to the headwaters), rehabilitate instream temperatures to levels that support designated beneficial use criteria.

Strategies: (see strategies 8D1–8D5)

Problem 17: Channel confinement and development of riparian areas, from the 12-mile section upstream to the headwaters, has caused a reduction in the pool:riffle ratio, a reduction in streambank stability, a reduction in shade, and has limited salmonid access to side channel habitat.

Aquatic Objective 17A: Improve pool:riffle ratios to properly functioning conditions (*refer to* Appendix F–PFC Metrics).

Strategies: (see strategies 8B1–8B3)

Aquatic Objective 17B: Improve bank stability to properly functioning conditions

Strategies: (in addition to 8C1–8C3)

17B1. Ensure continuation of the Salmon River Ecosystem Restoration Project (12-mile project)

Aquatic Objective 17C: Improve floodplain connectivity and access to side channel habitat to help offset losses of pool habitat

Strategies:

17C1. Control livestock access to encourage establishment of mature riparian vegetation

17C2. Conduct land acquisitions and riparian conservation easements where possible and where some measurable benefit will occur.

Upper Mainstem Salmon River Tributaries (Entering Mainstem from Pahsimeroi to Headwaters)

Yankee Fork

Problem 18: Historic dredge mining has left unconsolidated dredge tailings in the lower Yankee Fork River (USRITAT 1998, USFS 1999c). These tailings, as well as other mining waste, may contribute toxic chemicals to the Yankee Fork and other downstream reaches, and constrict the stream channel from interacting with adjoining floodplain areas. These problems thereby limit habitat suitability for spring chinook (SRYFS), summer steelhead (SRUMA-s) and bull trout (UPS) populations.

Aquatic Objective 18A: Rehabilitate water quality in affected reaches to conditions suitable to support designated beneficial use criteria.

Strategies: (in addition to strategies defined in objective 10A)

18A1. Develop a monitoring protocol for the diffuser (dewatering of a large tailings lake which diffuses into the mainstem of the Yankee Fork below the Jordan Creek confluence).

18A2. Ensure that appropriate monitoring and evaluation is being performed and results are available to all affected parties.

18A3. Conduct research to determine extent of groundwater contamination.

18A4. Build a wastewater treatment facility at the Grouse Creek mine to treat the tailing pond water and potentially contaminated groundwater.

Aquatic Objective 18B. Reconnect the mainstem Yankee Fork with adjoining floodplain area.

Strategies:

18B1. Use remote sensing and modeling to determine the historic floodplain.

18B2. Reconstruct the floodplain and channel to mimic historic conditions. This will involve restoring natural hydrologic processes including energy dissipation, deposition, etc.

18B3. Adaptively integrate M&E results to examine biological response resulting from the reestablishment of connectivity.

Valley Creek

Problem 19: Brook trout, which occur throughout the majority of Valley Creek and occupy habitat shared by bull trout, represent a potential threat to bull trout due to displacement and predation.

Aquatic Objective 19A: In the next 10 years, reduce and prevent impacts of brook trout × bull trout interaction.

Strategies:

19A1. Continue, or investigate new, brook trout eradication efforts. Utilize nonlethal approaches where possible. Options include, but are not exclusive of, selective electrofishing, snorkel-spearing, trapping, and chemical treatment.

19A2. Target brook trout for harvest. Work with local merchants, IDFG, USFWS, to encourage anglers to harvest brook trout from Valley Creek and associated tributaries/lakes.

19A3. Prevent spread. Ensure that isolated bull trout populations occurring upstream or downstream of barriers targeted for removal are secure.

19A4. Monitor and evaluate suppression efforts.

East Fork Watershed

Mainstem East Fork Salmon River—Herd to Germania Creek

Problem 20: Reductions in riparian shading combined with irrigation return flows, represent the primary factors contributing to increased temperatures in middle- and lower-elevation reaches.

Aquatic Objective 20A: Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria.

Strategies: (see strategies 8D1–8D5)

Problem 21: Reductions in riparian vegetation combined with the inherent geologic instability in the East Fork, has resulted in a decrease in streambank stability.

Aquatic Objective 21A: Improve bank stability to properly functioning conditions.

Strategies: (see strategies 8C1–8C3)

Herd Creek

Problem 22: Naturally high background sediment levels in the uplands combined with roads and grazing of domestic stocks are contributing to increased deposition in Herd Creek.

Aquatic Objective 22A: Reduce grazing related sedimentation in Herd Creek to levels that are suitable for spawning and rearing.

Strategies: (in addition to strategies defined in objective 10A)

22A1. Conduct a rangeland suitability study in the uplands to determine appropriate level of grazing.

Problem 23: Reductions in riparian shading combined with irrigation return flows, represent the primary factors contributing to increased temperatures.

Aquatic Objective 23A: Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria.

Strategies: (see strategies 8D1–8D5)

Problem 24: A reduction in riparian vegetation and conversion of floodplain areas has resulted in a decrease in streambank stability throughout much of Herd Creek.

Aquatic Objective 24A: Stabilize 10,000 feet (ISCC 1995) of streambank in Herd Creek focusing on areas where the stream exhibits excessive width:depth ratios.

Strategies: (see strategies 8C1–8C3)

Problem 25: Water diversions in the lower portion of Herd Creek are creating migration barriers to otherwise usable habitat.

Aquatic Objective 25A: Improve connectivity and access to habitat currently blocked by manmade barriers.

Strategies: (see strategies 12A1–12A5)

Other Tributaries (Entering Mainstem from Pahsimeroi to headwaters)

Problem 26: Tributaries to the upper Salmon River are impacted by water withdrawals that alter the hydrologic regimes (primarily low flow) of the small systems.

Aquatic Objective 26A: Rehabilitate or mimic natural hydrographs of tributaries to the Upper Salmon River (from Pahsimeroi to headwaters).

Strategies: (see strategies 9A1–9A14)

Discussion: It is important to emphasize that flow manipulations (*e.g.,* improvements to water delivery, sustenance of baseflows) to the current hydrograph will only benefit baseflow conditions provided there are adequate water storage mechanisms (e.g. wetlands, functional riparian areas, side channels, groundwater recharge, etc.) in place. Otherwise, attempts to restore a more natural hydrograph will result in more water leaving the system during peak flows, and less water available during periods that are critical to sustain focal species.

Problem 27: Roads, timber harvest, grazing, and changes to the hydrologic regime of the small Upper Salmon tributaries have acted alone or cumulatively to contribute excessive amounts of fine sediment to channels.

Aquatic Objective 27A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019.

Strategies: (see strategies 10A1–10A8)

Problem 28: To a limited extent, fish habitat in the Salmon River watershed upstream of the Yankee Fork is affected by migration barriers that water diversions create on tributary streams. This is a concern because fish use the tributaries as thermal refuge when water temperatures in the main river increase.

Aquatic Objective 28A: Within the next ten years (by 2014) improve connectivity of at least half of all tributaries that are currently considered to be disconnected from the mainstem Salmon (upstream of the Yankee Fork) due to water diversions.

Strategies: (in addition to those defined under objective 12A).

28A1. Install fish-friendly diversions.

28A2. Install fish-friendly road crossings.

Pahsimeroi Watershed

Mainstem Pahsimeroi—Mouth to Hooper Lane

Problem 29: In the Pahsimeroi River Valley, all mainstem tributaries are disconnected throughout the year because of water diversions and the geology of the valley. The disconnection has resulted in alterations to the mainstem Pahsimeroi's (mouth to

Hooper Lane) hydrologic regime (i.e., peak and base flows and flow timing) and has created barriers to migration.

Aquatic Objective 29A: Mimic or rehabilitate the natural hydrographs of streams in the Pahsimeroi watershed.

Strategies: (in addition to strategies 9A1–9A14)

29A1. Develop water conservation agreements to reduce levels of stream diversion (ISCC 1995).

Aquatic Objective 29B: Reconnect mainstem tributaries and modify diversion structures as needed to provide for chinook and steelhead migration.

Strategies: (see strategies 12A1–12A5)

Problem 30: Over a century of livestock grazing and instream flow alterations have substantially altered the species diversity, structure, composition, and connectivity of riparian zones in the Pahsimeroi watershed. These changes have resulted in excessive sedimentation, high stream temperatures, reduced shading and bank instability each of which may act cumulatively or independently to adversely affect chinook (SRPAH) and steelhead (SRPAH-s) populations.

Aquatic Objective 30A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019.

Strategies: (in addition to strategies 10A1–10A8)

30A1. Complete improvements to irrigation diversions to provide stable diversion points and reduce erosion from the Pahsimeroi confluence to Hooper Lane (ISCC 1995; almost 100% completed prior to 2001 in this stream reach (B. Loucks, USBWP, personal communication, May, 2004)).

Aquatic Objective 30B: Starting in the lower reaches of the mainstem, or where there are overlapping areas of occupied Chinook and steelhead habitat, rehabilitate and enhance riparian vegetation to levels that are within the historic range of natural variability.

Strategies: (see strategies 8C1–8C3 and 8D1–8D5)

Mainstem Pahsimeroi—Patterson Creek to Big Springs Creek

Problem 31: Instream flow diversions have substantially altered the species diversity, structure, composition, and connectivity of riparian zones in the Pahsimeroi watershed. These changes have resulted in excessive sedimentation, high stream temperatures, reduced shading and bank instability each of which may act cumulatively or independently to adversely affect chinook (SRPAH) and steelhead (SRPAH-s) populations.

Aquatic Objective 31A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019.

Strategies: (see strategies 10A1–10A8)

Aquatic Objective 31B: Starting in the lower reaches of the mainstem, or where there are overlapping areas of occupied Chinook and steelhead habitat, rehabilitate and enhance riparian vegetation (in areas not already fenced) to levels that are within the historic range of natural variability.

Strategies: (see strategies 8C1–8C3 and 8D1–8D5)

Problem 32: The high number of irrigation diversions in the mainstem Pahsimeroi, from Patterson Creek to Big Springs Creek, has created numerous barriers to fish migration.

Aquatic Objective 32A: Where feasible and practical, reconnect mainstem tributaries and modify diversion structures as needed to provide for chinook and steelhead migration.

Strategies: (see strategies 12A1–12A5)

Pahsimeroi Tributaries and Headwaters

Problem 33: Streamflow withdrawals and the geology of the valley act to disconnect virtually all of the Pahsimeroi tributaries from the mainstem, year-round. The loss of water affects base flow conditions and subsequently migration, but also may alter flow timing and to a lesser degree, peak flows.

Aquatic Objective 33A: Mimic or rehabilitate the natural hydrographs of streams in the Pahsimeroi watershed.

Strategies: (in addition to strategies 9A1–9A14)

33A1. Develop water conservation agreements to reduce levels of stream diversion (ISCC 1995).

Aquatic Objective 33B: Reconnect mainstem tributaries and modify diversion structures as needed to provide for chinook and steelhead migration.

Strategies: (see strategies 12A1–12A5)

Problem 34: Connection of intermittent, disconnected tributaries to mainstem reaches only occurs in instances of extreme high water, which is likely contributing to the absence of a functional, and connected riparian corridor (B. Loucks, USBWP, personal communication, May, 2004). The absence of vegetation along these channels facilitates sediment transport to perennial channels, which has been identified by the technical team as a factor adversely affecting chinook (SRPAH) and steelhead (SRPAH-s) populations.

Aquatic Objective 34A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019.

Strategies: (see strategies 10A1 through 10A8)

Aquatic Objective 34B: Rehabilitate and enhance riparian vegetation along Pahsimeroi tributaries to levels that are within the historic range of natural variability.

Strategies: (see strategies 8C1 through 8C3 and 8D1 through 8D5)

Lemhi Watershed

Many of the strategies and objectives in this section are drawn from the short-term Lemhi Agreement. We note that the Lemhi Agreement is an interim agreement that has been renewed on an annual basis and that the parties are working on a long-term agreement. From the time the agreement was signed in 2001, the parties have recognized that the measures in the short-term agreement were not sufficient and that, where possible and practical, more would be done to conserve listed salmonids in the long-term agreement.

Lemhi River—Mouth to Agency Creek

Problem 35: The hydrologic regime (peak flows, base flows, flow timing) and connectivity of most Lemhi tributaries has been altered by irrigation withdrawals. Only 7% of all tributaries remain connected to the mainstem. These changes limit resident and anadromous populations' access to potentially available habitat and delay anadromous smolt and adult migration in the lower reaches of the mainstem Lemhi, which may contribute to increased mortality rates, although no evidence has been offered to date.

Aquatic Objective 35A: Rehabilitate natural hydrographs in key anadromous and resident tributaries to ensure adequate base flows are available in lower, mainstem reaches (i.e., mouth to Agency Creek).

Strategies: (in addition to strategies 9A1–9A14)

35A1. Continue implementation of the Bureau of Reclamations Water Conservation Project and Lemhi Irrigators Plan (ISCC 1995). Continue to provide flow acquisition designed to improve passage habitat conditions in the Lower Lemhi through conservation agreements, leases, and water purchases until longer term solutions are developed.

35A2. Ensure the maintenance of the 25/35 cfs minimum flow (measured at the L5 gauge) as per the short-term Lemhi Agreement. This value is dependent on life stage use. If for migration, 35 cfs may be adequate. If for other uses, 35 cfs is likely going to be insufficient (J. Morrow, NOAA Fisheries, Habitat Division, personal communication, April, 2004). One possible approach that has been suggested for sustaining the 35 cfs is the development of a small storage reservoir in the upper Lemhi, although this places bull trout and Chinook in juxtaposition. Approximately 2,100 acre-feet of storage would be needed to provide 35 cfs in the lower river over a 30-day period.

Aquatic Objective 35B: Provided that there is adequate funding, personnel, and landowner participation, reconnect a minimum of one tributary every three years that are currently defined as partially or seasonally inaccessible to anadromous and/or resident focal species.

Strategies: (See strategies 9A1–9A14, 12A1–12A5, and 12B1–12B3)

Aquatic Objective 35C: Improve irrigation efficiency below diversion L-7 (ISCC 1995).

Strategies: (in addition to strategies 9A1, 9A3, 9A5–9A7, and 9A10–9A11)

35C1. Change the point of diversion for 510 acres currently irrigated from the Lemhi to being irrigated from the Salmon River. This would reduce the Lemhi call by 13 cfs.

Discussion: All parties agree that there is a flow problem in the Lower Lemhi. This plan should support the acquisition of streamflow, whatever the minimum number is.

Lemhi River—Agency Creek to Hayden Creek

Problem 36: Riparian function and channel morphology on the mainstem Lemhi has been compromised by road construction (State Highway 28 channelized and realigned 4.1 km of the Lemhi River, isolating 3.7 km of former channel from the river by the roadbed [Loucks 2000]) and floodplain development. The effects from these activities include excessive sedimentation, high stream temperatures, and changes to hydrologic processes and are most pronounced from Agency Creek to Leadore, and in the Big Springs Creek drainage.

Aquatic Objective 36A. Improve riparian function and natural hydrologic processes

Strategies: (see strategies 8C1–8C3 and 8D1–8D5)

Lemhi River—Hayden Creek to Leadore

Problem 37: Riparian function and channel morphology on the mainstem Lemhi has been compromised by road construction (State Highway 28 channelized and realigned 4.1 km of the Lemhi River, isolating 3.7 km of former channel from the river by the roadbed (Loucks 2000)) and floodplain development. The most pronounced effects from these activities include excessive sedimentation due to streambank destabilization, and high stream temperatures due to decreased shade. The problems are most pronounced from Agency Creek to Leadore, and in the Big Springs Creek drainage.

Aquatic Objective 37A: Maintain and enhance the riparian corridor along the upper 10 miles of the Hayden Creek-to-Leadore reach (ISCC 1995)

Strategies: (see strategies 8C1–8C3 and 8D1–8D5)

37A1. Explore opportunities to mimic a more natural hydrograph. For example, using strictly a management approach, manipulate withdrawal timing of mainstem Lemhi irrigation systems and tributaries in order to obtain a flushing flow that will scour the channel, and promote more natural riparian seed dispersal throughout the drainage (J. Morrow, NOAA Fisheries, Habitat Division, personal communication, April, 2004).

Big Springs Creek

Problem 38: Floodplain development in the Big Springs Creek drainage has destabilized streambanks and reduced riparian function which has contributed to excessive sedimentation, high stream temperatures, and a reduction in cover

Aquatic Objective 38A: Establish riparian vegetation along critical areas in Big Springs Creek to provide cover and reduce stream temperatures.

Strategies: (see strategies 8C1–8C3 and 8D1–8D5)

Aquatic Objective 38B: Reduce the sediment levels within spawning gravels.

Strategies: (see strategies 10A1–10A8)

Hayden Creek

Problem 39: Due to the geography of the channel, the placement of diversion screens often occurs a considerable distance from the point of diversion (e.g., Hayden Creek 11) creating excessively long ditches, ditch instability, fish stranding, and high conveyance losses. Also, within the drainage, there are potentially numerous barrier issues combined with inadequate riparian vegetation, especially in the lower reaches.

Aquatic Objective 39A: Improve migration at water diversions in Hayden Creek.

Strategies:

39A1. Evaluate and improve PODs. Evaluate the diversions to determine whether or not they represent an issue to migration.

Aquatic Objective 39B: Improve conveyance in Hayden Creek diversions to improve bank stability, decrease fish stranding, and shorten overall ditch lengths.

Strategies:

39B1. Work with landowners to evaluate alternative irrigation options such as pumping.

39B2. Line irrigation ditches or replace with pipes.

39B3. Work with private landowners to purchase or lease water rights (10-year or 20-year term).

39B4. Consolidate diversion points throughout the subbasin that are ineffective and/or unneeded.

Other Lemhi Tributaries and Lemhi Headwaters

Problem 40: Except for Big Springs Creek, tributaries of the upper Lemhi above Hayden Creek are no longer available to anadromous production because of low flows and diversions. Migration problems can possibly occur year-round, irrespective of irrigation needs. This may be due to the physical obstacle created by the diversion structure and/or the non-removal of the diversion during non-irrigation periods.

Aquatic Objective 40A: Reconnect mainstem tributaries and modify diversion structures as needed to provide for anadromous and resident migration.

Strategies: (see strategies 9A1–9A14, 12A1–12A5, and 12B1–12B2)

Middle Salmon–Panther Watershed

There is an ongoing lawsuit in the Panther Creek drainage over mitigation responsibilities associated with damages caused by Blackbird Mine. The outcome associated with the pending decision will likely dictate restoration projects and other funding. Because of the uncertainty associated with this decision, the following objectives and strategies were developed under the assumption that they may be revised but represent the key issues that need to be resolved for focal species in the watershed.

Problem 41: Focal species habitat occurring in tributaries entering the mainstem, between the confluences of the North Fork Salmon and Pahsimeroi Rivers, is primarily limited by a modified hydrologic regime, inadequate pool:riffle ratios, and structural migration barriers.

Aquatic Objective 41A: Rehabilitate natural hydrographs in key anadromous and resident tributaries to ensure for adequate base flows, channel-maintaining peak flows, and normal flow timing.

Strategies: (in addition to strategies 9A1–9A14)

41A1. Explore opportunities to mimic a more natural hydrograph. This may include altering withdrawal timing of irrigation systems in order to obtain a flushing flow that will scour the channel, and promote more natural channel forming processes (e.g., such as those that promote pool formation).

Aquatic Objective 41B: Improve connectivity and access to habitat currently blocked by manmade barriers.

Strategies: (see strategies 12A1–12A5)

Middle Fork Salmon Watershed (Upper and Lower)

The Middle Fork Salmon River watersheds are located in wilderness areas, and most waterways are pristine. Areas of concern are located outside the wilderness areas and are primarily associated with increased sedimentation from land-use activities, presence of brook trout, and potential legacy effects of mining activity.

Important salmon and steelhead streams (Bear Valley, Marsh, Camas, Big, Monumental, and Loon creeks) lie outside the wilderness area and have been degraded to various degrees by past land use activities such as mining, grazing, logging, and road building. Historical dredge mining had a significant influence on fish habitat in Bear Valley Creek, and this mining area has continued to contribute about 35% of the fine sediment to the creek since active mining ceased (SBNFTG 1998a). Legacy mining effects have also contributed low levels of chemical contamination into upper Marble Creek (Wagoner and Burns 1998). Also, in the Silver Creek drainage (a tributary to Camas Creek), an earthen dam above Rams Creek is a barrier and isolates fish in upper Silver Creek (USFS 1999d). This isolation reduces habitat available for bull trout in this area and reduces genetic exchange with other local populations in the area.

Middle Salmon–Chamberlain Watershed

Area west of Wind River (Including Meadow Creek)

Problem 42: Elevated stream temperatures are of primary concern in the Middle Salmon–Chamberlain Watershed, and specifically within the area west of Wind River (including Meadow Creek).

Aquatic Objective 42A. In stream reaches occurring in the Middle Salmon–Chamberlain Watershed, and specifically those occurring west of Wind River (including Meadow Creek), rehabilitate instream temperatures to levels that support designated beneficial use criteria.

Strategies: (see strategies 8D1–8D5)

South Fork Salmon Watershed

Problem 43: Localized riparian issues exist in the South Fork watershed. Areas where riparian function is most limited include those in which roadbeds have been constructed adjacent to or within the immediate floodplain.

Aquatic Objective 43A. Revegetate tributary reaches in areas not dominated by rip-rap or road beds and improve bank stability along the mainstem.

Strategies: (see strategies 8C1–8C3 and 8D1–8D5)

Problem 44: High numbers of brook trout occur in the Secesh drainage, and pose a potential displacement threat to westslope cutthroat trout, and a hybridization threat to bull trout. The extent and severity of the problem is currently unknown.

Aquatic Objective 44A. Decrease or extirpate brook trout populations in the watershed.

Strategies:

44A1 Identify areas of high brook trout densities.

44A2. Employ removal actions that do not pose a threat to native populations.

44A3. Monitor and evaluate effectiveness of removal activities.

Problem 45: A lack of functioning LWD is affecting channel structure in Johnson Creek and is reducing habitat quality for focal salmonids.

Aquatic Objective 45A. Improve riparian function to increase LWD recruitment.

Strategies:

45A1. Protect existing functional riparian areas.

45A2. Promote the importance of riparian vegetation to landowners, emphasizing its role as a bank-stabilizing component.

45A3. Rehabilitate non-functioning riparian areas where feasible.

45A4. Monitor and evaluate effectiveness of rehabilitation efforts.

Problem 46: Fine sediments in the South Fork mainstem are currently high due to the geologically unstable nature of the watershed and legacy effects from land management.

Aquatic Objective 46A. Promote landscape management activities that minimize the threat of chronic sediment inputs.

Aquatic Objective 46B. Gain an understanding of how fine sediments are affecting secondary production, habitat availability and use by focal species.

Strategies:

46B1. Use available methods to quantitatively establish changes in pool frequency and volume and other habitats. Due to the lack of historical data, this will entail examination of recent trend data and include further monitoring and evaluation of fine sediment at established monitoring sites.

46B2. Determine the degree to which secondary production is affected by fine sediments in the South Fork mainstem.

46B3. Investigate seasonal habitat use and availability by focal species' relative to sediment impacts.

46B4. Integrate research findings into future management strategies.

Discussion: Rehabilitation efforts have taken place, and it is unlikely that additional efforts will effectively change sediment volumes in the channel. There is however, a threat of additional sedimentation occurring, which would retard previous rehabilitation efforts. We also are unsure as to the effects fine sediments are having on seasonal habitat availability and use by local populations.

Lower Salmon/Little Salmon Watersheds

Problem 47: A common factor limiting the condition of salmonid rearing habitat throughout the Little Samon, Lower Salmon mainstem and on some specific associated tributaries of the Lower Salmon/Little Salmon is the inadequacy of shade-providing, bank-stabilizing riparian vegetation.

Aquatic Objective 47A. Using riparian area revegetation actions, stabilize 25 MILES of streambank along the mainstem Little Salmon River

Strategies: (see strategies 8C1–8C3 and 8D1–8D5)

Discussion: Riparian vegetation bordering the mainstem Little Salmon does little in terms of its shading function (*e.g.,* ability to cool the water column). It does, however, serve an important function in bank stabilization, and due to its absence along many reaches, plays a minimal role in sedimentation reduction processes.

Problem 48. High numbers of brook trout occur in lower Salmon tributaries (e.g., French Creek, Elkhorn Creek, Slate Creek) and pose a potential hybridization threat to bull trout where they coexist. The extent and severity of the problem is currently unknown.

Aquatic Objective 48A. Decrease or extirpate brook trout populations in the watershed.

Strategies:

48A1 Identify areas of high brook trout densities.

48A2. Employ removal actions that do not pose a threat to native populations.

48A3. Monitor and evaluate effectiveness of removal activities.

Problem 49: The lack of properly functioning riparian corridor, floodplain/channel encroachment, and upper meadow water diversions have adversely impacted water temperature, flow regimes, and channel morphology

Aquatic Objective 49A: Improve riparian condition to decrease stream temperatures

Strategies: (see strategies 8D1–8D5)

Aquatic Objective 49B. Increase the number of pieces of LWD in reaches currently deficient, to volumes consistent with PFC ratings (*refer to* Appendix F)

Strategies: (see strategies 8A1–8A4)

Aquatic Objective 49C. Reduce floodplain/channel encroachment (e.g., roads, development, etc.)

Strategies: (in addition to strategies 8B1; 8C1-8C3):

49C1: Adaptively integrate M&E results

3.2.2.2 Terrestrial Ecosystem

Problem 50: The quantity and quality of functioning wetland habitats has been reduced. Determining the extent of the problem is difficult due to lack of information (see assessment sections 2.3.1, 2.3.9, and 3.1).

Terrestrial Objective 50A: Conserve wetland resources and assess wetland habitat conditions.

Strategies:

50A1. Complete the National Wetland Inventory (NWI) mapping for the Salmon subbasin at the watershed scale to accumulate information on the current and potential distribution of each wetland system.

50A2. Develop a comprehensive wetland inventory and mapping effort by watershed in the Salmon subbasin in watersheds impacted by land conversion by 2015.

50A3. Develop restoration priorities and assess wetland functionality.

50A4. Protect wetland habitats through land acquisition, fee title acquisitions, conservation easements, land exchanges, public education, promotion of BMPs, fencing, promotion of alternative grazing strategies and the installation of alternative forms of water for livestock

50A5. Monitor and evaluate efforts to protect wetlands. Integrate information into Strategy 50A1 and modifying activities under Strategy 50A2 and 50A3 as necessary based on new information.

Discussion: Wetlands cover only a small portion of the subbasin, but offer some of the most diverse and unique habitats available. Wetlands occur as small ponds filled by spring runoff, wet meadows, springs and seeps, bogs, small lakes, and riverine and streamside riparian areas (riverine and streamside riparian areas are addressed separately in problem statement 51). Many wetland communities in the subbasin have been degraded by livestock grazing, road development, landuse conversion, urban expansion, and altered hydrologic regimes. This has negatively impacted numerous focal species including Columbia spotted frog, willow flycatcher, peachleaf willow, geyer willow, booth willow, Drummond willow, black cottonwood, river otter, and beaver (see assessment section 2.3.1, assessment appendix 2-19, and assessment appendix 2-20).

The location, condition, and function of the wetland habitats of the subbasin are not well understood or documented. There is very little confidence in current wetland data. On the ground data collection is needed through continued habitat mapping to support the development of an inventory of all wetlands in the subbasin; it is also important to continue habitat mapping as technology improves. The technical team suggested a deadline of 2015 (allocating one year for each of the 10 watersheds) for completion of the wetland inventory and mapping effort. Completion of inventory efforts and the development of restoration and protection priorities will be an important first step to wetland preservation.

Terrestrial Objective50B: Restore historic wetlands to proper functioning condition[6].

Strategies:

50B1. Identify areas for restoration--use hydric soils maps to determine the location of historic wetlands where herbaceous wetlands were most common historically.

50B2. Prioritize areas for restoration using information developed in Strategy 50B1.

[6] The Salmon Terrestrial Technical Teams' use of the term 'proper functioning condition (PFC)' is analogous to the definition by USACE (1998) -- Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding, and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The functioning condition of riparian-wetland areas is a result of interaction among geology, soil, water, and vegetation.

50B3. Restore historic wetlands--restore identified historic wetland areas that will provide benefits to multiple species.

50B4. Restore existing wetlands--Improve wetland function and quality by controlling invasive species such as purple loosestrife.

50B5. Monitor and evaluate wetland restoration. Assess response of focal species to changes in habitat improvements. Integrate new information into Strategies 50B1 and 50B2. Modify Strategies 50B3 and 50B4 as necessary based on new information and priorities.

Discussion: Within the Salmon subbasin, large expanses of wetland areas have been eliminated. The primary cause of this loss has been filling for agricultural use. Large wet meadow areas were converted to agricultural use. Many other wetland areas have been degraded through land use and hydrologic changes, and the introduction of exotic species (see assessment sections 2.3.1, 3.1, and appendix 2-19). Grazing and off-highway vehicle use also represent substantial threats to wetland communities, and implementing the strategies in objectives 57A and 59A to minimize the impacts of these activities on the natural resources of the subbasin will also provide substantial benefits to wildlife. Working to restore these areas will benefit numerous native species.

The Upper Salmon terrestrial subcommittee selected restoration of 1500 acres by 2019[7] as a balance between biological need and feasibility of implementation. The Lower Salmon terrestrial subcommittee suggested an effort to restore existing wetlands that are not functioning rather than creating new wetlands. Within a hydrologic unit restore 10-20% of the non-functional wetlands (reference wetland inventory developed in 50A2) to proper functioning condition by 2019[7]. Because they tend to provide benefits to fish, wildlife, and water quality that are out of proportion with their relatively small size, functional wetland areas are good candidates for protection through land acquisition or conservation easements (2.3.1, 3.1, and appendix 2-19).

Problem 51: The quantity and quality of lowland riparian habitat has decreased (see assessment sections 2.3.1, 2.3.9, and 3.1).

Terrestrial Objective 51A: Conserve riparian habitats.

Strategies:

51A1. Assess existing condition and extent of lowland riparian habitat in the Salmon subbasin.

51A2. Identify and prioritize riparian habitats for conservation. Give highest priority to riparian habitats supporting spawning and rearing for anadromous and native resident salmonids.

[7] A deadline of 2019 was chosen for meeting may of the objectives proposed in this plan. This deadline was chosen based on the NPCC's guidance that the management plan should take on a 10-15 year planning horizon (NPCC 2001a).

51A3. Conserve riparian communities through riparian pastures, long-term agreements, conservation easements, land exchanges, promotion of BMPs, land stewardship, land purchase, and fee title acquisitions.

51A4. Increase stewardship and public knowledge--increase understanding of the importance of riparian habitat through education programs for both the general public and road maintenance personnel.

51A5. Promote collaboration/cooperation between agencies, organizations, and individuals in conserving unique representatives/core areas with multiple ownerships.

51A6. Integrate the Partners in Flight Bird Conservation Plans into management plans for public lands in the physiographic area.

51A7. Monitor and evaluate efforts to conserve riparian habitats. Integrate new information and modify implementation strategies as necessary.

Discussion: Adjacent to many streams, rivers, and wetlands, riparian habitats are water-dependent systems that are strongly associated with stream dynamics and hydrology. Riparian habitats may reduce stream temperatures by providing shade, reduce sediments through channel stabilization and filtration, increase channel habitat diversity, and improve floodwater retention and groundwater recharge (see assessment section 2.3.1 and assessment appendix 2-19).

Riparian areas and wetlands (addressed separately in problem statement 50) cover only a small portion of the subbasin, but these habitats consistently support greater diversity and abundance of wildlife species than other habitat types and are often important breeding habitats, seasonal ranges, or migration corridors for a variety of fish and wildlife species. The Columbia spotted frog, willow fly catcher, river otter, beaver, cottonwood, and willows are a few of the species in the Salmon subbasin that are closely associated with riparian areas and lotic environments (see assessment section 2.3.1, assessment appendix 2-19, and assessment appendix 2-20).

Very little confidence exists in current riparian data. On the ground data collection is needed through continued habitat mapping to support the development of an inventory of all riparian areas in the subbasin; it is also important to continue habitat mapping as technology improves. Completion of inventory efforts and the development of restoration and protection priorities will be an important first step to riparian preservation. Priority should be given to protect existing high quality riparian areas.

Habitat degradation including loss or degradation of riparian habitats is considered a limiting factor for all focal aquatic species (see assessment section 3.1). Critical habitat as defined by NOAA Fisheries specifically includes riparian zones adjacent to waterways used (or potentially used) by listed fish species (see assessment section 2.2). Changes to habitat components such as woody debris jams, vegetation, and/or hydrology are most likely to affect these species. Proper vegetation and cover is crucial for both aquatic and terrestrial species. Loss or removal of riparian vegetation may lead to other changes which also impact aquatic and terrestrial resources including altered development of meanders, side channels, and attached wetlands that provide important habitat for both aquatic and terrestrial species (see assessment section 2.3.1).

Terrestrial Objective 51B: Restore 50% of degraded (functional at risk or non-functional) riparian areas to proper functioning condition[6] by 2019[7].

Strategies:

51B1. Identify and prioritize riparian habitats for restoration. Give highest priority to riparian habitats supporting spawning and rearing for anadromous and native resident salmonids and that also provide benefits to special status terrestrial species.

51B2. Restore riparian habitats-- Encourage landowners or managers to take advantage of funding opportunities for creating, restoring, and maintaining lowland riparian habitat on their properties. For example, restore riparian communities in agricultural lands through increased enrollment by landowners in the Continuous Conservation Reserve Program (CCRP).

51B3. Develop new programs that work to acquire and restore riparian habitats.

51B4. Encourage landowners or managers of riparian lands to replant native riparian vegetation along protected stream reaches that have become degraded.

51B6. Restore hydrologic regimes to support riparian functions.

51B7. Continue to reevaluate grazing strategies on allotments to help improve riparian areas.

51B8. Monitor and evaluate efforts to restore riparian habitats. Assess response of focal species to changes in habitat improvements. Integrate new information and modify implementation strategies as necessary.

<u>Discussion:</u> Riparian habitats in the Salmon subbasin have been altered through various human activities, most notably grazing/browsing, altered hydrologic regime, invasive exotics, and land use conversion (see assessment sections 2.3.1, 3.1, and appendix 2-19). Riparian habitats are very important to both terrestrial and aquatic communities in the subbasin, and these changes have the potential to impact numerous species. Nearly one-quarter of the Salmon subbasin's terrestrial vertebrate species use this habitat for essential life activities (see assessment section 2.3.1).

Heavy grazing has impacted the health of the riparian communities in the subbasin, but recent efforts to exclude cattle from riparian areas, use of BMPs, alternative grazing strategies, changes in grazing timing, and other factors have resulted in improvements in riparian condition (see assessment section 2.3.1, 3.1, and assessment appendix 2-19). Continued and expanded implementation of these strategies (as described in problem 57A) should result in continued improvements in the riparian habitats of the subbasin and provide abundant, well-distributed, high-quality riparian habitat that will support the many wildlife and fish species that depend on these habitats.

Restoring beaver to their historic ranges is a strategy that could benefit riparian habitats. Beavers are the only species that function to impound water by creating diversions or dams and are an important component of aquatic/riparian ecosystem health where they are native. The beaver is especially important to aquatic and riparian/herbaceous wetland habitats since it creates and maintains waterways and wetland habitats and affects hydrography (see assessment section 2.1, 4.2.3.2, and assessment appendix 2-20).

In some instances, riparian loss or degradation is addressed elsewhere in this plan specifically to achieve other objectives (e.g. temperature amelioration). Readers are referred to strategies addressing minimum flow concerns (Objective 9A), temperature (Objective 9D) and livestock grazing (Objective 57A). Strategies presented under these objectives also call for restoration of riparian condition for specific purposes (or in response to specific impacts), and are complimentary to those presented for this general riparian restoration objective. The Lower Salmon technical subcommittee suggested restoration of 50% of existing impacted riparian areas; this recommendation takes into account that a lot of riparian area is on private land.

Problem 52: Reductions in the extent and declines in the condition of warm/dry old growth and mature ponderosa pine/Douglas-fir forest habitats in the subbasin have negatively impacted the numerous wildlife species that utilize these habitats (see assessment sections 2.3.3, 2.3.9, and 3.1).

Terrestrial Objective52A: Conserve and maintain mature/old growth "open" stands of ponderosa pine and Douglas fir forest habitats (warm/dry habitats).

Strategies:

52A1. Inventory and map existing mature, warm/dry ponderosa pine/Douglas-fir forest habitats on all lands within the subbasin. Use existing information where appropriate.

52A2. Prioritize warm/dry ponderosa pine/Douglas-fir forest communities for conservation--give priority to larger remnants and those with highest potential to be lost.

52A3. Conserve ponderosa pine/Douglas-fir forest communities--conserve existing mature ponderosa pine/Douglas-fir communities through land purchase, fee title acquisitions, conservation easements, land exchanges or other strategies. Develop new programs to acquire and restore low to mid elevation mature ponderosa pine forests, if necessary.

52A4. Encourage the planting of ponderosa pine, where appropriate to the habitat type, existing state, federal and tribal reforestation efforts.

52A4. Maintain native mature/old growth "open" ponderosa pine/Douglas-fir forest communities. Use prescribed burning and/or understory removal to mimic natural fire cycles in frequency and intensity and reduce susceptibility stand-replacing fire events (see assessment appendix 3-1). Consider reforestation efforts where appropriate.

52A5. Monitor and evaluate effectiveness of activities to reduce negative impacts to wildlife species. Integrate new information and modify implementation strategies as necessary.

Discussion: The loss of old/mature, dry/warm ponderosa pine/Douglas-fir forest is primarily a result of timber harvest, grazing pressure, conversion to agriculture, invasive exotic species, and encroachment by other species following fire suppression. Under historic fire regimes, mature stands were usually maintained in a late seral single layer structure. This forest type is maintained by fire and is vulnerable to fire exclusion. Reductions in ponderosa pine/Douglas-fir habitats have negatively impacted native focal wildlife species (see assessment section 2.3.3). The current distribution of dry, mature ponderosa pine/Douglas-fir forests in the Salmon subbasin is illustrated in Assessment Section 2.3.3, Figure 2-80.

Needles, cones, buds, pollen, twigs, bark, seeds, and associated fungi and insects provide food for many species of birds and mammals. Ponderosa pine/Douglas-fir forests provide numerous species of birds and mammals with shelter at each stage of growth but are particularly valuable in mature stands and as snags, where it provides housing for numerous cavity dwelling species and valuable perch trees. Reductions in old/mature ponderosa pine/Douglas-fir habitats have negatively impacted native focal wildlife species including rare white-headed woodpeckers and flammulated owls (see assessment section 2.3.3). This xeric, open canopy forest type also provides ungulate winter range and serves as movement corridors in winter. Carnivores benefit from concentrated ungulate prey populations on winter range in this type (see assessment section 2.3.3).

Loss of pine/fir habitats has occurred throughout the subbasin (see assessment section 2.3.3 and appendix 2-19). Conservation of stands of ponderosa pine/Douglas-fir forests in areas where the habitats were historically dominant will help to conserve wildlife dependent on the warm-dry ponderosa pine/Douglas-fir forest habitat types. The technical team believes protection of mature stands is important. Prescribed burning and/or understory removal are two methods suggested for protecting mature stands. Restoration of the natural fire regimes to historic norms should be a long-term goal. Reestablishment of natural ecological processes will also create the habitat features found in earlier seral stages used by wildlife.

Terrestrial Objective 52B: Manage for mature/old growth "open" stands of ponderosa pine and Douglas-fir in warm/dry- ponderosa pine, Douglas-fir, and grand fir habitat groups within historic range of variability (HRV)[8] by vegetation response units (VRU)[9].

Strategies:

52B1. Identify and prioritize areas to restore and maintain warm/dry ponderosa pine/Douglas-fir forest communities. Integrate information developed in Objective 52A Strategies 52A1, 52A2 and 52A6.

52B2. Manage old, mature, warm-dry ponderosa pine/Douglas-fir forest across the landscape within historic range of variability (HRV) for occurrence, by vegetation response unit (VRU).

52B3. Manage successional stages--where appropriate to the habitat type, use prescribed burning and selective thinning to encourage succession and the establishment of mature ponderosa pine/Douglas-fir forest communities (see assessment appendix 3-1).

52B3. Develop new programs to acquire and restore low to mid elevation mature ponderosa pine forests, if necessary

52B4 Monitor and evaluate the effectiveness of Strategies 52B2 and 52B3 at addressing Objective 52B. Assess response of focal species to changes in habitat improvements. Integrate new information to modify strategies 52B1 and 52B2 as necessary.

Discussion: As discussed in Objective 52A, timber harvest, grazing pressure, land use conversion, and fire suppression have resulted in a substantial decline in the abundance of old/mature, dry/warm ponderosa pine/Douglas-fir forests in the subbasin (see assessment section 2.3.3, 3.1, and assessment appendix 2-19 for details). Management for the restoration of old/mature dry/warm ponderosa pine/Douglas-fir forests to areas of historic dominance and encouragement of natural succession processes will increase the amount of ponderosa pine/Douglas-fir habitats available to dependent wildlife.

Before the initiation of logging and fire suppression, ponderosa pine/Douglas-fir forests were maintained by regular underburning. Many areas of the subbasin covered by open ponderosa pine/Douglas-fir habitats are now dominated by

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[8] Historic Range of Variability is the variability of regional or landscape composition, structure, and disturbances, during a period of time of several cycles of the common disturbance intervals, and similar environmental gradients (Quigley and Arelbide 1997a).

[9] Vegetation Response Units (VRUs) are broad ecological land units that display unique patterns of habitat type groups (potential vegetation) and terrain. The vegetation response unit (VRU) is intended to be an aggregation of land having similar capabilities and potentials for management. These areas have similar patterns in habitat types, soils, hydrologic function, landform and topography, lithology, climate, air quality and natural disturbance and successional processes. The interaction of all these processes creates a mosiac across the area landscape. Patterns of plant community composition, age class structure, and patch size will tend to fall within certain ranges for each VRU. The VRUs provide a mechanism to interpret existing vegetation in the context of natural disturbance processes and enable a projection of future landscape conditions (Kootenai National Forest 1999 and Nez Perce National Forest 1998).

denser stands of shade-tolerant tree species. These changes have likely impacted populations of ponderosa pine/Douglas-fir habitat dependent wildlife species in the subbasin. Ponderosa pine/Douglas-fir habitats are important to a variety of wildlife in a variety of ways. The focal species, white-headed woodpeckers are completely dependant on the seeds of the Ponderosa pine for winter feeding and show a preference for these habitat types for nesting and foraging during other seasons of the year. Flammulated owl habitat includes open stands of fire-climax ponderosa pine or Douglas-fir forests (see assessment section 2.3.3, assessment appendix 2-19 and assessment appendix 2-20 for details). Management for the restoration of ponderosa pine/Douglas-fir forests within historic range of variability (HRV) by vegetation response units (VRU) will increase the amount of ponderosa pine/Douglas-fir habitats (and eventually mature ponderosa pine/Douglas-fir habitats) available to dependent wildlife.

Problem 53: The excessive loss and degradation of shrub-steppe habitat in the Salmon subbasin has negatively impacted numerous native plant and animal species dependent on these habitats, such as sage grouse (see assessment sections 2.3.2, 2.3.9, and 3.1).

Terrestrial Objective 53A: Conserve ecological integrity[10] of shrub-steppe habitat.

Strategies:

53A1. Assess existing condition and extent of shrub-steppe habitat in the Salmon subbasin.

53A2. Prioritize shrub-steppe habitats for protection--give priority to larger remnants and those with highest potential to be lost.

53A3. Maintain historical disturbance patterns that result in some early seral communities

53A4. Maintain healthy bunchgrass communities; maintain adequate ground cover of non-senescent grasses and forbs to conceal ground nests and support an adequate food base for terrestrial species

53A5. For sage grouse, maintain natural springs/riparian areas (or establish artificial springs/riparian areas) in condition suitable for use by sage grouse during chick rearing

53A6. Monitor and evaluate efforts to conserve shrub-steppe habitats. Integrate new information and modify implementation strategies as necessary.

<u>Discussion:</u> Comparatively high fish and wildlife density and species diversity characterize shrub-steppe habitat. Approximately 100 bird species and 70 mammal species can be found in sagebrush habitats. Some of these are sagebrush obligates or near obligates. Sagebrush and the native perennial grasses and forbs of the shrub-

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[10] Ecological integrity is the maintenance of native and desired non-native species and associated processes (Quigley and Arelbide 1997a). The Salmon Terrestrial Technical Teams' use of the term 'ecological integrity' incorporates composition, structure, and function (as defined by Quigley and Arelbide 1997a) within a natural range of variability.

steppe are important sources of food and cover for wildlife. Native perennial bunchgrass species serve a keystone role in the maintenance of vegetative and watershed stability and resilience to disturbance events and environmental change. Loss of the abundance and vigor of bunchgrass triggers the decay of watershed integrity and reduces the capability of these sites to provide wildlife habitat and commercial resource values. This habitat provides important wildlife breeding habitat and seasonal ranges (see assessment section 2.3.2).

The U.S. Fish and Wildlife Service determined substantial biological information exists to warrant a more in-depth examination of greater sage-grouse status. Petitions include information detailing loss, fragmentation, and degradation of sage-grouse habitat due to wildfire, invasion of non-native plants, livestock management, agricultural conversion, herbicide treatment, mining and energy development, among other causes. Once review is complete, the Service will determine whether to propose listing the species as threatened or endangered (see assessment section 3.5.2). Sage grouse are shrub-steppe dependant species.

Terrestrial Objective 53B: Restore ecological integrity[10] and increase stand density and diversity for 5% of degraded shrub-steppe habitat by 2019[7].

Strategies:

53B1. Identify and prioritize areas to restore fragmented and degraded sagebrush habitats.

53B2. On private lands, when possible, assist private landowners in restoring native vegetation.

53B3. Restore historical disturbance patterns that result in some early seral communities.

53B4. On public lands, decrease encroachment by conifer species.

53B5. Restore a healthy bunchgrass community; maintain adequate ground cover of grasses and forbs to conceal ground nests and support an adequate food base for terrestrial species.

53B6. Monitor and evaluate efforts to restore shrub-steppe habitats. Assess response of focal species to changes in habitat improvements. Integrate new information and modify implementation strategies as necessary.

<u>Discussion:</u> Alteration of fire regimes, fragmentation, livestock grazing, and the addition of exotic invasive plant species have changed the character of shrub-steppe habitat. Sagebrush steppe ecosystems of the Great Basin in the western United States are examples of fire prone ecosystems. Many wildlife species depend on sagebrush steppe ecosystems for survival. Sagebrush and the native perennial grasses and forbs of the shrub-steppe, are important sources of food and cover for wildlife (see assessment section 2.3.2 and assessment appendix 2-19)

A change in the natural fire regime is decreasing the extent of sagebrush ecosystems, and the populations of wildlife species that depend on sagebrush are undergoing steep declines because of habitat loss (see assessment section 3.1 and assessment appendix 2-19). Invasion of cheatgrass is fueling larger and more frequent fires that are outcompeting sagebrush as well as the associated forb and grass species that are native components of that ecosystem (see assessment section 3.1 and assessment appendix 2-19).

Improper livestock grazing management can impact species composition of shrub-steppe communities, disrupt ecosystem functioning, and alter ecosystem structure (see assessment section 3.1 and appendix 3-1). The main negative impacts from cattle are the grazing of plants and trampling of vegetation and soil (see assessment section 3.1 and appendix 3-1). Under proper conditions and management (including consideration of timing and duration) grazing has been shown to benefit shrub-steppe ecosystems within the subbaisin (B. Loucks, USBWP, personal communication, May 2004).

The Upper Salmon Technical Committee felt that 5% by 2019[7] was a reasonable goal for restoration. This number balances biological need with the feasibility of implementation.

Problem 54: The extensive loss and degradation of native grassland habitats of the Salmon subbasin has negatively impacted native plant communities and animal species dependent on these habitats (see assessment sections 2.3.4, 2.3.9, and 3.1).

Terrestrial Objective 54A: Conserve ecological integrity[10] of remaining native grassland remnants.

Strategies:

54A1. Collect and map data--inventory and map existing native grassland remnants, building on the work of Weddell and Lichthardt (1998).

54A2. Prioritize opportunities for conservation--give priority to larger remnants or those that contain rare, state special status species, and federally listed plant species. Integrate information presented in the inventory of Strategy 54A1.

54A3. Conserve remnants--protect remaining native grassland remnants through land acquisition, fee title acquisitions, conservation easements, or land exchanges.

54A4. Monitor and evaluate the effectiveness of protecting native grassland remnants as a strategy for providing native grassland habitats and protecting native grassland dependent wildlife species. Integrate new information into Strategies 54A1 and 54A2 as part of next iteration of program.

Discussion: The Salmon subbasin contains both Palouse prairie and canyon grasslands. Canyon grasslands and Palouse prairie are generally dominated by the same bunchgrass species, but the overall plant species composition varies between the two habitat types. While Palouse prairie generally occurs on gently rolling plateaus of deep soil, canyon grasslands occur on in areas of steeper topography and commonly have shallower soils. There is only a small portion of Palouse prairie in the Salmon subbasin; the majority of the prairie is in southeastern

Washington, with some prairie also in adjacent Idaho and Oregon (see assessment section 2.3.4 and assessment appendix 2-19). The Palouse is one of the most endangered ecosystems in the U.S. with only 1% of the original habitat remaining; it is highly fragmented with most sites < 10 acres. Since 1900, 94 % of the Palouse grasslands have been converted to crop, hay, or pasture lands (see assessment section 2.3.4).

Both grazing and fire suppression favor shrub species over grasses and accelerate soil erosion. Extensive amounts of grasslands have been, or are being, converted to agricultural production. Once these ecosystems are converted, there is only limited potential for restoration to native grasslands, either mechanically or by removal of livestock (see assessment section 2.3.4 and appendix 2-19). Preservation of relatively intact prairie grasslands will provide habitat for the many species that depend on them, such as listed Spalding's catchfly (see plan section 5: Coordination with Existing Programs). Loss of grassland habitats is also a factor contributing to various grassland bird species (see assessment section 2.3.4 and appendix 2-19). Because remnants of native grasslands are very rare they are of high protection priority. The federal government currently manages almost all grasslands in the upper Salmon (B. Loucks, USBWP, personal communication, May 2004). Preservation of relatively intact prairie grasslands will provide habitat for the many species that depend on them as well as preserving a template to guide restoration efforts aimed at expanding the extent of these habitats (See Objective 54B).

Terrestrial Objective 54B: Restore ecological integrity[10] of 5-15% of degraded grasslands by 2019[7].

Strategies:

54B1. Research grassland restoration methods--explore techniques for effectively restoring grassland habitats in coordination with the Palouse Prairie Foundation and other interested landowners, agencies and organizations.

54B2. Identify and prioritize areas for native grassland restoration. Integrate information from Objective 54A, Strategy 54A2 into process.

54B3. Restore native grassland habitats--actively improve or create native grassland habitats through noxious weed control, cultural practices and seeding. Encourage the use of native species in existing state, federal, and tribal habitat programs.

54B4. Acquire and restore grasslands--continue existing programs that work to acquire and restore prairie and canyon grasslands. Develop new programs to acquire and restore prairie and canyon grasslands.

54B5. Monitor and evaluate the effectiveness of Strategies 54B3 and 54B4. Assess response of focal species to changes in habitat improvements. Integrate new information into Strategies 54B1 and 54B2. Modify Strategies as necessary based on new information.

Discussion: Due to their excellent deep soils and moisture regime, a majority of the Palouse prairie grasslands have been converted to agriculture. Much of the remaining intact prairie grasslands occur in "eye-brow" communities where the topography is too steep for successful farming; these communities are usually relatively small (B. Loucks, USBWP, personal communication, May 2004). The steep contours in canyon grasslands have prevented the conversion of canyon grasslands to agriculture. Alternatively, livestock grazing and the invasion of exotic plant species have significantly altered the canyon grasslands. Even native grassland habitats that have not been outright converted to agriculture or urban lands, have been degraded through the introduction of exotic species, grazing practices, fragmentation etc. (see assessment section 2.3.4 and appendix 2-19).

Once established cheatgrass outcompetes native bunchgrasses and is very difficult to remove. In the past, efforts at restoring areas dominated by cheatgrass have been marginally successful at best. The development of more successful and cost effective techniques for reducing and eliminating cheatgrass and restoring native bunchgrass communities, would have immeasurable benefits to grassland restoration efforts and grassland dependant wildlife species. Given the low success rate of restoring grassland areas that have become dominated by cheatgrass or noxious weeds to native grassland communities, it is sometimes necessary to use a more competitive non-native grass species such as crested wheatgrass to rehabilitate degraded areas. While using non-native species is not ideal for wildlife species, their establishment can help prevent further degradation (e.g. cheatgrass being replaced by medusahead) and restore economically valuable forage (see assessment appendix 2-19 and 3-1).

With current technologies the restoration of degraded grassland systems is expensive and time consuming. The terrestrial subcommittee selected the 5-15% goal with these constraints in mind. However, they recognize that as new techniques for grassland restoration are developed this goal may need to be increased in future iterations of the plan. Restoring these habitats to a more natural state and building connections between habitat fragments will benefit the many terrestrial species that depend on this habitat.

Problem 55: The extensive loss and degradation of aspen habitats of the Salmon subbasin has negatively impacted native plant communities and animal species dependent on these habitats (see assessment sections 2.3.5, 2.3.9, and 3.1).

Terrestrial Objective 55A: Conserve ecological integrity[10] of aspen habitat.

Strategies:

55A1. Assess existing condition and extent of aspen habitat in the Salmon subbasin.

55A2. Prioritize aspen habitats for protection--give priority to larger remnants and those with highest potential to be lost.

55A3. Maintain historical disturbance patterns that result in some early seral communities.

55A4. Monitor and evaluate efforts to conserve aspen habitat as a strategy for providing aspen habitats and protecting aspen dependent wildlife species. Integrate new information into Strategies 55A1 and 55A2 as part of next iteration of program.

Discussion: The aspen habitat component is patchily distributed throughout the subbasin. Growing concern about the structure and function of aspen habitats throughout the Western U.S. has resulted in greater interest in understanding the causes limiting aspen habitat quantity and quality. In the Salmon subbasin, aspen habitat declines have been attributed to a combination of altered fire regime, grazing and browsing, and in some cases localized alteration of the hydrologic regime (see assessment section 4.2.2.4). Many wildlife species use and depend on the aspen to provide food, cover, and nesting or roosting opportunities. Aspen is important for certain cavity nesters because it has a high food value (see assessment section 2.3.5).

Heavy livestock browsing can adversely impact aspen growth and regeneration. With fire suppression and alteration of fine fuels, fire rejuvenation of aspen habitat has been greatly reduced since about 1900. Conifers now dominate many seral aspen stands, and extensive stands of young aspen are uncommon (see assessment appendix 2-19).

Research done by USFS has suggested that most of the loss and degradation of aspen stands is a result of senescence and encroachment of conifers. Attempts at burning the stands in more cool and humid times of the year have been unsuccessful. Successful restoration of Aspen habitats may require a combination of strategies that involve both burning and mechanical means (B. Loucks, USBWP, personal communication, May 2004).

Terrestrial Objective 55B: Restore ecological integrity[10] of aspen habitat.

Strategies:

55B1. Identify and prioritize areas to restore aspen habitat

55B2. Determine the effect of livestock browsing on aspen sprouts.

55B3. Restore historical disturbance patterns that take place in early seral communities (by use of fire or mechanical means).

55B4. On private lands, when possible, assist private landowners in restoring native vegetation.

55B5. On public lands, decrease encroachment by conifer species.

55B6. Monitor and evaluate efforts to restore aspen habitats. Assess response of focal species to changes in habitat improvements. Integrate new information and modify implementation strategies as necessary.

Discussion: As discussed in the preceding objective, aspen stands are in decline across the West, and very few stands appear in the Salmon subbasin (see assessment section 2.3.5, figure 2-85). The combination senescenence due to modern fire suppression and encroachment of conifers as well as a steady increase in livestock and elk herbivory has prevented aspen regeneration in many forests; conifer understories are now widely overtopping and shading aspen stands (see assessment section 2.3.5).

The terrestrial subcommittee acknowledges that the mapping of existing aspen habitats is currently underway, making it difficult to determine an exact amount of aspen habitat that should be restored. Restoration of aspen habitats should begin immediately wherever possible. A quantitative goal for restoration should be determined in future iterations of this plan once the current mapping effort has been completed.

Problem 56: Exotic invasive plant species have negatively impacted native terrestrial focal habitats and species (see assessment sections 1.7.5, 3.1, 3.2.2.2, 4.2.4.1, and assessment appendix 3-1).

Terrestrial Objective 56A: Prevent the introduction of exotic invasive plant species into native habitats (see section 6.2: Terrestrial Prioritizations) to conserve quality, quantity, and diversity of native plant communities providing habitat to native wildlife species.

Strategies:

56A1. Establish early detection and eradication programs to identify and treat new and existing exotic invasive plant establishments and infestations.

56A2. Identify and prioritize native habitats susceptible to invasion from exotic invasive plant species (Use Cooperative Weed Management Area (CWMA) plans, county weed boards, or other sources that provide information to be used in prioritization. Priority emphasis should be in areas that are in pristine condition (areas with minimal establishment of exotic species). Take into consideration cost-effectiveness and expected biological response (see section 6.2: Terrestrial Prioritizations).

56A2. Prevent new infestations--minimize ground disturbing activities in habitats highly susceptible to weed invasion through local cooperation and revegetate/treat following disturbance.

56A3. Prevent seed dispersal--encourage the use of weed free seeds and feeds. Develop and implement programs and policies designed to limit the transportation of weed seeds from vehicles and livestock

56A5. Restore vegetative cover after major disturbances to prevent invasion by weeds and promote native plant communities long-term. Monitor disturbed areas and treat weeds.

56A6. Increase public participation—promote and participate in existing programs, support the Idaho Weed Management Strategy in developing education and awareness programs in noxious weed identification and prevention.

56A7. Prevent establishment--minimize establishment of new invaders by supporting early detection and eradication programs.

56A8. Monitor and evaluate the effort to protect native plant communities from exotic invasive plant species. Integrate new information into Strategy 56A1 and modify implementation strategies as necessary.

Discussion: Exotic invasive plant species pose one of the greatest threats to the wildlife habitats of the subbasin. They often out compete native plant species, and alter ecological processes reducing habitat suitability for native fish and wildlife, and negatively impact agriculture and ranching. Many exotic invasive species are not palatable to either livestock or wildlife, nor do they provide suitable habitat for wildlife species (see assessment sections 1.7.5, 3.1, and assessment appendix 3-1). Currently exotic invasive plant species are common in many areas of the subbasin and preventing their spread and establishment in the subbasin is a priority (see section 6.2: Terrestrial Prioritizations).

Exotics invasive plant species have various impacts on native habitats. The invasion of cheatgrass in shrub-steppe habitat is fueling larger and more frequent fires that are out-competing sagebrush as well as the associated forb and grass species that are native components of that ecosystem. It has been estimated that 25% of the original sagebrush ecosystem is now annual cheatgrass/medusa-head rye grassland, and an additional 25% of the sagebrush ecosystem has only cheatgrass as an understory constituent (see assessment section 3.1 and assessment appendix 3-1). European purple loosestrife (*Lythrum salicaria*) has been spreading at a rate of 115,000 ha/yr and is changing the basic structure of most of the wetlands it has invaded (see assessment section 3.1 and assessment appendix 3-1). Spotted knapweed infests a variety of natural and semi-natural habitats including barrens, fields, forests, prairies, meadows, pastures, and rangelands. It out competes native plant species, reduces native plant and animal biodiversity, and decreases forage production for livestock and wildlife. It has increased at an estimated rate of 27% per year since 1920 (see assessment section 3.1 and assessment appendix 3-1). Spotted knapweed is capable of establishing itself into undisturbed sites; however, disturbance allows for rapid establishment and spread.

Without proper management, livestock can act as vectors for seeds, disturb the soil, and reduce the competitive and reproductive capacities of native species. Exotic invasive plant species have been able to displace native species, in part, because native grasses of the Intermountain West and Great Basin are not adapted to frequent and close grazing (see assessment section 3.1 and assessment appendix 3-1). Consequently, populations of native species have been severely depleted by livestock, allowing more grazing-tolerant weedy species to invade. Many native plant communities can also be invaded by exotic invasive plant species, even in the absence of ground disturbance.

After major disturbances, evaluate for potential restoration practices that will support the establishment of competitive beneficial plant communities. The overall objective of restoration after a major disturbance should be to cover the ground with beneficial vegetation (native or non-native) to prevent exotic invasive species invasion. Restoration protocol may require use of non-native seed at first to reduce erosion and prevent weed establishment, but the long-term goal of restoration should be the establishment of native plant communities. On many sites the most effective competition is crested, Siberian, tall, or intermediate wheatgrass (B. Loucks, USBWP, personal communication, May 2004). Restoration protocol may vary dependant on land ownership or management. Management decisions should be made on a site-by-site basis. For example, in wilderness areas restoration protocol may call exclusively for use of native plant species, while areas under different management may suggest protocol that stresses priority to prevent erosion and weeds independent of whether species used are native or non-native. Non-native species may be suitable to use directly after a major disturbance to prevent erosion and weeds, but may be difficult to replace if the long-term goal is to establish native plant communities.

Preventing the spread of exotic invasive species into areas of relatively pristine habitat is one of the highest priorities for wildlife management in the subbasin (see section 6.2: Terrestrial Prioritizations). Effective education programs that help residents and visitors to the subbasin identify exotic invasive plant species and learn how to reduce or prevent their spread will be critical to this effort. The introduction and spread of exotic invasive species is tied to other activities in the subbasin including livestock grazing, road construction and use/motorized vehicle access, fire, timber harvest and other soil disturbing activities. Strategies developed by the technical team to address these issues were developed in objectives 57, 59, 60, and 61. Implementing these strategies will also help to reduce the impact of introduced plant species on the subbasin (see assessment sections 1.7.5, 3.1, and assessment appendix 3-1).

The Idaho IISC completed an Assessment of Invasive Species Management in Idaho in July 2003 (NNRG 2003). The IISC recommends the Assessment become the basis for a more comprehensive plan designed to address the threats posed by invasive species in Idaho. Other recommendations include the establishment of an equitable and stable source of funds as insufficient funding and staff was noted as a major barrier by a great majority of Idaho's invasive species managers. It was also recommended that educational programs be conducted with focus on: (1) property owners, and (2) those having some relationship with invasive species pathways. The latter category ranges from nursery operators who import exotic species to recreationists. It is also important to set priorities for species to be addressed. There is a wide variety of species requiring control efforts and little consensus among managers on priorities for them. Efforts to prioritize species, and then work to prevent or manage outbreaks of them, must be accompanied by an assessment of the risk that each poses, including the risk of introduction if they are not already established. Coordination of invasive species work within state government is important to ensure that a comprehensive invasive species program in Idaho is not diluted by competing efforts among various agencies. Enactment of changes in state law should be considered to provide the Idaho Invasive Species Council with a clear statutory basis for developing and implementing a comprehensive invasive species program. The identification of research needs is recommended as there is much to be learned about invasive species, ranging from how some microbials might spread to finding acceptable biological controls for noxious weeds. Finally, it is recommended that the Idaho "Invasive Species Summit" re-convene to review the current situation and discuss what future steps will be needed (NNRG 2003).

Terrestrial Objective 56B: Reduce the extent and density of established exotic invasive plant species.

Strategies:

56B1. Provide for early detection of existing and new weed infestations.

56B2. Identify and prioritize exotic invasive plant infestations for treatment in cooperation with existing Cooperative Weed Management Areas (CWMA) in the subbasin and prioritize according to cost-effectiveness, invasiveness of species and expected biological response. Integrate new information with existing inventories and management efforts from each CWMA in the subbasin (i.e. Lemhi, Custer, and Frank Church, Salmon River, and Tri-state)(see section 6.2: Terrestrial Prioritizations).

56B3. Treat weed infestations--implement the most economical and effective treatment methods for reducing weed densities or eliminating weed populations. Use the area and species-specific Weed Management objectives and priorities developed by the Cooperative Weed Management Area Committees in the subbasin.

56B4. Use multiple methods, hand pulling, herbicide spraying, biological control agents, and seeding after disturbance as appropriate to treat priority problems.

56B5. Educate public about weed treatment- supporting the Idaho Weed Management Strategy in developing education and awareness programs in exotic invasive plant identification, prevention, and treatment.

56B6. Monitor and evaluate efforts to reduce weeds. Integrate new information into Strategy 56B1 and modify implementation strategies as necessary.

Discussion: As discussed in the preceding objective, exotic invasive plant species degrade habitat and reduce its suitability for native plants and animals. These invaders are also economically expensive in terms of control measures and reductions in yield for agriculture and ranching (see assessment sections 1.7.5, 3.1, and assessment appendix 3-1). The battle against exotic invasive species is often discouraging. Limited funding, difficulty in coordinating efforts, and the need for greater public education into the problem and strategies for exotic invasive species control all add to the difficulty. Working to develop effective methods for reducing the prominence of exotic invasive plant species in the subbasin is a priority and will be an important step in preserving native biodiversity (see section 6.2: Terrestrial Prioritizations). The highest priority for treatment should be given to new invading species and rapidly spreading invading species (see assessment section 1.7.5).

The Idaho State Department of Agriculture (ISDA) sponsors a variety of programs that encourage collaboration and provide resources to manage exotic invasive species (ISDA 2003). The Noxious Weed Cost Share Grant Program accelerates the attack on exotic invasive species by supplementing local funds and resources, providing additional incentives for local landowners, officials, and citizens to work collaboratively to develop a more comprehensive and effective exotic invasive species management program. The ISDA Noxious Weeds Program is involved in coordinating statewide weed prevention efforts, identifying and providing funding and resources, and representing the interests of Idahoan's regarding invasive species management and control.

The Idaho Weed Summit was held by the ISDA to develop an action plan for the State. The resulting plan, *Idaho's Strategic Plan for Managing Noxious Weeds* was released in February of 1999 and focused on locally led Cooperative Weed Management Areas (CWMA). Top priorities of CWMA's include the involvement of all landowners in a watershed or region, development of Integrated Weed Management Plans, and defining roles and partnerships that allow for the blurring of jurisdictional lines of ownership to optimize cooperative efforts (ISDA 2003). Currently, Idaho has 32 successfully functioning CWMA's that cover more than 82% of the state as a result. The Lemhi, Custer, and Frank Church, Salmon River, and Tri-state CWMA's cover the vast majority of the Salmon subbasin. The appropriate County Weed Superintendent in each CWMA should be contacted (ISDA 2003) prior to identification, prioritization, and treatment efforts in the subbasin.

Control of infestations has been difficult, and the ecological consequences have been serious. Negative impacts include reduction in biodiversity, forage, habitat and aesthetic quality, and even soil productivity. Increased surface runoff and sediment yield may occur in areas infested by exotic invasive plant species, which would also negatively impact aquatic systems. Future planning efforts should consider the recommendations of the Idaho Invasive Species Council (IISC) Plan when it becomes available.

Where appropriate, encourage the use of biological control agents as a long-term control strategy without the potentially negative financial and environmental impacts of widespread herbicide use. Integrated Pest Management should be used as a tool to complement both prevention and treatment efforts. There should be continues support for existing programs involving education and providing materials, awareness programs in exotic invasive plant identification, spread, prevention, and treatment.

Problem 57: Historic and current livestock grazing has impacted fish and wildlife habitats and populations in some portions of the subbasin (see assessment section 3.1 and assessment appendix 3-1).

Terrestrial Objective57A: Restore ecological integrity[10] in upland grasslands, riparian areas, and forest habitats.

Strategies:

57A1. Identify and prioritize areas impacted by grazing for protection and restoration at a finer scale than available in section 6.2.

57A2. Implement proper grazing management --encourage establishment of riparian pasture systems, exclusion fences, off-site watering areas, or riparian conservation easements. Adjust seasonal timing of livestock grazing to minimize soil compaction, erosion and invasive exotic plant propagation.

57A3. Prevent seed dispersal--minimize the potential for livestock to facilitate the spread of exotic invasive plant species through weed-free hay programs, quarantine requirements, and other actions

57A4. Monitor and evaluate the effort to protect and restore habitats from grazing impacts. Integrate new information into Strategy 9A1 and modify implementation strategies as necessary.

Discussion: Grazing is an important land use in the Salmon subbasin involving important economic and multigenerational cultural traditions. It is important to recognize the positive values in regard to ranching such as its economic importance in the subbasin, reduced fuel loads, preservation of rural values and lifestyle, and land use aside from development. In general, efforts should focus on cooperative improvement in riparian and wet meadow habitats, while acknowledging that some priority projects in other areas exist. Minimizing grazing impacts is a priority in the subbasin (see section 6.2: Terrestrial Prioritizations).

Of the total area in the Salmon subbasin, 52% is impacted by grazing and browsing by domestic animals (see assessment appendix 3-1, table 10). Undisturbed herbaceous ecosystems across the western United States are rare. Still, a precise determination of the ecological effects of grazing is often difficult to obtain because ungrazed land is extremely rare, exclosures are small, exact figures on grazing intensities are scarce, and approaches for evaluating the effects of grazing are not standardized. For example, the status of grazing and browsing by domestic animals in the Salmon subbasin is unknown for approximately 19% of the total area (assessment appendix 3-1, table 10).

The majority of grazing and browsing activities within the subbasin occur in the Pahsimeroi, Little Salmon, Lemhi, Upper Salmon, and Middle Salmon–Panther watersheds (see assessment appendix 3-1, Table 10 and Figure 16). Comparatively, very little grazing activity occurs in the Upper Middle Fork Salmon, Lower Middle Fork Salmon, South Fork Salmon, and Middle Salmon–Chamberlain watersheds, some of which have large portions of designated wilderness (see assessment appendix 3-1, Figure 16). This land use, with improper management, can be detrimental to habitat for fish and wildlife particularly when it occurs in riparian and wetland habitats. Most commonly grazing disturbance takes the form of reduced riparian vegetation, particularly shrub cover, erosion and damage to stream banks, soil damage and compaction, altered species composition of communities, altered fire regime, and introduction of exotic invasive species (see assessment section 3.1 and assessment appendix 3-1 for detailed discussion of grazing distribution and impacts).

The abundance of food, water, and shade, which attracts wildlife to riparian areas, also attracts livestock. Despite widespread recognition of the problem and attempts to remove or restrict livestock from riparian areas, riparian degradation from overgrazing is a serious problem the direct effects of livestock grazing upon the wetland riparian habitats have been summarized as follows (see assessment appendix 3-1):

- Higher stream temperatures from lack of sufficient woody streamside cover.
- Excessive sediment in the channel from bank and upland erosion.
- A high coliform bacterium counts.
- Channel widening from hoof-caused bank sloughing and later erosion by water.
- Change in the form of the water column and the channel it flows in.
- Change, reduction, or elimination of vegetation.
- Elimination of riparian areas by channel degradation and lowering of the water table.
- Gradual stream channel trenching or braiding depending on soils and substrate composition with concurrent replacement of riparian vegetation with more xeric plant species.

Terrestrial Objective 57B: Reduce impacts of livestock interactions with vulnerable terrestrial species populations.

Strategies:

57B1. Identify and prioritize areas where livestock are having the greatest effect on vulnerable terrestrial species populations.

57B2. Develop grazing management plans to limit adverse impacts to rare, federally listed or culturally important plant populations.

57B3. Minimize livestock impacts on big game species--where possible, alter grazing management to minimize livestock impacts on winter range areas (see assessment appendix 3-1).

57B4. Minimize impacts of domestic livestock on sage grouse and pygmy rabbits. Focus on protecting nesting habitat for sage grouse.

57B5. Plan with range managers to use livestock grazing techniques that will have beneficial impacts on plant communities in order to benefit all grass and forb dependent terrestrial species.

57B6. Monitor and evaluate efforts to reduce impacts of domestic livestock on plant and wildlife species. Modify implementation strategies as necessary.

<u>Discussion:</u> Livestock can compete with native wildlife populations for forage and/or space. Heavy browsing by big game animals may inhibit shrub and grass cover, alter the plant composition, alter vegetative structure, prevent adequate plant reproduction, or cause direct mortality (see assessment section 3.1 and assessment appendix 3-

1). Generally, big game impacts to the habitat become significant when the animals become numerous as to exceed the carrying capacity of the habitat, which livestock contribute.

Dietary overlap between big game animals and livestock is subject to the specific forage components required by the animals and the timing of ungulate use. Dietary overlap between elk and cattle is most likely to occur on fall cattle range used by elk later in the year as winter range (see assessment section 3.1 and assessment appendix 3-1). Dietary overlap between elk and domestic sheep occurs during the summer when both species rely heavily on forbs (see assessment section 3.1 and assessment appendix 3-1). The degree of diet overlap between cattle and mule deer is relatively small. The diets of domestic sheep and mule deer overlap during the spring and fall when both ungulates are using browse and forbs (see assessment section 3.1 and assessment appendix 3-1). Winter bighorn sheep diets and summer-fall cattle diets have the greatest potential for overlap of any seasonal diet combination between these two ungulates. Under this combination, the diets of both, cattle and bighorn sheep are dominated by graminoids. However, as with elk and cattle, the differences in seasonal habitat use displayed by cattle and bighorn sheep minimizes the potential for dietary competition between these species. Dietary overlap between domestic sheep and bighorn sheep is not understood as well (see assessment section 3.1 and assessment appendix 3-1). Carefully managing the areas and seasons of livestock use will help to limit these (and other) competitive interactions and their impact on native species.

Terrestrial Objective 57C: Eliminate Domestic Sheep and goat grazing in areas likely to transmit disease to bighorn sheep.

Strategies:

57C1. Increase public and landowner education programs to improve the understanding of the threat of transmitting disease from domestic sheep to bighorn sheep.

57C2. Work with land management agencies, landowners and livestock owners in a collaborative manner to eliminate domestic sheep and goat grazing within bighorn sheep habitat. Provide adequate and fair compensation.

57C3. Eliminate areas where interaction between bighorn sheep and domestic sheep is likely through grazing restrictions, land acquisition, fee title acquisitions, conservation easements, or land exchanges.

57C4. Monitor and evaluate the effectiveness of eliminating domestic sheep and goats from bighorn sheep habitat in protecting bighorns from disease transmission.

<u>Discussion:</u> Goat grazing in some areas may be in conflict with big horn sheep. Disease communicated from domestic goats and sheep to wild bighorn sheep is a limiting factor to the bighorn populations. Sheep and goat grazing should be eliminated where interactions with bighorn sheep are possible.

Disease is the primary limiting factor to bighorn sheep in the subbasin (F. Cassirer IDFG, personal communication, 2004). When bighorn sheep come in contact with domestic sheep infected with *Pasteurella*, bighorns usually die of pneumonia within 3 to 7 days of contact (Martin et al. 1996, Schomer and Woolever 2001). Field treatment of *Pasteurella* with antibiotics has had some success, but prevention of infection is the goal of the wildlife management agencies in the subbasin. The most effective prevention is separation between bighorns and domestic sheep or goats. Working with public and private land managers to remove domestic sheep from the subbasin will increase the suitability of the subbasin for supporting bighorn sheep (see assessment appendix 2-20).

Problem 58: The expansion of urban and rural human development has impacted native terrestrial species and their habitats (see assessment section 3.1 and assessment appendix 3-1).

Terrestrial Objective 58A: Minimize the negative impact of current and future development on native terrestrial species and their habitats in the subbasin.

Strategies:

58A1. Identify, map, and prioritize for protection of important habitats and travel corridors.

58A2. Work with city and county governments to include consideration of these important habitats in the planning process. Provide factual information on the impacts of development on wildlife species and habitats.

58A3. Encourage compliance with ordinances and covenants addressing weed and pet control.

58A4. Protect existing important habitats under threat of development through land purchase, fee title acquisitions, conservation easements, land exchanges and other actions.

58A5. Work with permittees and other ranchers to improve financial viability of ranches in order to reduce the potential for development and fragmentation of lands currently being used for livestock grazing.

58A6. Monitor and evaluate the effort to protect wildlife and their habitats from the effects of development. Integrate new information into Strategy 58A1 and modify implementation strategies as necessary.

<u>Discussion:</u> Land conversion at the urban-rural interface (also called “sprawl”) has a number of impacts on the natural environment and human activity. As farm and ranch lands, forests, and other open spaces are transformed, wildlife habitat and wetland/ riparian areas are frequently diminished (see assessment section 3.1 and assessment appendix 3-1). Working to improve financial viability of ranches is the best way to reduce the potential for development and fragmentation of lands currently being used for livestock grazing.

Urbanization has been linked to stream channelization problems, riparian degradation, and downstream flooding (see assessment section 3.1 and assessment appendix 3-1). The resulting fragmentation of habitat has many impacts on the landscape and wildlife populations. Habitat Fragmentation affects predator – prey relationships, species composition, dispersal, density, distribution, and population genetics, as well as, microclimate variables such as sunlight penetration and temperature. Sprawl also increases road densities, which inevitably exposes previously undisturbed habitat and open space to additional development (see assessment section 3.1 and assessment appendix 3-1).

Although much of the Salmon subbasin is exempt from urban sprawl, the human populations and cities of the subbasin are increasing in size and encroaching upon wildlife habitats. Watersheds impacted by development include the Little Salmon, Lower Salmon, Upper Salmon, Lemhi and Middle Salmon–Panther (see assessment appendix 3-1, Figure 6). Based on data collected in 1994, the greatest impacts are in the Lower Salmon and Little Salmon, with 54% and 47% of the watershed area, respectively, impacted by sprawl. The southernmost tip of the Upper Middle Fork Salmon watershed has very high impacts from sprawl. This area is affected by urbanization in the adjacent to the watershed (see assessment section 3.1 and assessment appendix 3-1).

Recreation, tourism and quality of life issues play a significant role in population increases across the region. The population growth trend and its related development directly challenge community and environmental quality in many ways. Communities throughout the basin are struggling to deal with the impacts of this population growth to agricultural lands, water quality, forests, wildlife and habitat (see assessment section 3.1 and assessment appendix 3-1). Increasing development results in habitat fragmentation, higher road densities, and loss of wildlife security. Humans living in previously wild areas also result in significant predation on native fauna by pets. Land development and habitat fragmentation negatively affects many of the terrestrial focal species within the subbasin such species as white-headed woodpecker and sage grouse (see assessment section 3.1 and assessment appendix 2-20 and 3-1). Road building and management practices have improved with additional knowledge. Efforts to reduce the negative impacts of development on native species and habitats should continue.

Of concern are the ranches and other large private holdings that are currently or potentially being converted to housing and other uses with less benefit to wildlife. Easements and acquisition are examples of tools for reducing conversion impacts in areas critical to wildlife. Fire control has become a highly contested issue as development increases in the urban interface. Human encroachment has also in creased wildlife/human conflicts and depredations, resulted in lost hunting opportunities because of safety concerns, constrained management options (less opportunity for fire as a tool etc.), increased demands for Wildland Urban Interface (WUI) management (intensive thinning) (see assessment section 3.1 and assessment appendix 3-1).

Problem 59: Roads (dependant on density/location), associated human use, and motorized access have altered the size, quality, distribution and connectivity in and between habitat patches in the subbasin (see assessment section 3.1 and assessment appendix 3-1).

Terrestrial Objective 59A: Reduce the impact of the transportation system and motorized access on wildlife and fish populations and habitats.

Strategies:

59A1. Plan restoration--conduct a transportation system analysis on the roads system of the Salmon subbasin. Recommend ways to reduce road impacts on terrestrial and/or aquatic habitats (e.g. closure, maintenance, obliteration). Prioritize areas with high road densities, high sediment production, high surface erosion, and/or are landslide prone. Prioritize areas with high quality wildlife and fish habitat. Prioritize areas and seasons of the year that wildlife is most vulnerable, i.e. calving and nesting sites in spring and winter range (see section 6.2: Terrestrial Prioritizations).

59A2. Reduce road impacts--implement activities prioritized in previous strategy.

59A3. Conserve habitats--encourage continued conservation of diverse communities and high quality habitats in existing roadless areas.

59A4. Monitor and evaluate efforts to reduce the impact of roads on the fish and wildlife populations of the subbasin. Modify implementation strategies as necessary.

Discussion: The development and use of roads affect ecosystems and the wildlife and fish dependent on them in numerous ways. Wisdom et al. (2000) found roads to be detrimental to >70% of the 91 species of wildlife he considered. Road construction eliminates the habitat in its path and fragments surrounding habitat patches. Additional impacts of roads include: compaction of soils, disturbance of organic layers, and higher rates of erosion or mass wasting. Road culverts can pose barriers to fish migration. Automobile traffic associated with roads becomes a vector for the spread of invasive exotic species, injures and kills animals through collisions, alters migration patterns, reduces security and increases harvest rates. There are wildlife passages available in some areas, but there is a continued need to identify migration corridors to facilitate further mitigation (see assessment section 3.1 and assessment appendix 3-1).

Motorized access has impacted wildlife security, especially in natal and wintering areas and seasons, and in high elevation habitats. Limiting human disturbance of wildlife, especially in locations and in seasons of highest vulnerability will benefit aquatic and terrestrial species. Roads that impact wildlife populations by providing access during the breeding or hunting season may not cause problems at other times of year. In these types of cases, seasonal closures may resolve the problem. The USFS and other land management agencies in the subbasin identify roads that are posing a threat to the subbasin's fish and wildlife resources and impose restrictions, make closures, or have roads removed. Coordinating these efforts across the subbasin will maximize benefits to fish and wildlife populations, while maintaining access and recreational opportunities (see assessment section 3.1 and assessment appendix 3-1). In many cases, existing road restrictions and access barriers are violated due to lack of enforcement and monitoring (see assessment section 3.1 and assessment appendix 3-1). Reducing the impact of the transportation system and motorized access on wildlife and fish populations and habitats is a priority in the subbasin (see section 6.2: Terrestrial Prioritizations).

Problem 60: Alteration of the natural fire regime in the Salmon subbasin has negatively impacted native terrestrial focal habitats and species (see assessment section 3.1 and assessment appendix 3-1).

Terrestrial Objective 60A: Restore and conserve ecosystem integrity[11] across the landscape through restoration of natural processes, using methods including prescribed fire, wildfire use for resource benefit (WFURB), and mechanical methods (thinning and harvest).

Strategies:

60A1. Increase public awareness of the fundamental importance of fire through educational programs about the role of fire in the ecosystem (see assessment section 4.2.4.2.).

60A2. Identify and prioritize areas for fire management.

60A3. Identify historical ranges of variability (HRV) in structure, function, and composition that would have occurred on the landscape under natural fire regimes for each vegetation response unit (VRU).

60A4. Use fire and other management tools to reestablish natural fuel loads in the various focal habitat types.

60A5. Assess for each site the combination of techniques (thinning, prescribed fire, etc.) necessary to restore or maintain desirable plant community attributes including fuel levels, as well as ecological processes. In poor and fair ecological condition grassland/shrub-steppe habitat types, develop an integrated weed control and fire management strategy.

60A6. Monitor and evaluate efforts to manage fire in order to restore and conserve natural ecological processes. Integrate new information into strategies 60A2 and 60A3 and modify implementation strategies as necessary.

Discussion: An altered fire regime has been ranked as a severe to moderately limiting factor in nearly all habitats in the subbasin (see assessment section 3.1 and assessment appendix 3-1). While most ecosystems experience very large fires occasionally, the present-day frequency of large fires is increasing. Assessment appendix 3-1, Figure 11 shows current fire severity in the Salmon subbasin, while Assessment appendix 3-1, Figure 12 depicts areas in the subbasin that are most likely to experience severe burns. Assessment appendix 3-1, Table 9 compares the relative percentages of risk by altered fire regimes by watershed in the Salmon subbasin. In addition, assessment appendix 3-1, Figure 13 illustrates fire regime condition class, which is an approximation of ecosystem departure resulting from a change in fire regimes. The desired goal in the Salmon subbasin is to maintain landscapes that exhibit vegetative conditions created by natural events such as fire. Restoring natural disturbance regimes (by use of fire or mechanical means) in the subbasin is a priority (see section 6.2: Terrestrial Prioritizations).

Fire suppression has resulted in increased accumulation of fuels, higher vegetation densities, and a major shift in species composition and size class distribution of trees. The accumulation of duff, as well as increased density of vegetation and fuels, has created conditions in which even light severity fires can be damaging. The accumulation of ground fuels along with denser, multi storied stand conditions has also created “fuel ladders” that cart fire into the tree canopy, resulting in high intensity crown fires. Unlike the moderate severity fires that burned historically, many wildfires now have the potential to impact soil productivity and increase erosion through the consumption of organic matter and high temperature that may result. In mid elevation forests, fire exclusion and other factors (e.g., timber harvest) have resulted in a shift from young and old single layer stands dominated by shade-tolerant tree species (e.g., Douglas-fir and grand fir). The development of dense, multi-layered stands has resulted in larger, more frequent stand-replacing fires and a greater susceptibility to insects and disease. Higher fuel loads also increase the potential for soil heating and higher mortality of trees and understory vegetation. The net result is wildfires that are more severe and more difficult to control (BLM 2002).

Exclusion of fire as a forest process has significantly changed wildlife habitat conditions. Lack of areas with fire-killed or weakened trees has impacted snag-dependent species in some areas. Thinning effects of ground fires has allowed shade tolerant-tree species to crowd out important forage plants and compete for moisture and nutrients, discouraging the growth of large trees and maintenance of old growth conditions (BLM 2002). Due to dense forest conditions the possibility of large-stand replacing fires is now greater than it was historically. These types of fires can negatively impact wildlife species that require mature stands or associated KECs (see assessment section 2.1). Large fires result in a more homogenous distribution of structural conditions and can reduce the diversity of species an area can support. The above strategies strive to restore the subbasin to more natural disturbance regimes, which will begin to move forest structural conditions and compositions in the subbasin back within the HRV and provide more suitable habitat conditions for native wildlife that are adapted to these natural forest conditions (see assessment sections 2.3.9, 3.1, 4.2.2, assessment appendix 2-19, and assessment appendix 3-1 for details).

Problem 61: Timber harvest has affected stand structure of forest habitats (see assessment section 3.1, 4.2.3.5, and assessment appendix 3-1).

Terrestrial Objective 61A: Restore forest ecological integrity, including structure, function, and composition[3].

Strategies:

61A1. Increase public awareness about vegetation diversity through interpretive and education programs that address species, communities, ecosystems and their processes.

61A2. Identify historic range of variability (HRV) on the landscape under natural ecological processes (i.e. openings, early seral, mid seral, mature and old growth, patch size variability and distribution).

61A3. Restore ecological integrity (composition, structure, function) through management practices such as thinning and prescribed fire.

61A4. Use reduced impact equipment and alternative harvest techniques to reduce disturbance and compaction to soil.

61A5. Design timber harvest and associated road construction to minimize erosion.

61A6. Avoid timber harvest in riparian areas or areas that will have direct impact on aquatic habitats or water quality.

61A7. Monitor and evaluate efforts to restore forest ecological integrity. Integrate new information into strategy 61A2 and modify implementation strategies as necessary.

Discussion: Timber harvest has occurred throughout the Salmon subbasin (see assessment appendix 3-1, Figure 17 and Table 12). The most intense timber-harvest activities have occurred in the Little Salmon and Lower Salmon watersheds (see assessment appendix 3-1, Figure 17 and Table 12). Very low to medium harvest activities have occurred in the protected areas of the central Salmon subbasin. Intense timber-harvest activities occurring primarily in the Little Salmon and Lower Salmon watersheds have impacted approximately 1,190 and 2,600 km^2, respectively. Other watersheds impacted by timber harvest and the approximate area impacted include the Middle Salmon–Panther (4,180 km^2), Upper Salmon (2,880 km^2), South Fork Salmon (2,120 km^2), Middle Salmon–Chamberlain (1,410 km^2), Pahsimeroi (977 km^2), Upper Middle Fork Salmon (700 km^2), and Lower Middle Fork Salmon (460 km^2) (see assessment section 3.1, 4.2.3.5, and assessment appendix 3-1).

Intensive, even-aged management through the 1980's has led to negatively impacted visual quality, wildlife, riparian zones and water quality. Timber harvest has impacted forest species composition, soil processes and erosion, stream structure, streamflow, water quality, and large woody debris. By far the greatest concerns about timber harvest and water quality result from the issue of roads. Serious degradation of fish and wildlife habitat can result from poorly planned, designed, located, constructed, or maintained roads. Roads directly affect natural sediment and hydrologic regimes by altering streamflow, sediment loading, sediment transport and deposition, channel morphology, channel stability, substrate composition, stream temperatures, water quality, and riparian conditions within a watershed (see assessment section 3.1, 4.2.3.5, and assessment appendix 3-1).

Problem 62: The loss or dramatic reduction in anadromous fish runs throughout the subbasin has reduced nutrient inputs and reduced habitat suitability for salmon-dependent wildlife (see assessment sections 3-1 and 3.2.2.1).

Terrestrial Objective62A: Restore natural nutrient input cycles and mitigate for damages to aquatic and terrestrial populations due to the loss of these nutrients.

Strategies:

62A1. Assess nutrient inputs and cycling in the Salmon subbasin. .

62A2. Quantify the impacts of secondary losses and nutrient reductions on wildlife populations caused by the construction and continued operation of the hydropower system.

62A3. If nutrient levels are demonstrated to be limiting to wildlife, investigate alternatives to restore natural nutrient levels to the subbasin. Integrate with nutrient restoration efforts to benefit aquatics, when possible, to benefit both aquatic and terrestrial species

62A4. Research restoration practices--Investigate innovative methods to restore nutrient loading to upland areas similar to those currently used to restore nutrient loads to streams (compensatory loads to offset salmon loss). Research innovative approaches to restore nutrient recycling.

62A5. Prioritize areas for restoration of nutrient loads integrating information from Strategies 62A1-3.

62A6. Implement projects to restore nutrients to upland areas following prioritization developed in Strategy 62A4.

62A7. Monitor and evaluate efforts to restore nutrients to upland areas. Monitor focal fish and wildlife to assess population response to changes in nutrients. Integrate new information into effort and revise strategies as needed.

<u>Discussion:</u> The flow of nutrients into the subbasin has been altered by reduction of anadromous fish runs. The reduction of these nutrient flows has potentially impacted numerous wildlife species and the subbasin ecosystem as a whole. In the Salmon subbasin, 87 wildlife species are associated with salmonids (see assessment section 2.1.2, Table 2-3). Four focal wildlife species are associated with salmonids. The willow flycatcher has an indirect association with salmon: the bird opportunistically feeds on insects that appear on fish carcasses. The black bear, grizzly bear, and marten all have direct relationships with salmonids: the marten rarely feeds on carcasses and the bears recurrently feed on both spawning adults and carcasses (see assessment section 2.1.2, Table 2-3). Numerous other species in the system are considered to have a recurrent, indirect or rare relationship to salmon (see assessment section 2.1.2, Table 2-3). Declines in populations of these species may be linked to reductions in anadromous fish runs (see assessment section 2.1.2, Table 2-3).

Quantifying the impact of reduced nutrient inputs into the subbasin will allow for more a more in-depth understanding of ecosystem processes and more effective management of the subbasin resources. Maintaining and enhancing salmon runs in the subbasin will be critical aspects of restoring natural nutrient cycles. Other options include the development of innovative technologies to reduce the impact of upstream hydropower on nutrient inputs or restore nutrients to upland areas and streams.

3.2.3 Socioeconomic Components

These social and economic objectives are designed to provide operational guidance for implementing the terrestrial and aquatic protection and rehabilitation objectives and strategies outlined in the *Salmon Subbasin Management Plan*. The problem statements and socioeconomic objectives in Table 9 were developed to address factors limiting the successful implementation of the Vision in the Salmon subbasin. They are not meant to be optional or to be implemented to the detriment of aquatic and terrestrial objectives and strategies, but are meant to be integrated into the implementation process and should be addressed whenever possible as part of all planning and implementation activities. These objectives address important aspects of the context for aquatic and terrestrial protection and rehabilitation. The successful management of fish and wildlife in the subbasin is partially dependent on implementing the strategies detailed in this section. A demographic and economic summary for the Salmon subbasin is presented in Appendix H to support implementation of socioeconomic objectives in this plan.

The Planning Team developed the following objectives and strategies during regular subbasin planning meetings. These objectives, strategies and discussions were developed within a collaborative, consensus-based discussion. All changes and revisions were reviewed and approved by the Planning Team.

Table 9. Socioeconomic problems statements and objectives in the Salmon subbasin. These must be taken in context with associated strategies and discussion comments in this section about socioeconomic components.

Socioeconomic Problem Statements	Socioeconomic Objectives
Problem 63: Although the majority of the area in the upper portion of the Salmon subbasin is Federal reserves, approximately 80% of currently occupied habitat of anadromous species occurs on private lands, which also represents lands most important for local economies.	Socioeconomic Objective 63A: In the upper portion of the Salmon subbasin, minimize negative impacts on and maximize benefits to local communities while maximizing benefits to fish and wildlife and users of those resources.
Problem 64: The management of both public and private lands in the lower Salmon impacts local economies.	Socioeconomic Objective 64A: In the lower portion of the Salmon subbasin, minimize negative impacts on and maximize benefits to local communities while maximizing benefits to fish and wildlife and users of those resources.
Problem 65: Many important cultural uses of the Salmon subbasin are impacted by fish and wildlife activities. Indian tribes are continually losing opportunities to practice long standing traditions that keep their cultures alive, traditions related to and contingent on responsible natural resource management. Non-Indian users also face difficulty in maintaining cultural uses. Local industries that support these users suffer or benefit from impacts on these uses.	Socioeconomic Objective 65A: Protect and foster both Indian and non-Indian cultural uses of natural resources in the Salmon subbasin.

Socioeconomic Problem Statements	Socioeconomic Objectives
Problem 66: Better coordination is necessary to focus funding. Lack of coordination reduces efficiency of activities, creates the possibility of redundancies, and reduces the ability to focus funding and activities on highest priorities.	Socioeconomic Objective 66A: In the upper portion of the Salmon subbasin, use the Upper Salmon Basin Watershed Project to coordinate implementation of habitat strategies to maximize efficiencies in implementation. In the lower portion of the Salmon subbasin, develop a group to guide implementation of this plan and to coordinate recommendations with co-managers for funding, implementation, and other management activities.
Problem 67: The bureaucratic and regulatory processes are significantly delaying implementation of projects. The federal and regulatory processes are becoming increasingly burdensome, increasingly slow, and are resulting in a loss of credibility. The loss of local control, which has spread the decision-making process across the region, has added time and process that reduce the effectiveness of beneficial implementation efforts. Local biologists are no longer able to make timely decisions critical to successful implementation.	Socioeconomic Objective 67A: Streamline funding and permitting processes to reduce the burden associated with implementing projects. Simplify the process.

Problem 63: Although the majority of the area in the upper portion of the Salmon subbasin is Federal reserves, approximately 80% of currently occupied habitat of anadromous species occurs on private lands, which also represents lands most important for local economies.

Socioeconomic Objective 63A: In the upper portion of the Salmon subbasin, minimize negative impacts on and maximize benefits to local communities while maximizing benefits to fish and wildlife and users of those resources.

Strategies:

63A1. Minimize impacts on the agricultural community by cooperatively working with ranchers to ensure that public grazing permits mesh with the use of private lands in the most environmentally responsible manner to optimize the use of both private and public forage. Although a large percentage of public lands are grazed, they support only about 30% of the livestock feed base. Although private lands account for less than 5% of the total land base, they provide 70% of the livestock feed base, and a significant percentage of the wildlife ungulant feed base as well as 80% of currently occupied habitat.

63A2. Maximize benefits to the communities. Achieve harvestable, naturally sustaining fish populations in the Salmon subbasin to have social, economic and cultural benefits to users and tribes.

63A3. Minimize impacts on the culture and customs of local communities.

63A4. Where possible, utilize local labor forces, contractors, and suppliers when implementing habitat-improvement projects.

63A5. Monitor and evaluate efforts to assist local areas and maximize economic benefits. Cooperate with regional efforts to develop low-cost tools for use throughout the Columbia Basin to evaluate economic impacts. Modify strategies as necessary.

63A6. Maximize economic benefits of the plan. For protection and enhancement, efforts should be made to minimize loss of local land base and community revenues. Consider trading federal lands or federal land development rights to ranchers for development rights on desirable, hence valuable, private lands. Develop non-traditional strategies to address land use issues.

Discussion: Economic and social factors play an important role in determining the effective and efficient implementation of habitat-related improvement or protection strategies. When they are not considered as part of protection and rehabilitation activities, they can undermine the success and reduce effectiveness of these activities. The result should be to consider socioeconomic impacts as well as biological impacts in seeking solutions to problems.

This consideration of socioeconomic impacts is particularly important in the upper Salmon, where approximately 80% of occupied fish habitat is on private lands (according to the upper Salmon Technical Teams). While this situation concentrates the area needing projects, it also means that the areas most needing protection or rehabilitation overlap with areas important to economic activity in the subbasin. The Planning Team recommends targeting projects with the greatest fisheries benefit and the least adverse economic effects. The goal is to achieve the subbasin's portion of the 16 million fish historically returned to the Columbia Basin. The subbasin would achieve gains in a number of economic sectors if this goal were to be reached. The goal is most likely to be reached if the activities taken to achieve habitat improvement are as beneficial as possible to local economies while having a minimum of negative impacts.

Costs to operators need to be minimized. For example, 95% of the agriculture in Lemhi County is cow/calf agriculture (Personal communication Loucks). These agricultural lands are overlaid with the important spawning areas of the subbasin. The success of protection and rehabilitation efforts in these areas relies on managers' cooperation with private landowners. Minimizing negative economic impacts on operators is essential to ensuring the cooperation necessary to successfully implement this plan in important areas of the subbasin.

In the upper Salmon subbasin, most projects already use local labor, contractors, and suppliers. Future projects and activities need to continue to involve local labor and resources in implementation activities. This practice is constrained by the bidding process of a number of agencies, but when possible, local resources should be used. This approach encourages direct participation in the process while providing work and economic benefits to local areas. Restoration activities in the upper Salmon have already provided significant economic resources to the area.

Specific social and economic factors that are important to gauging benefits and impacts of restoring and protecting fish and wildlife in the Salmon subbasin need to be further defined. In addition, low-cost tools that can be used at the subbasin scale need to be developed. This analysis needs to be targeted toward specific economic and social factors affecting resource decision making. Once these tools have been developed, this information needs to be integrated into subbasin prioritization efforts. All subbasins have this same need for useful, low-cost economic and social analysis tools. The Planning Team recommends that the NPCC fund a single basinwide project to develop these tools for use in the Salmon and all other subbasins.

When private lands are converted to protected or federal status, their designation on county tax rolls changes. The amount of annual tax paid to the county for converted land is reduced or eliminated. This practice can negatively impact counties and local services. Future projects that have these types of impacts need to address this loss of revenue. Payment in lieu of taxes and other tools should be used to address this problem.

Problem 64: The management of both public and private lands in the lower Salmon impacts local economies.

Socioeconomic Objective 64A: In the lower portion of the Salmon subbasin, minimize negative impacts on and maximize benefits to local communities while maximizing benefits to fish and wildlife and users of those resources.

Strategies:

64A1. Minimize impacts on the agricultural community.

64A2. Maximize benefits to the communities. Achieve harvestable, naturally sustaining fish populations in the Salmon subbasin to have social and economic and cultural benefits to users and tribes.

64A3. Minimize impacts on the culture and customs of local communities.

64A4. Where possible, utilize local labor forces, contractors, and suppliers when implementing habitat-improvement projects.

64A5. Maximize economic benefits of the plan. For protection and enhancement, efforts should be made to minimize loss of local community revenues.

Discussion: In the Salmon subbasin, approximately 9% of the subbasin is in private ownership and 90% is publicly managed (see assessment section 1.6.2, Table 1-6). The private land is concentrated in the lower and upper portions of the subbasin, with the majority of the middle portion in public management (see assessment section 1.6.2, Figure 11). Management of both private and public lands impacts local economies in the subbasin.

Along the Little Salmon River, accessibility to fishing is a problem. Much of the fishing is concentrated along a few miles of river, most of which is privately owned and managed. The influx of fishermen the last few years had benefited the local economy but also concentrated impacts on streambanks and private property in the areas fished. Impacts include damaged riparian vegetation, garbage and sewage dumped directly into the river, and effects from parked cars (personal communications from the first public involvement meeting in Riggins). The public (through input at public involvement forums) has identified the need to extend areas open to fishing and to open new areas. A desire was expressed for more access to fishing while reducing the impacts of concentrated fishing activities. These impacts are also concerns in the TMDL process for water quality issues (Guy Hopkins, PC, March 9, 04).

Both hatchery and wild fish contribute to local economies. Some fishermen desire to catch but not harvest, anadromous fish. Salmon fishing has historically been an important part of recreational activities in the subbasin. Until the last few years, the loss of the salmon fishery has been a significant recreational loss and negatively impacted local economies (ISCC 1995).

Problem 65: Many important cultural uses of the Salmon subbasin are impacted by fish and wildlife activities. Indian tribes are continually losing opportunities to practice long standing traditions that keep their cultures alive, traditions related to and contingent on responsible natural resource management. Non-Indian users also face difficulty in maintaining cultural uses. Local industries that support these users suffer or benefit from impacts on these uses.

Socioeconomic Objective 65A: Protect and foster both Indian and non-Indian cultural uses of natural resources in the Salmon subbasin.

Strategies:

65A1. Integrate information and education on important Indian and non-Indian culture, treaty rights, and historic and current resource use into project selection and implementation. Provide such information to land managers, regulatory agencies, policymakers, and the public.

Discussion: Healthy habitats and fish and wildlife populations provide economic and cultural benefits to Indian and non-Indian users in the Salmon subbasin. The economy of the Salmon subbasin depends highly on natural resources, although the nature of this dependency has changed over time. Over 75% of the economy of the upper basin relies on natural resource use – including agriculture, visitors, mining, and timber harvest. Outdoor recreation is an important part of local culture and customs throughout the subbasin (ISCC 1995).

In addition to economics, social values need to be incorporated when implementing activities. The protection of treaty rights is a key component of public land management. The living culture of the Indian Tribes and nontribal citizens in the Salmon subbasin relies heavily on continued opportunities to harvest the natural resources managed on public and private lands.

General changes to natural resource and public land management in the Salmon subbasin impact traditions and cultural uses. As land is broken up into smaller private parcels, more land is posted as off limits and no longer accessible for traditional uses that have taken place since time immemorial.

Problem 66: Better coordination is necessary to focus funding. Lack of coordination reduces efficiency of activities, creates the possibility of redundancies, and reduces the ability to focus funding and activities on highest priorities.

Socioeconomic Objective 66A: In the upper portion of the Salmon subbasin, use the Upper Salmon Basin Watershed Project to coordinate implementation of habitat strategies to maximize efficiencies in implementation. In the lower portion of the Salmon subbasin, develop a group to guide implementation of this plan and to coordinate recommendations with co-managers for funding, implementation, and other management activities.

Strategies:

66A1. Assist Soil and Water Conservation Districts, Watershed Advisory Groups, and other existing groups to organize project goals and implementation strategies.

66A2. Assist interested groups with organizing local watershed programs.

66A3. Facilitate networking of these groups with technical assistance in the subbasin.

66A4. Involve communities in finer scale planning efforts (e.g., reach or watershed) than subbasin planning and in program and project planning.

66A5. Coordinate plan implementation with federal, tribal, state, local, and other interests and avoid program and project duplication.

66A6. Form a group in the lower Salmon focused on fish and wildlife planning and implementation to coordinate and prioritize activities.

66A7. Promote stewardship of natural resources through enhanced local involvement and support.

66A8. Implement information and education actions identified in this management plan.

66A9. Provide opportunities for subbasinwide information distribution, such as periodic public meetings, newsletters, websites, etc.

Discussion: Coordination of programs and projects in the subbasin will achieve benefits beyond the value of any individual program or project, as well as promote the application of ecosystem management principles. Existing programs and projects are listed in the inventory. The Upper Salmon Basin Watershed Project (USBWP) already provides a forum for the integration of efforts at federal, state, tribal, and local levels. The USBWP was formed in 1993 as part of the NPCC's model watershed project to encourage planning partnerships that involve local landowners, government agencies, tribal governments, and other interested parties (ISCC 1995). The USBWP is designed to coordinate all human activities affecting salmon and steelhead production on a comprehensive watershed management basis. The USBWP originally focused on the Lemhi, Pahsimeroi, and East Fork Salmon River drainages. It currently operates from the mouth of the Middle Fork to the headwaters of the basin. This coordination needs to be supported and further developed in the upper subbasin, and a similar vehicle needs to be developed in the lower subbasin.

In the upper Salmon subbasin, the USBWP will coordinate the planning and implementation of habitat projects, largely on private lands. Efforts currently exist to coordinate monitoring and evaluation activities. More effort needs to be invested in developing a cooperative interagency strategy for collecting and compiling data in the subbasin. Research, monitoring, and evaluation activities exceed the USBWP's ability to coordinate activities in the upper subbasin. Multiple agencies will need to collaborate to coordinate efforts. The USBWP does not currently coordinate production activities in the subbasin, nor does it anticipate fulfilling this role in the future. Decisions on production projects are being made in the *United States v. Oregon* arena. Hatchery production monitoring and evaluation activities will be coordinated under the *Lower Snake River Compensation Plan*.

In the lower Salmon, a new group needs to be formed to provide this coordination and integration function and to spearhead activities needed to address the listed strategies. The USBWP could be used as a model for the development of the group in the lower Salmon subbasin. The group needs to include major co-managers in the lower portion of the subbasin. This group will coordinate prioritization of limiting factors and projects for habitat in the lower subbasin, will make recommendations on funding and will provide a forum for coordinating implementation of projects in the lower subbasin. Just as in the upper Salmon subbasin, in the lower Salmon portion of the subbasin decisions on production projects are being made in the *United States v. Oregon* arena. Hatchery production monitoring and evaluation activities will be coordinated under the *Lower Snake River Compensation Plan*.

Better integration of efforts requires further involvement of subbasin communities in the planning. This involvement enables coordination of local efforts with subbasin-scale efforts, as well as enabling the development of as many projects as possible to provide cultural, social, and economic benefits to local communities. Since private lands make up approximately 9% of the subbasin, groups that recruit, assist with, and implement projects on private lands are important to this effort. Implementation of the subbasin plan requires efforts at multiple scales, including subbasin, population, watershed, and finer scales. In areas with no local efforts, additional groups need to be fostered. Technical expertise needs to be available for participation in finer scale efforts. This expertise will help achieve continuity and consistency in local efforts, as well as informing subbasin-scale efforts.

Broad public understanding and commitment to fish and wildlife efforts in the Salmon subbasin need to be developed. This effort needs to involve individuals and agencies. The current primary local groups need to coordinate with the subbasin-scale effort, and coordination needs to work both ways. Information and resources from the agencies, tribes, and subbasin-scale efforts need to be provided to local groups, while local data, information, and priorities need to be integrated into the subbasin-scale effort. A sustained, long-term effort to provide information to communities and residents of the subbasin needs to be maintained indefinitely. If a single organization cannot spearhead this effort, then it should be woven into projects and programs when possible. If possible, multiple roles and efforts should occur simultaneously.

Problem 67: The bureaucratic and regulatory processes are significantly delaying implementation of projects. The federal funding and regulatory processes are becoming increasingly burdensome, increasingly slow, and are resulting in a loss of credibility. The loss of local control, which has spread the decision-making process across the region, has added time and process that reduce the effectiveness of beneficial implementation efforts. Local biologists are no longer able to make timely decisions critical to successful implementation.

Socioeconomic Objective 67A: Streamline funding and permitting processes to reduce the burden associated with implementing projects. Simplify the process.

Strategies:

67A1. (Federal regulatory agencies) Work aggressively to streamline regulatory and permitting processes.

67A2. (USFWS, NOAA Fisheries, and BPA) Develop tools, or use tools that have been developed but not implemented, to streamline permitting processes.

67A3. (Federal agencies) Assign staff with the authority to make decisions in the subbasin to work exclusively on subbasin issues.

67A4. Utilize local biologists and other local experts who have extensive knowledge about the subbasin in final decision-making processes.

67A5. Limit or eliminate the role of the ISRP in making and commenting on policy, management and funding issues.

Discussion: Processes and procedures are so time consuming and burdensome that they detract from implementing activities on the ground. This complaint is a ubiquitous one that reflects a growing problem that will continue to limit the effectiveness of actions taken to implement this plan. To address this issue, federal regulatory agencies need to work aggressively to streamline their processes, such as scientific review, funding recommendations and regulatory permitting. This process involves using existing but not yet implemented tools, as well as developing tools where none exist.

Local planners need direct access to federal agency staff with decision-making authority. Locally based federal staff often do not have the authority to make decisions within existing processes. Another problem is the lack of federal agency staff available to participate in planning and implementation activities. When they do participate in decision-making processes in the subbasin, locally-based staff participation does not constitute actual acceptance, and local staff are often overruled by higher level administrative staff. NOAA Fisheries and USFWS are of particular concern regarding these issues. This circumstance defeats the effort to include federal staff in decision-making processes. Staff with decision-making authority need to be available in the subbasin as part of decision-making processes.

Biologists, experts and citizens (tribal and non tribal) in the Salmon subbasin have centuries of combined knowledge and experience in the subbasin. Local and traditional expertise needs to be better respected and integrated into the decision-making processes.

4 Research, Monitoring, and Evaluation Plan

This section describes conditions identified in the *Salmon Subbasin Management Plan* that will require research, monitoring, and evaluation (RM&E) activities to aid in resolving management uncertainties. This RM&E section is closely related to the objectives and strategies described in section 3: Problem Statements, Objectives, and Strategies of this subbasin management plan, which were developed to address limiting factors identified in the *Salmon Subbasin Assessment* and promote the vision for the Salmon subbasin.

The need for adaptive management, monitoring, and evaluation of project implementation was an issue of focus during the development of objectives and strategies. Each objective has a set of strategies to either gain further understanding of limiting factors or take actions toward correcting limiting factors. Objectives also have a strategy focused on evaluating the effectiveness of implementation strategies in achieving desired objectives, modifying where necessary. In order to assess the effectiveness of a strategy, the measurable impact of implementing the strategy on environmental conditions will need to be collected throughout implementation activities. This section seeks to guide the collection of the most appropriate data to allow for effective adaptive management.

Successful adaptive management begins with stakeholder gatherings following a policy planning process that begins with goal identification, an understanding of uncertainties, and culminates in model simulations to understand potential management policies (Aldridge et al. 2004). This subbasin planning process has supported most of these efforts. Two key components of adaptive management are 1) to conduct management as an experiment with sound experimental design, and 2) maintain a direct feedback loop between science and management (Aldridge et al. 2004). The result is the incorporation of the scientific method (experiments) into a management framework (policy decisions), a substantial step above traditional trial and- error or learn-as-you-go management. A major flaw that often leads to a failure in adaptive management is the breakdown of progress from the development stage to the design and implementation of field experiments (Aldridge et al. 2004).

A series of meetings with technical personnel representing various tribal, federal, state, and county agencies involved in management of fish and wildlife resources in the Salmon subbasin guided development of this RM&E section. The group reviewed guidance in *A Technical Guide for Subbasin Planners* (NPCC 2001) and incorporated elements they considered appropriate and feasible based on the projects timeline, the needs of the subbasin, and the current state of knowledge in the subbasin. The group attempted to develop an integrated and iterative monitoring and evaluation plan that is consistent with the three-tiered system advocated by the ISRP (2003) and the Columbia Basin Fish and Wildlife Authority's (CBFWA) Collaborative Systemwide Monitoring and Evaluation Project (CSMEP; CBFWA 2004). The three tiers integral to this type of RM&E plan are described below as they were defined by CBFWA. The three tiers and their relationship to adaptive management are illustrated in

Figure 3.

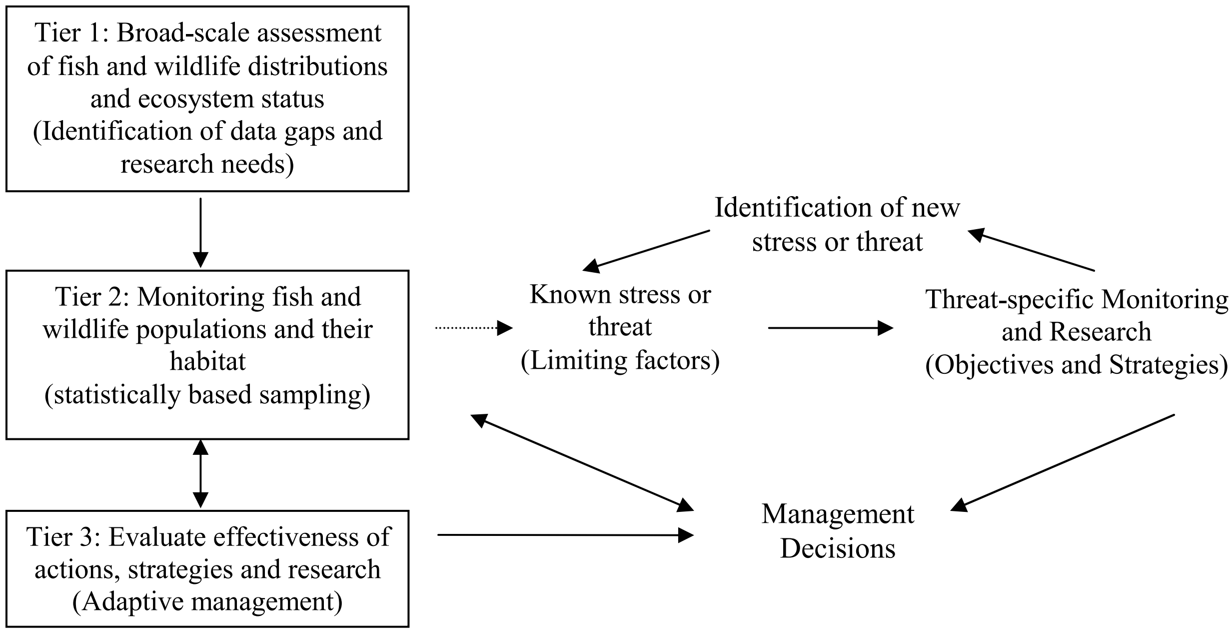

Figure 3. Ecological framework for research, monitoring, and evaluation in the Salmon subbasin.

Both terrestrial and aquatics sections of the management plan describe RM&E needs. Needs include research or monitoring that fills existing knowledge or data gaps, answers questions critical to successfully managing species or communities, tests or develops innovative rehabilitation/management techniques, or allows evaluation of the relative success of ongoing rehabilitation/management activities. Other needs are defined as programs for gathering data or conducting research to further understanding of specific populations, their habitats and ecosystems. All RM&E projects must provide a clear linkage to adaptive management processes that improve the direction of future actions.

In the context of a subbasin plan, RM&E is needed to: (1) ensure strategies selected and implemented are addressing limiting factors as anticipated, and (2) verify that the limiting factors identified in the assessment are, in fact, elements limiting the environmental expression and biological performance desired. Three main types of strategies were identified for achieving the objectives and improving the limiting factors in the subbasin; strategies focused on filling data gaps, addressing research needs, or implementing actions to improve or preserve conditions. The types of data that will be need to be collected to assess the successfulness of each strategy in contributing to meeting the objective will vary among the three above mentioned types of strategies. Additionally, the amount of information available to the Technical Teams to make these recommendations varied among the three types of strategies.

Tier 1 monitoring and analyses will provide broad-scale assessments of aquatic and terrestrial focal species distributions and status of focal habitats across the subbasin (trend monitoring) filling data gaps and supporting research needs identified in the objectives and strategies.

Research requires the use of experimental designs incorporating “treatments” and “controls” randomly assigned to study sites (ISRP 2003).

Addressing data gaps and conducting research contribute to an overall assessment of conditions and trends in the subbasin and, potentially, ecosystem. Additional monitoring of fish and wildlife populations and habitat (Tier 2) entail a monitoring component that provides measurable outcomes.

The effectiveness of specific actions taken (strategies) will be measured in the evaluation component (Tier 3). An evaluation of information collected through monitoring should assess any deviation of monitoring results from target goals or anticipated results. Three levels of evaluation are necessary: 1) an objective and independent scientific evaluation that interprets the strengths and weaknesses of available information, 2) a decision-making evaluation where contractors responsible for conducting monitoring projects shall coordinate with management agencies or entities to adaptively modifying management activities accordingly, and 3) a public evaluation where opportunity exits for comments. Recommendations to modify policy or management activities should follow evaluation.

The following topics were discussed during RM&E development:

1. Existing data gaps limiting management decisions or prioritization of activities.
2. Conditions in the subbasin requiring research to help resolve management uncertainties. Hypothesis testing. The spatial and temporal scale at which research be conducted.
3. The short-term indicator variables to measure during M&E activities to determine the success of strategies in achieving the desired objective. The predicted long-term biological outcome of successful strategy implementation.

4.1 Data Gaps

Fisheries and Terrestrial Technical Teams compiled a list of data gaps needed for management in the subbasin (Table 10 and Table 11). Data gaps represent areas where limited baseline data are a hindrance to effective management of the fish and wildlife resources of the subbasin. In most cases, these gaps are related to a basic understanding of species or habitat distribution, condition and trends. While it would be possible, and probably worthwhile, to develop research projects focused on closing many of these data gaps, they do not generally fit the criteria of a classic research need. Aquatic and terrestrial data gaps have been identified individually. The order in which gaps are listed in no way implies priority. Rehabilitation efforts directed at either aquatic or terrestrial resources are likely to impact the ecosystem as a whole, and aquatic and terrestrial needs are not perceived to be mutually exclusive.

Table 10. Data gaps identified as strategies to achieve aquatic biological and environmental objectives.

Objectives	Strategies	Methods	Outcome
1A: Increase the number of naturally spawning adults to achieve recovery goals in Table 5 within 24 years	1A2. Determine population specific smolt-to-adult return rates (SARs) for anadromous salmonids on a representative set of index streams. Develop historic run reconstruction data and evaluate protocols for comparison between Salmon River, other Snake River basin, and comparable downriver populations.	1.Quantify smolt-to-adult return rates for anadromous species to Lower Granite Dam on an annual basis to measure SAR recovery objectives. 2. Determine population specific smolt-to-adult return rates (SARs) for anadromous salmonids on a representative set of index streams. Develop historic run reconstruction data and evaluate protocols for comparison between Salmon River, other Snake River basin, and comparable downriver populations.	Effective management and conservation of anadromous focal species
2A: By 4th field HUC, carry out focused activities designed to improve our understanding and definition of small populations, while protecting the genetic integrity of wild populations that are below historical levels.	2A3. Collect steelhead data 2A4. Define data gaps	1. Collect tributary specific adult steelhead abundance data and continue to improve on extinction risk analysis, relative to population and effective population size, and population growth rate determination. 2. Collect tributary specific adult salmon and steelhead abundance and productivity information on wild stocks that have not been influenced by hatchery intervention. 3. Apply gene conservation measures (cryopreservation) to prevent irretrievable loss of genetic diversity. 4. Monitor and evaluate the effectiveness of ongoing artificial propagation programs. 5. Quantify adult hatchery composition in natural production areas. 6. Identify streams where adult abundance data needs to be collected to determine population size of bull trout.	Provide information to describe basic population size, population growth rate, and provide information to assess risk metrics

Objectives	Strategies	Methods	Outcome
3A: Address data gaps necessary to measure freshwater survival and productivity.	3A1. Use new and existing projects (ISS and GPM) to further the knowledge of egg to smolt survival and the mechanisms that affect survival. 3A2. Determine juvenile or smolt per female measurement to	1. Quantify egg to smolt survival on focal fish species and the mechanisms that affect survival. 2. Determine juvenile or smolt per female	Further our knowledge of freshwater survival and productivity.
3B: Compare freshwater conditions among populations	1. Evaluate habitat and water quality conditions at monitoring (index) sites		Enable more accurate definition of habitat rehabilitation needs
3C: Address data gaps necessary to measure progress towards delisting and full recovery	3C1. Quantify population specific adult and juvenile abundance information for focal species on a representative set of index streams 3C2. Determine population specific smolt-to-adult return (SAR) rates for chinook salmon and steelhead on a representative set of index streams. 3C3. Determine population productivity (e.g., spawner to spawner ratios and/or lambda) on a representative set of index streams. 3C4. Measure reproductive success of adult hatchery salmon and steelhead through parentage analysis.		Refined adult age structure determinations for use in derived productivity measures Enable assessment of delisting criteria
4B. In the next 10 years, establish the degree of bull x brook trout hybridization and determine the potential to diminish future brook x bull trout hybridization	4B1. Continue Funding of Ongoing Research	Continue and expand ongoing distribution surveys of both brook and bull trout, including standardized genetic sampling	Determine levels of brook x bull trout hybridization
4C: Assess the effects of competition between introduced species and native anadromous and resident salmonids	4C1. Continue Funding of Ongoing Research	Continue and expand ongoing distribution surveys of introduced species and native species. Integrate research with that pertaining to egg:smolt survivorship (Objective 2A)	Address effects of bull trout density dependence
39A: Improve migration at water diversions in Hayden Creek	39A1. Evaluate the diversions to determine whether or not they represent an issue to migration	Follow standard methods used in definition of fish barriers (*e.g.,* software programs such as FISHXING (2003)	Improved distribution

Table 11. Data gaps identified as strategies to achieve terrestrial biological and environmental objectives.

Objectives	Strategies	Methods	Outcome
5A. Increase understanding of existing and historic composition, recent population trends, habitat conditions and trends, and limiting factors of the	Identify existing information and collect data to fill in gaps on focal plants and animals, ESA-listed, Neotropical migrant, and culturally important species.	Adhere to species survey protocols and work with experts to develop survey methodologies when no protocol is available	Effective management and conservation of plant and animal populations

Objectives	Strategies	Methods	Outcome
terrestrial species of the Salmon subbasin	Collect accurate quantity and quality habitat data with a high confidence level at the watershed scale.	GIS, aerial photo interpretation, field surveys, Hydric soils maps, NWI, PFC ratings	Effective management of land
	Maintain all data in a central database	Relational databases (e.g., Microsoft Access and GIS)	Access and availability of data for terrestrial species of interest
	Support efforts of CDC to document the occurrence of rare species	Relational databases (e.g., Microsoft Access and GIS); consistently provide information to CDC through email or other electronic format	Increased knowledge of the distribution of rare plant and animal species in Idaho
	Describe historic terrestrial species occurrence in the subbasin	Museum records, journals, GIS modeling, expert opinion	A better understanding of current species composition and status
50A. Conserve wetland resources and assess wetland habitat conditions	Complete National Wetland Inventory (NWI) mapping for subbasin at the watershed scale	GIS, aerial and satellite photography, field assessment	A clear definition and classification of wetland habitats
	Develop a comprehensive wetland inventory and mapping effort by watershed in the subbasin in watersheds impacted by land conversion	GIS field assessment	Accurate (with high confidence level) riparian vegetation map of current condition
	Develop restoration priorities	PFC	Implementation of restoration with the strongest ecological impact
50B. Restore historic wetlands to proper functioning condition	Identify and prioritize wetland areas for restoration	Hydric soils maps, aerial photos, NWI, PFC ratings	Biodiversity and increased habitat available to wetland associated species
51A. Conserve riparian habitats	Identify and prioritize riparian habitats for conservation	NWI, PFC, presence of anadromous and native resident salmonids (spawning and rearing)	Biodiversity and increased habitat available to riparian associated species
51B. Restore riparian habitats	Identify and prioritize riparian habitats for restoration	NWI, PFC, presence of anadromous and native resident salmonids (spawning and rearing)	Biodiversity and increased habitat available to riparian associated species
52A. Conserve and maintain mature/old growth "open" stands of ponderosa pine and Douglas fir forest habitats	Inventory and map existing mature, warm/dry ponderosa pine/Douglas-fir forest habitats	Aerial photo interpretation, field surveys, basal area, canopy cover	Effective management of pine/fir forest habitats and their associated species
	Prioritize warm/dry ponderosa pine/Douglas-fir forest communities for protection	Remnant size, risk assessment	Biodiversity and increased habitat available to mature/old growth pine/fir forest associated species

Objectives	Strategies	Methods	Outcome
52B. Manage for mature/old growth "open" stands of ponderosa pine and Douglas-fir in warm/dry-ponderosa pine, Douglas-fir, and grand fir habitat groups within historic range of variability (HRV) by vegetation response units (VRU)	Identify and prioritize areas to restore and maintain warm/dry ponderosa pine/Douglas-fir forest communities	GIS, aerial photo interpretation, field surveys, basal area, canopy cover	Forest restoration towards historical range benefiting associated terrestrial species
53A. Conserve ecological integrity of shrub-steppe habitat	Prioritize shrub-steppe habitats for protection	GIS, aerial photo interpretation, field surveys, patch size, connectivity, risk assessment	Biodiversity and increased habitat available to shrub-steppe associated species
53B. Restore ecological integrity and increase stand density and diversity for 5% of degraded shrub-steppe habitat	Identify and prioritize fragmented and degraded shrub-steppe habitats for restoration	GIS, aerial photo interpretation, field surveys, patch size, connectivity, risk assessment	Biodiversity and increased habitat available to shrub-steppe associated species
54A. Conserve ecological integrity of remaining native grassland remnants	Inventory and map existing native grassland remnants (build on the work of Weddell and Lichthardt 1998)	GIS, aerial photo interpretation, field surveys	Effective management and conservation of grassland habitats and their associated species
	Prioritize areas for conservation	GIS, aerial photo interpretation, field surveys	Biodiversity and increased habitat available to grassland associated species
54B. Restore ecological integrity of 5-15% of degraded grasslands	Identify and prioritize areas for native grassland restoration	GIS, aerial photo interpretation, field surveys	Biodiversity and increased habitat available to grassland associated species
55A. Conserve ecological integrity of aspen habitat	Prioritize aspen habitats for protection	GIS, aerial photo interpretation, field surveys	Biodiversity and increased habitat available to aspen associated species
55B. Restore ecological integrity of aspen habitat	Identify and prioritize areas to restore aspen habitat	GIS, aerial photo interpretation, field surveys	Biodiversity and increased habitat available to aspen associated species
Conserve and restore ecological integrity of juniper mountain mahogany (juniper mountain mahogany is not recognized with a specific problem statement and set of objectives within this plan)	Inventory and map existing condition and extent of juniper mountain mahogany habitat to enhance knowledge of species biology	GIS, aerial and satellite photography, field assessment	Increased knowledge of quantity and quality of habitat and biology of species
	Prioritize juniper mountain mahogany habitats for protection	GIS, aerial photo interpretation, field surveys, patch size, connectivity, risk assessment	Biodiversity and increased habitat available to juniper mountain mahogany associated species
	Identify and prioritize fragmented and degraded juniper mountain mahogany habitats for restoration	GIS, aerial photo interpretation, field surveys, patch size, connectivity, risk assessment	Biodiversity and increased habitat available to juniper mountain mahogany associated species

Objectives	Strategies	Methods	Outcome
56A. Prevent the introduction of exotic invasive plant species into native to conserve quality, quantity, and diversity of native plant communities providing habitat to native wildlife species	Identify and prioritize native habitats for protection susceptible to invasion from invasive exotic plant species	GIS, field surveys, CWMA plans, county weed boards	Preservation of pristine habitats for terrestrial species
56B. Reduce the extent and density of established exotic invasive plant species	Identify and prioritize exotic invasive plant infestations for treatment	GIS, field surveys, cooperate with existing CWMAs and prioritize according to cost-effectiveness, vigor of invasive exotics, and expected biological response	Restoration of higher quality habitat for terrestrial species
57A. Restore ecological integrity in upland grasslands, riparian areas, and forest habitats	Identify and prioritize areas impacted by grazing for protection and restoration	GIS, aerial photo interpretation, field surveys, invasive exotics, ground cover, shrub cover, plant species composition	Decrease in the historic and current impacts of livestock grazing on fish and wildlife habitats and populations
57B. Reduce impacts of livestock interactions with vulnerable terrestrial species populations	Identify and prioritize areas where livestock are having the greatest effect on vulnerable terrestrial species populations	GIS, aerial photo interpretation, field surveys	Decreased impact of livestock grazing on terrestrial species populations
58A. Minimize the negative impact of current and future development on native terrestrial species and their habitats	Identify, map, and prioritize for protection important habitats and travel corridors of terrestrial focal species	GIS, aerial photo interpretation, field surveys of movements and habitat use	Maintenance of habitat connectivity for terrestrial species populations
	Work with city and county governments in the planning process	Provide information on the impacts of development on terrestrial species and habitat	Planning that conserves terrestrial species and their habitats
59A. Reduce the impacts of the transportation system and motorized access on wildlife and fish populations and habitats	Identify and prioritize areas for restoration from effects of transportation system	GIS, aerial photo interpretation, field surveys, inclusion of high quality fish and wildlife habitat	Maintenance of habitat quality, quantity, and connectivity for aquatic and terrestrial species
	Identify migration corridors--assess where there is a need for wildlife passages and mitigation.	GIS, aerial photo interpretation, field surveys, inclusion of high quality fish and wildlife habitat	Reduced impact of transportation system and motorized access on wildlife. Enhanced wildlife migration corridors
60A. Restore and conserve ecosystem integrity across the landscape through restoration of natural processes, using methods including prescribed fire, wildfire use for resource benefit (WFURB), and mechanical methods (thinning and harvest)	Identify and prioritize areas for fire management	GIS, aerial photo interpretation, ground cover, shrub cover, canopy cover	Implementation of effective fire policy preserving and/or restoring natural structural conditions for terrestrial species and their habitats
	Identify historical ranges of variability (HRV) in structure, function, and composition that would have occurred on the landscape under natural fire regimes for each vegetation response unit (VRU)	Spatial and temporal modeling in GIS	Increased understanding and better management of terrestrial species populations and their habitats

Objectives	Strategies	Methods	Outcome
61A. Restore forest ecological integrity, including structure, function, and composition	Identify historic range of variability (HRV) on the landscape under natural ecological processes (i.e., openings, early seral, mid seral, mature and old growth, patch size variability and distribution)	Spatial and temporal modeling in GIS	Increased understanding and better management of terrestrial species populations and their habitats
62A. Restore natural nutrient input cycles and mitigate for damages to aquatic and terrestrial populations due to the loss of these nutrients	Prioritize areas for restoration of nutrient loads	GIS, field surveys	Increased nutrient availability and production of aquatic and terrestrial populations

4.2 Research Needs

Addressing data gaps will provide a strong foundation for the design of research projects. Determining the status of focal species and their habitats will require determination of sampling frequencies, sampling protocols, experimental design, and statistical analysis appropriate for the species of interest and the scope of research. Such details should be included at the proper scale in project proposals. Objectives and strategies, hypotheses for testing, and the spatial and temporal scale at which research should be conducted provide a guide for research efforts in the subbasin (Table 12, Table 13, and Table 14). The hypotheses given should be considered examples to begin research, not a complete list.

Aquatic research needs are addressed in two parts; the first table (Table 12) presents needs that are developed from the objectives and strategies section of the Plan (section 3.2) while Table 13 defines research needs that were identified by the Fisheries Technical Team as important, but not necessarily connected to the objectives and strategies.

Table 12. Aquatic research needs identified as strategies to achieve biological and environmental objectives (sections 3.2.1.1and 3.2.2). Hypotheses for testing and the scale at which research is to be conducted are provided, where possible.

Strategy/Null Hypothesis		Expected outcomes	Spatial Scale	Project duration
4A1	Use methods such as those described in Nelle (1999) to collect data on smallmouth bass feeding habits in the lower Salmon River H_o: Predation does not limit the abundance, distribution, life history, and ecological relationships of focal species and habitats	Increased understanding of the effects of predation on salmonids by exotic species	Lower mainstem Salmon	5-years
7A1	Determine the effects of reductions in marine-derived nutrients (e.g., salmon carcasses) on aquatic and terrestrial food webs H_o: Aquatic and terrestrial trophic levels are not influenced by reductions in salmon carcasses	Improved definition of ecosystem impacts associated with anadromous carcass reductions	subbasin and surrounding areas	life of management plan
18A3	Conduct research to determine extent of groundwater contamination H_o: Unconsolidated dredge tailings in the lower Yankee Fork River are not contributing toxic chemicals to groundwater resources	Improved ability to prioritize remediation efforts to protect aquatic focal species	Yankee Fork	8 years
18B1	Use remote sensing and modeling to determine the historic floodplain H_o: The mainstem Yankee Fork is currently in the historic floodplain	Improved definition of potential focal species habitat	Yankee Fork	8 years
46B1	Use available methods to quantitatively establish changes in pool frequency and volume and other habitats. H_o: Fine sediments are of insufficient volume to alter pool habitat characteristics or other habitat types	Improved ability to prioritize habitat rehabilitation	Subbasinwide	10 years
46B2	Determine the degree to which secondary production is affected by fine sediments in the South Fork mainstem. H_o: Fine sediments are not affecting secondary production in the South Fork	Improved ability to prioritize habitat rehabilitation	South Fork Salmon	10 years
46B3	Investigate seasonal habitat use and availability [in the South Fork Salmon] by focal species' relative to sediment impacts. H_o: Fine sediments are not affecting focal species' seasonal habitat use and availability in the South Fork Salmon	Improved ability to prioritize habitat rehabilitation	South Fork Salmon	10 years

Table 13. Supplemental aquatic research needs identified by the Upper Salmon Aquatics Team. These research needs are not specifically defined in the subbasin plan but are relevant to many of the objectives and strategies. This does not represent a comprehensive list and was not agreed upon by all (*e.g.,* Upper and Lower) aquatics team members.

Research Need	Performance Measure	Scale	Duration	Expected Outcome
1. Determine the effectiveness of specific types of rehabilitation projects on improving productivity of various salmonid life history stages	egg:parr survival egg:smolt survival parr:smolt survival population growth rate (lambda (λ))	Subbasinwide; Population level	24 years	Provide information relative to habitat condition and its influence on juvenile salmonid survival-production; this may restructure mgmt. of certain stocks
2. Determine the effects of historic 'fish mining'[1] on current populations in the Upper Salmon	Effective Population Size (N_e)	Upper Salmon	5 years	Determine if chinook populations in the Upper Salmon have been genetically altered
3. Assess the effect and extent of hatchery straying on wild stocks	Genetic Diversity Adult Spawner Spatial Distribution	Subbasinwide	Annual—ongoing	Improve hatchery practices
4. Determine which flow enhancement projects are most effective	Adult Spawner Spatial Distribution Juvenile Rearing Distribution Age Class Structure Condition of Juveniles at Emigration Index of Juvenile Abundance population growth rate (lambda (λ))	Primary aggregates	10 years	Improved habitat rehabilitation prioritization
5. Determine whether the increased mortality rate between the town of Salmon and Lower Granite Dam is somehow related to Upper Salmon River chinook parr (pre-smolts) overwintering areas	Juvenile Rearing Distribution parr:smolt survival Index of Juvenile Abundance parr:smolt survival population growth rate (lambda (λ))	Primary aggregates	10 years	Improved habitat rehabilitation prioritization

1/ Significant numbers of spring/summer chinook were historically taken (mined) from the Lemhi River to augment dwindling downriver Columbia River stocks. Some local biologists hypothesize that the number of fish taken from Upper Salmon tributaries was significant enough to alter the current genetic structure of existing populations.

RM&E relative to Artificial Propagation Projects (this does not represent a comprehensive list and was not agreed upon by all (*e.g.,* Upper and Lower) aquatics team members):

1. Continue ongoing LSRCP and IPC hatchery programs to meet mitigation responsibilities.
2. Refine genetic preservation techniques in conservation hatchery and conventional hatchery programs, captive broodstock programs, and cryopreservation programs.
3. Apply safety net hatchery intervention based on extinction risk analysis and benefit risk assessments.
4. Implement additional artificial propagation programs to meet adult return objectives identified in Table 6 for anadromous salmonids and lamprey.
5. Monitor and evaluate artificial propagation programs to describe program effectiveness of ongoing mitigation and conservation hatchery programs.

Other RM&E Information Needs (this does not represent a comprehensive list and was not agreed upon by all (*e.g.,* Upper and Lower) aquatics team members):

1. Accurately determine age structure and sex composition of adult salmon and steelhead on a representative number of index streams for run reconstruction efforts.
2. Quantify anadromous species adult survival from Lower Granite Dam to natal streams.
3. Collect accurate and precise adult abundance and productivity data on anadromous species as a direct measure of ESA delisting targets. Define a representative number of index streams and implement or continue data collection.
4. Continue collection of life history characteristics and genetic diversity data on focal fish species.
5. Determine the relationship between focal species survival and production and stream discharge. Relate adequate stream flow recommendations to these and other fish response variables.

Table 14. Terrestrial research needs identified as strategies to achieve biological and environmental objectives (sections 3.2.1.2 and 3.2.2.2). Hypotheses for testing and the scale at which research is to be conducted are provided, where possible.

Research Needs/Hypotheses	Potential Focal Species for Research	Expected Outcome/Potential Management Application	Spatial Scale	Project Duration
6B. Evaluate and quantify terrestrial losses associated with continued operation and secondary impacts of Lower Snake River Projects H_1: The decline of anadromous fish species influences population dynamics of terrestrial species	Willows Black Cottonwood Columbia Spotted Frog Willow Flycatcher River Otter Beaver	Effective land and species management based on an increased understanding of natural ecosystem processes	subbasin and surrounding areas	10–15 yrs
52A. Evaluate the responses of wildlife species of ponderosa pine/Douglas-fir forest	Pileated Woodpecker White-headed	Effective land and species management based on an increased	ponderosa pine/Douglas-fir forest	3–5 yrs (short-term effects); 10–15 yrs

Research Needs/Hypotheses	Potential Focal Species for Research	Expected Outcome/Potential Management Application	Spatial Scale	Project Duration
communities to conservation and management actions H_1: Terrestrial species density and diversity differs in ponderosa pine/Douglas-fir forest communities that more closely represent structural conditions under historic fire regimes than of those largely impacted by timber harvest, fire suppression, and conversion to agriculture H_2: Prescribed burning and/or manual thinning causes short and long-term population responses by terrestrial species of pine/fir forest communities	Woodpecker Flammulated Owl Marten	understanding of natural landscape processes	communities	(long-term effects)
55B. Determine the effect of livestock browsing on aspen sprouts H_1: Livestock browsing of aspen sprouts has degraded aspen habitat	Aspen	Enhanced grazing management	subbasinwide	5–10 yrs
56B4. Develop and research effective biological control agents to treat exotic invasive infestations H_1: Exotic invasive infestations can be effectively controlled by use of biological control agents.		Increased effectiveness in management of invasive plant species and noxious weeds	subbasin and surrounding areas	5–10 yrs
59A1. Research mitigation methods and areas for terrestrial habitats and species impacted by the transportation system- identify migration corridors. There are wildlife passages available, but the need is to identify where there is a need for mitigation. H_1: Primary roads serve as barriers to dispersal for wildlife species H_2: Primary roads serve as dispersal corridors for invasive plant species	Columbia Spotted Frog Lynx Black Bear Deer Elk Pronghorn Antelope Bighorn Sheep	Reduced impact of transportation system on terrestrial species migration and habitat	subbasinwide	3–5 yrs
62A1. Assess nutrient inputs and cycling in the subbasin H_1: Aerial coverage and percent cover of riparian/wetland vegetation has changed over time H_2: Human activities influence nutrient inputs and cycling **62A2. Evaluate the extent of secondary losses to wildlife populations caused by the construction and continued operation of the hydropower system** H_1: Construction and operation of the hydropower system has influenced wildlife populations H_1: The decline of anadromous fish	Willows Black Cottonwood	Increased understanding of ecosystem processes and nutrient cycling in the subbasin	subbasin and surrounding areas	8–10 yrs

Research Needs/Hypotheses	Potential Focal Species for Research	Expected Outcome/Potential Management Application	Spatial Scale	Project Duration
species influences population dynamics of terrestrial species **62A4. Research innovative methods to restore nutrients** H_1: Riparian/wetland structure (e.g., stem height) and function (e.g., rates of uptake, storage, and release of C, N, and P) differ between restored (enriched) and control (no treatment) sites				

4.3 Monitoring and Evaluation Plan

The RM&E plan proposed below is not intended to be a field-ready program; rather, it represents a first step in program development. The focus is on the strategy level, not on the project level. Current or ongoing RM&E programs (as described in the Inventory) likely incorporate many of the RM&E needs identified in this section. Development of any new plans will therefore be coordinated with existing programs to maximize effectiveness and reduce redundancy. Technical Teams designed the RM&E plan in response to recommendations by the NPCC (2001) in consideration of time limitations and the scale of planning activities.

Objectives and strategies that entail a monitoring component are outlined in Table 15 (Aquatic) and Table 16 (Terrestrial). A list of short-term indicators to measure the successful implementation of strategies that achieve desired objectives, and the expected long-term biological outcome, are provided to guide monitoring in the Salmon subbasin.

4.3.1 Aquatics M&E

The information provided in the aquatics M&E section considers taking both a 'bottom-up' and 'top-down' approach. The bottom-up approach is in accordance with direction provided two years ago in the *Technical Guidance for Subbasin Planners* (NPCC 2001), and identifies status M&E at the project scale. The top-down approach is recognized to be a critical component of M&E efforts at the regional or programmatic level, as it examines monitoring questions now being asked at large-scale landscape and ecosystem levels and has been called for in the Federal Salmon Recovery Strategy and the Implementation Plan of the Action Agencies addressing the NOAA-Fisheries Biological Opinion (Biological Opinion) on the Federal Columbia River Power System (FCRPS). (Note: the Action Agencies are Bonneville Power Administration, the Army Corps of Engineers, and the Bureau of Reclamation).

The aquatics M&E section follows guidelines provided in the Pacific Northwest Aquatic Monitoring Partnership (PNAMP 2004). The PNAMP represents a group whose mission is to coordinate between project-specific and regional M&E efforts to establish the most effective system design and application needed to accomplish objectives at both levels. Several assumptions are built into the guidance document, which are also applicable to the Salmon M&E section (PNAMP 2004)

1. Monitoring and evaluation coordination and implementation will be an ongoing activity at the reach, subbasin, and regional levels.
2. Monitoring that is proposed will be more effective if it fits within a broader programmatic network of status monitoring programs and intensively monitored watersheds.
3. It is assumed that local, bottom-up approaches developed within the Imnaha will have higher likelihood for successful funding and meaningful results if they reflect the approaches being developed within the comprehensive state, tribal initiatives, and federal pilot projects (Wenatchee, John Day, and Upper Salmon), and the top-down framework and considerations being developed by PNAMP.

The Salmon aquatics technical team (SATT) used the subbasin assessment, information provided in Section 3.2.1.1 (Aquatic Species Objectives and Strategies - Biological), Section 3.2.2.1 (Subbasin-Level Problem Statements, Objectives, and Strategies), and Section 0 (Watershed-Level Problems, Objectives, and Strategies) of this document (Problem Statements, Objectives, and Strategies), information provided in the Collaborative Systemwide Monitoring and Evaluation Project (CBFWA 2004), and chinook and steelhead guidance provided in Hesse and Harbeck (2004), and Hesse et al. (2004 *in review*). These sources provide a list of measurable objectives and indicators to address subbasin-level questions about factors defining the condition of the watersheds and associated salmon and steelhead populations.

Hesse and Harbeck (2004) and Hesse et al. (*in review*) assisted in the development of the Salmon aquatic M&E objectives and indicators since the work provides a format that (1) is specific to the Salmon, (2) coordinates an array of monitoring and evaluation activities, (3) fits within a regional framework, and (4) results in information with broad applicability. Monitoring and Evaluation methods used in the NEOH program have also been tested in the Upper Salmon 'pilot projects' (CBFWA 2004). These M&E projects are currently being implemented or planned to test and develop more precise protocols and provide increasingly explicit guidance based on field-tested approaches at the subbasin level (*e.g.,* they demonstrate how the top-down approach can work to create monitoring projects that have systemwide applications; PNAMP 2004). M&E approaches presented in Hesse and Harbeck (2004) and Hesse et al. (*in review*) also draws from federal, state, tribal, academic and independent sources for monitoring and evaluation recommendations and statistical council and has recently received favorable review by the ISRP (NPCC 2004).

4.3.1.1 Monitoring and Evaluation Objectives and Indicators

Objectives and strategies that entail a monitoring component are outlined in Table 15 (Aquatic) and Table 16 (Terrestrial). A list of short-term indicators to measure the successful implementation of strategies that achieve desired objectives, and the expected long-term biological outcome, are provided to guide monitoring in the Salmon subbasin.

As mentioned above, the following tables

Table 15. Performance measures[11] (from Hesse and Harbeck 2004, and Hesse et al. *in prep.*) and expected biological outcome used to evaluate success of implemented strategies in achieving aquatic objectives in the Salmon subbasin.

Objectives	Strategies	Key Performance Measures[1]	Biological Outcome
Aquatic Objective 1A: Increase the number of naturally spawning adults to achieve recovery goals in Table 6 within 24 years (timeline is consistent with the NPCC's Fish and Wildlife Program). This should amount to 4-6% SAR for spring-summer chinook, 3% for fall chinook (minimum), 4% for sockeye (minimum), and 4% for steelhead (minimum) as measured at Lower Granite Dam and in the tributaries.	Determine population specific smolt-to-adult return rates (SARs) for anadromous salmonids on a representative set of index streams. Develop historic run reconstruction data and evaluate protocols for comparison between Salmon River, other Snake River basin, and comparable downriver populations.	Smolt-to-adult return rates will be generated for four performance areas; tributary to tributary, tributary to Lower Granite Dam (LGD), LGD to LGD, and LGD to tributary. Coded Wire Tags (CWT) and PIT tag methods will be used to generate hatchery SARs. PIT tag methods will be utilized for natural origin group SARs. Associated performance measures include post-release survival (Salmon hatchery production only), smolt-equivalents, and harvest.	Develop historic run reconstruction data and evaluate protocols for comparison between Salmon River, other Snake River basin, and comparable downriver populations.
Aquatic Objective 1B. Achieve goals defined in Table 6 for the Salmon subbasin through the application of artificial propagation programs. Minimize short and long-term genetic, ecological and life history effects on wild populations	Implement additional artificial propagation programs to meet goals identified in Table 6 for anadromous salmonids and lamprey.	Adult abundance to tributary (number of mature adult fish (including jacks) to a watershed mouth (or defined area) by age, origin, and sex). This performance measure includes; fish removed by in-tributary harvest; fish removed for broodstock; fish remaining in areas outside (downstream) of the assessment point; expanded for in-tributary prespawn mortality (if the estimated index is measured post-escapement). Associated performance measures of age class structure, hatchery fraction, adult spawner sex ratio, redd counts, and harvest support refined characterization of escapement attributes (run reconstruction).	Increased salmonid production

[11] Refer to Appendix Table 5. Summary of key performance measures in relation to spatial scale, required precision, frequency of sampling, and linkage to the monitoring and evaluation objectives (from Hesse and Harbeck 2004, and Hesse et al. *in prep.*)., and Appendix Table 6. Definitions of key performance measures used to evaluate fish populations and habitat in Salmon monitoring and evaluation efforts (CSMEP unpublished data; CBFWA 2004).

Objectives	Strategies	Key Performance Measures[1]	Biological Outcome
Aquatic Objective 2A: By 4th field hydrologic unit, carry out focused activities designed to improve our understanding and definition of small populations, while protecting the genetic integrity of wild populations that are below historical levels.	Preserve the genetic integrity of existing wild stocks in the Salmon subbasin	age-at-return; size-at-return; sex ratios; adult run-timing	Genetically unique and viable spawning aggregates
	Continue ongoing programs	adult to adult return rates of hatchery-reared and naturally spawned salmon; measure of effective population size for both population components	
	Collect steelhead data	population size; effective population size; population growth rate determination	
Aquatic Objective 4B: Reduce and prevent impacts of brook trout x bull trout hybridization. In the next 10 years, establish the degree of bull x brook trout hybridization and determine the potential to diminish future brook x bull trout hybridization	Implement Management Actions	genetic diversity; reproductive success (N_b/N); effective population size (N_e)	Genetically unique and viable spawning aggregates
	Implement Preventative Measures	adult spawner distribution; juvenile rearing distribution;	
Aquatic Objective 4C: Assess the effects of competition between introduced species and native anadromous and resident salmonids	Implement Management Actions	adult spawner distribution; juvenile rearing distribution; adult spawner abundance; harvest abundance in tribs.	Conservation of native species
	Implement Preventative Measures	adult spawner distribution; juvenile rearing distribution	
Aquatic Objective 7A: Spatially assess the impacts of carcass-related nutrient reductions on the aquatic and terrestrial biota. If appropriate, prescribe management actions to offset impacts	Implement Actions	adult spawner distribution; juvenile rearing distribution; adult spawner abundance; harvest abundance in tribs.; macroinvertebrate assemblage; chemical water quality	Decreased juvenile density dependence
Aquatic Objective 8A: Increase the number of pieces of LWD in reaches currently deficient, to volumes consistent with PFC ratings (*refer to* Appendix F)	Protect existing riparian habitat that is currently classified as properly functioning	adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution
	Enhance and rehabilitate riparian habitat that is currently classified as functioning at risk or not functioning		
	artificially recruit LWD to the stream		

Objectives	Strategies	Key Performance Measures[1]	Biological Outcome
Aquatic Objective 8B: Improve pool:riffle ratios to properly functioning conditions	Return the channel to the floodplain so as to increase channel sinuosity to levels consistent with the historic natural range of variability	juvenile rearing distribution; physical habitat; stream network; fish and amphibian assemblage	Improved overwintering and summer rearing survival
	Compensate for transportation corridor encroachment on streams		
Aquatic Objective 8C: Improve bank stability to properly functioning conditions	Stabilize known problem areas through riparian plantings	juvenile rearing distribution; physical habitat; stream network; fish and amphibian assemblage	Improved overwintering and summer rearing survival
	Protect revegetation efforts from herbivory		
Aquatic Objective 8D: Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria	Rehabilitate riparian vegetation to PFC (Appendix F)	adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution
	Rehabilitate floodplain connectivity		
	Promote riparian development through exclusion and riparian pastures		
	Reconnect tributaries		
Aquatic Objective 9A: By 2010, complete stream reach-specific designations (and maintenance) of streamflows that are adequate for life history stages of focal species and that are sufficient for providing channel maintenance.	Improve water conveyance systems	instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival
	Lease or acquire water rights		
	Improve the irrigation efficiency		
	Enact legislative authority to create 'Water Bank'		
	Develop irrigation management plans with irrigators to create the most efficient program based on crop needs and soil types		
	Provide adequate flows to support spawning and rearing life history stages of focal salmonid species	age class structure; juvenile rearing distribution; adult spawner spatial distribution; SAR; juvenile emigrant abundance; adult spawner abundance; index of juvenile abundance	Increased juvenile and adult abundance, distribution, and survival
Aquatic Objective 10A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in	Riparian management	physical habitat; turbidity; macroinvertebrate assemblage; fish & amphibian assemblage; relative reproductive success; recruit/spawner (smolt per female or redd);	Increased egg:parr survival and increased juvenile condition
	Upland management		

Objectives	Strategies	Key Performance Measures[1]	Biological Outcome
the number of stream miles meeting such criterion by 2019	Access management	index of spawner abundance; juvenile freshwater survival;	
	Rehabilitate floodplain connectivity and riparian function		
	Treat legacy effects from mining-related sedimentation		
	Mimic the shape and timing of the natural hydrograph so as to ensure the proper transport and deposition of sediment	instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival
Aquatic Objective 11A. Reduce concentrations of non-organic chemicals to levels consistent with IDEQ beneficial use criteria	Clean up and stabilize (through planting) unconsolidated tailings piles at active, inactive, and orphan sites	chemical water quality; adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution
	Implement mitigation approaches such as slope recontouring, drainage rerouting, or export of waste material		
Aquatic Objective 12A: Rehabilitate connectivity where it will benefit native fish populations, with emphasis on bull trout.	Reconnect waterways	passage; barriers/diversions; stream network; juvenile rearing distribution; adult spawner distribution; spawner abundance	Increased abundance, survival, and distribution
Aquatic Objective 12B. Implement fish screening in tributaries after dewatering and passage issues are resolved	Increase instream flows through irrigation improvement projects.	passage; barriers/diversions; stream network; juvenile rearing distribution; adult spawner distribution; spawner abundance	Increased abundance, survival, and distribution
	Develop experimental screen designs to be used in tributary screening (i.e., bull trout screens, resident fish screens, etc.)		
Aquatic Objective 13A: Mimic the shape and timing of the natural hydrograph in the mainstem Salmon (from the East Fork confluence to the headwaters)	Modify [diversions] operations	instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival
Aquatic Objective 14A: Reduce potential losses of fishes that enter screened irrigation complexes	Structural Fixes	instream flow; passage; barriers/diversions; stream network; juvenile rearing distribution	Reduction in salmonid mortality rates
	Improve water conveyance systems and put water back into the channel		
	Permanently secure water through either transactions or a water bank program		
Aquatic Objective 14B:	Structural Fixes	instream flow;	Reduction in salmonid

Objectives	Strategies	Key Performance Measures[1]	Biological Outcome
Improve connectivity of tributaries that are currently intercepted by irrigation complexes	Improve water conveyance systems and put water back into the channel	passage; barriers/diversions; stream network; juvenile rearing distribution	mortality rates
Aquatic Objective 17C: Improve floodplain connectivity and access to side channel habitat to help offset losses of pool habitat	Control livestock access to encourage establishment of mature riparian vegetation	juvenile rearing distribution; physical habitat; stream network; fish and amphibian assemblage	Improved overwintering and summer rearing survival
	Conduct land acquisitions and riparian conservation easements where possible		
Aquatic Objective 18A: Rehabilitate water quality in affected reaches to conditions suitable to support designated beneficial use criteria	Build a wastewater treatment facility at the Grouse Creek mine to treat the tailing pond water and potentially contaminated groundwater	chemical water quality; adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution
Aquatic Objective 18B. Reconnect the mainstem Yankee Fork with adjoining floodplain area	18B2. Reconstruct the floodplain and channel to historic conditions. This will involve restoring natural hydrologic processes including energy dissipation, deposition, etc.	juvenile rearing distribution; physical habitat; stream network; fish and amphibian assemblage	Improved overwintering and summer rearing survival
Aquatic Objective 19A: In the next 10 years, reduce and prevent impacts of brook trout x bull trout interaction	Continue brook trout eradication efforts	index of juvenile abundance; condition of juveniles; genetic diversity	Reduced competition, predation, and hybridization
	Target brook trout for harvest		
	Prevent spread		
Aquatic Objective 28A: Within the next ten years (by 2014) improve connectivity of at least half of all tributaries that are currently considered to be disconnected from the mainstem Salmon (upstream of the Yankee Fork) due to water diversions	Install fish-friendly diversions	adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution
	Install fish-friendly road crossings		
Aquatic Objective 29A: Mimic or rehabilitate the natural hydrographs of streams in the Pahsimeroi watershed	Substitute water diverted from Patterson-Big Springs Creek by pumping water from the Salmon River	instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival

Objectives	Strategies	Key Performance Measures[1]	Biological Outcome
Aquatic Objective 30A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019	Improve 12 irrigation diversions to provide stable diversion points and reduce erosion from the Pahsimeroi confluence to Hooper Lane	physical habitat; turbidity; macroinvertebrate assemblage; fish & amphibian assemblage; relative reproductive success; recruit/spawner (smolt per female or redd); index of spawner abundance; juvenile freshwater survival;	Increased egg:parr survival and increased juvenile condition
Aquatic Objective 39B: Improve conveyance in Hayden Creek diversions to improve bank stability, decrease fish stranding, and shorten overall ditch lengths	Work with landowners to evaluate alternative irrigation options such as pumping Line irrigation ditches or replace with pipes Work with private landowners to purchase or lease water rights Consolidate diversion points throughout the subbasin that are ineffective and/or unneeded	instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival
Aquatic Objective 41A: Rehabilitate natural hydrographs in key anadromous and resident tributaries to ensure for adequate base flows, channel-maintaining peak flows, and normal flow timing	Manipulation of consumptive uses	instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival
Aquatic Objective 44A. Decrease or extirpate brook trout populations in the watershed	Employ removal actions that do not pose a threat to native populations	index of juvenile abundance; condition of juveniles; genetic diversity	Reduced competition, predation, and hybridization
Aquatic Objective 45A. Improve riparian function to increase LWD recruitment	Protect existing functional riparian areas Rehabilitate non-functioning riparian areas where feasible	adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution

Objectives	Strategies	Key Performance Measures[1]	Biological Outcome
Aquatic Objective 46B. Gain an understanding of how fine sediments are affecting secondary production, habitat availability and use by focal species	Investigate seasonal habitat use and availability by focal species' relative to sediment impacts	physical habitat; turbidity; macroinvertebrate assemblage; fish & amphibian assemblage; relative reproductive success; recruit/spawner (smolt per female or redd); index of spawner abundance; juvenile freshwater survival;	physical habitat; turbidity; macroinvertebrate assemblage; fish & amphibian assemblage; relative reproductive success; recruit/spawner (smolt per female or redd); index of spawner abundance; juvenile freshwater survival
Aquatic Objective 48A. Decrease or extirpate brook trout populations in the watershed	Employ removal actions that do not pose a threat to native populations	index of juvenile abundance; condition of juveniles; genetic diversity	Reduced competition, predation, and hybridization

1/ See Appendix E, Appendix Table 5 for a list of performance measures and Appendix Table 6 for their definitions.

Table 16. Performance measures and expected biological outcome used to evaluate success of implemented strategies in achieving terrestrial objectives in the Salmon subbasin

Objectives	Strategies	Key Performance Measures	Biological Outcome
Terrestrial Objective 6A. Sustain viable populations of terrestrial species	Implement recovery actions for federally listed species	Population trends, population growth rate (λ), effective population size (N_e), reproductive success, juvenile recruitment, survivorship; for plant species: See recovery plans, when available	Biodiversity and population viability for threatened and endangered terrestrial species
	Restore and maintain viable populations of nonlisted nongame and game terrestrial species	Population trends, population growth rate (λ), effective population size (N_e)	Biodiversity and population viability for rare, sensitive, and culturally important terrestrial species
	Conserve, restore, and sustain populations of big game species	Population trends, population growth rate (λ), effective population size (N_e)	Biodiversity and traditional levels of cultural, subsistence and recreational hunting are supported
	Conserve, restore, and sustain populations of harvestable species (waterfowl, upland game, furbearers)	Population trends, population growth rate (λ), effective population size (N_e)	Biodiversity and traditional levels of cultural, subsistence and recreational hunting are supported
Terrestrial Objective 50A. Conserve wetland resources	Actively protect wetland habitats	Land acquisition, fee title acquisitions, conservation easements, land exchanges, public education programs; implementation of BMPs, fencing, and alternative grazing strategies	Conservation of wetland habitats and wetland associated species

Objectives	Strategies	Key Performance Measures	Biological Outcome
Terrestrial Objective 50B. Restore historic wetlands to proper functioning condition	Restore identified historic wetland areas	Acres of wetlands, PFC rating	Habitat restoration for wetland associated species
	Restore existing wetlands by controlling exotic invasive plant species	Plant composition, abundance of exotic invasive plant species	Improved wetland condition and function and increased habitat quality for wetland associated terrestrial species
Terrestrial Objective 51A. Conserve riparian habitats	Assess condition and extent of lowland riparian habitat	PFC rating, vegetation composition, vegetation cover, miles of streams	Effective management, conservation, and monitoring of riparian habitats and their associated species
	Actively conserve riparian communities	Land purchase, fee title acquisitions, conservation easements, land exchanges, public education programs; implementation of BMPs, fencing, and alternative grazing strategies	Biodiversity and promotion of natural ecological processes
	Increase stewardship and public knowledge of the importance of riparian habitat	Number of education programs, public involvement	Public support and encouragement for conservation of riparian habitats and their associated species
	Promote collaboration/cooperation between agencies, organizations, and individuals in conserving unique representatives/core areas with multiple ownerships	Number of cooperative projects	Effective management and conservation of riparian habitats and species across the landscape
	Integrate Partners in Flight Bird Conservation Plans into management of public lands	Incorporation of PIF into land management plans, avian species abundance and diversity	A coordinated multi-agency and multi-species management approach--broad cooperative management scheme.
Terrestrial Objective 51B. Restore riparian areas to proper functioning condition	Encourage landowners and managers to take advantage of funding opportunities for creating, restoring, and maintaining lowland riparian habitat	Participation of private landowners in restoration programs (e.g., Continuous Conservation Reserve Program)	Improved ecological condition of riparian areas and increase of habitat quality for riparian associated species
	Develop new programs that work to acquire and restore riparian habitats	Number of programs, acres riparian habitat acquired and restored	Improved ecological condition of riparian areas and increase of habitat quality for riparian associated species
	Replant native riparian vegetation along degraded stream reaches	Plant composition and abundance, soil stability, vegetation density	Improved ecological condition of riparian areas and increase of habitat quality for riparian associated species

Objectives	Strategies	Key Performance Measures	Biological Outcome
	Restore hydrologic regimes to support riparian functions-- purchase water rights, and implement water conservation measures	Stream hydrographs, flow gauges	Restoration of proper function, accurate stream hydrographs
Terrestrial Objective 52A. Conserve and maintain mature/old growth “open” stands of ponderosa pine and Douglas fir forest habitats (warm/dry habitats)	Protect existing mature ponderosa pine/Douglas-fir forest communities	Land purchases, fee title acquisitions, conservation easements, land exchanges; acres of protected habitat	Conservation of habitat for species associated with mature/old growth forest habitats
	Use prescribed burning and/or manual understory removal to protect mature stands from stand-replacing fire events	Tree survival, basal area, canopy cover	Conservation of habitat for species associated with mature/old growth forest habitats
	Develop new programs to acquire and restore low to mid elevation mature ponderosa pine/Douglas-fir forest communities	Number of programs, acres of low to mid elevation mature pine/fir forest acquired and/or restored	Restoration of habitat for species associated with mature/old growth forest habitats
Terrestrial Objective 52B. Manage for mature/old growth “open” stands of ponderosa pine and Douglas-fir in warm/dry- ponderosa pine, Douglas-fir, and grand fir habitat groups within historic range of variability (HRV) by vegetation response units (VRU)	Use prescribed burning and selective thinning to manage successional stages	Basal area, canopy cover, dbh	Accelerated establishment of mature pine/fir forest communities
Terrestrial Objective 53A. Conserve ecological integrity of shrub-steppe habitat	Assess existing condition and extent of shrub-steppe habitat	Invasive exotics, ground cover, species composition, shrub cover, connectivity, size of habitat patches, acres of shrub-steppe habitat	Baseline analysis of rangeland health and functionality
	Promote multiple successional stages through prescribed burn and manual techniques	Ground cover, shrub cover, species composition	Diversity of shrub-steppe successional stages across the landscape
	Maintain healthy bunchgrass communities	Invasive exotics, ground cover, species composition, shrub cover, soil/site stability, hydrologic function, integrity of biotic community, ecological rating	Adequate ground cover of non-senescent grasses and forbs to conceal ground nests and support an adequate food base for terrestrial species
Terrestrial Objective 53B. Restore ecological integrity and increase stand density and diversity for 5% of degraded shrub-steppe habitat	Assist private landowners in restoring native vegetation	Availability and use of native seed	Biodiversity and increased habitat available to shrub-steppe associated species
	Restore historical disturbance patterns that result in some early seral communities	Ground cover, species composition, shrub cover, shrub height	Diversity of shrub-steppe successional stages across the landscape
	Decrease encroachment by conifer species though prescribed fire or manual techniques	Presence/absence of conifer species, density and abundance of conifer species	Maintenance of habitat for shrub-steppe species

Objectives	Strategies	Key Performance Measures	Biological Outcome
	Restore to a healthy bunchgrass community	Invasive exotics, ground cover, species composition, shrub cover, soil/site stability, hydrologic function, integrity of biotic community, ecological rating	Adequate ground cover of non-senescent grasses and forbs to conceal ground nests and support food and cover needs of terrestrial species
Terrestrial Objective 54A. Conserve ecological integrity of remaining native grassland remnants	Protect remaining native grassland remnants	Land acquisitions, fee title acquisitions, conservation easements, or land exchanges	Biodiversity and increased habitat available to grassland associated species
Terrestrial Objective 54B. Restore ecological integrity of 5-15% of degraded grasslands	Continue to develop methods and restore native grassland habitats through control of invasive exotics, cultural practices and seeding	Frequency of invasive exotics, species composition and abundance, native species reestablishment success, carbon storage, hydrologic function	Biodiversity and increased habitat available to grassland associated species
	Develop new programs and continue existing programs that work to acquire and restore prairie and canyon grasslands	Number of restoration programs, level of activity and involvement	Biodiversity and increased habitat available to grassland associated species
Terrestrial Objective 55A. Conserve ecological integrity of aspen habitat	Assess existing condition and extent of aspen habitat in the Salmon subbasin	Invasive exotics, ground cover, species composition, shrub cover, connectivity, size of habitat patches, acres of aspen habitat	Baseline analysis of rangeland health and functionality
	Maintain historical disturbance patterns that result in some early seral communities	Ground cover, species composition	Diversity of aspen successional stages across the landscape
Terrestrial Objective 55B. Restore ecological integrity of aspen habitat	Restore historical disturbance patterns that take place in early seral communities	Ground cover, species composition,	Diversity of aspen successional stages across the landscape
	Assist private landowners in restoring native vegetation	Availability and use of native seed	Biodiversity and increased habitat available to aspen associated species
	On public lands, decrease encroachment by conifer species	Presence/absence of conifer species, density and abundance of conifer species	Maintenance of habitat for aspen species
Terrestrial Objective 56A. Conserve quality, quantity, and diversity of native plant communities providing habitat to native wildlife species by preventing invasive exotics	Minimize ground disturbing activities in habitats highly susceptible to invasion of invasive exotics	Invasive exotics	Prevention of new infestations and preservation of habitat quality in native plant communities
	Encouraging the use of weed free seeds and feeds	Invasive exotics	Prevention of seed dispersal through human and livestock vectors and preservation of habitat quality in native plant communities

Objectives	Strategies	Key Performance Measures	Biological Outcome
	After major disturbances, restore vegetative cover, treat weeds, and long-term promotion of native plant communities	Frequency of invasive exotics, species composition and abundance, native species reestablishment success	Quality, quantity, and diversity of habitat conserved for terrestrial species
	Promote and participate in existing programs and support the Idaho Weed Management Strategy	Number of programs and participants developing education and awareness in invasive exotic identification, spread, prevention, and treatment	Increased public participation in existing weed management programs
	Support early detection and eradication programs	Frequency of invasive exotics, species composition and abundance	Prevent establishment of invasive exotics and preservation of habitat quality in native plant communities
Terrestrial Objective 56B. Reduce the extent and density of established invasive exotics	Implement economical and effective methods to treat priority problem areas identified by the CWMA committees	Frequency of invasive exotics, species composition and abundance	Restoration of habitat for terrestrial species and increased biodiversity
	After disturbance, select appropriate methods to treat prioritized areas for invasive exotics (e.g., hand pulling, spraying, biological control agents, seeding)	Frequency of invasive exotics, species composition and abundance	Restoration of habitat for terrestrial species and increased biodiversity
	Support the Idaho Weed Management Strategy	Number of programs and participants developing education and awareness in invasive exotic identification, spread, prevention, and treatment	Increased habitat conservation and restoration through public education of invasive exotics
Terrestrial Objective 57A. Restore ecological integrity in upland grasslands, riparian areas, and forest habitats	Adjust season of use for livestock grazing and encourage establishment of riparian pasture systems, exclusion fences, off-site watering areas, and/or conservation easements in riparian areas	Soil compaction, erosion, invasive exotics, ground cover, species composition, shrub cover	Implementation of grazing management with minimal negative impacts to fish and wildlife habitats and populations
	Support weed-free hay programs, quarantine requirements, and other actions preventing seed dispersal of invasive exotics	Number of weed-free hay programs, participation by ranchers in minimizing dispersal of invasive exotics	Implementation of grazing management with minimal negative impacts to fish and wildlife habitats and populations
Terrestrial Objective 57B. Reduce impacts of livestock interactions with vulnerable terrestrial species populations	Develop grazing management plans to limit adverse impacts to rare, federally listed or culturally important plant populations	Presence/absence, survival, and abundance of native plant species; soil/site stability, hydrologic function, integrity of plant community	Conservation and persistence of rare, federally listed and/or culturally important plant populations

Objectives	Strategies	Key Performance Measures	Biological Outcome
	Minimize livestock impacts on big game species	Movements and habitat use of big game species, diet quality, productivity, abundance, population trends	Maintenance of stable to increasing populations of big game species
	Minimize impacts of livestock on sage grouse and pygmy rabbits	Movements and habitat use, diet quality, productivity, abundance, population trends	Maintenance of stable to increasing populations of sage grouse and pygmy rabbits
Terrestrial Objective 57C. Eliminate domestic sheep and goat grazing within bighorn sheep habitat	Work with land management agencies, landowners and livestock owners in a collaborative manner to eliminate domestic sheep and goat grazing within bighorn sheep habitat.	Sheep disease rates, survival, and productivity	Healthy bighorn sheep populations
	Increase public and landowner education programs to improve the understanding of the threat of passing disease from domestic sheep to bighorn sheep	Educational programs	Public awareness and understanding of the threat of passing disease from domestic sheep to bighorn sheep
Terrestrial Objective 58A. Minimize the negative impact of current and future development on native terrestrial species and their habitats	Encourage compliance with ordinances and covenants addressing weed and pet control	Nonnative exotics, mortalities of terrestrial species attributable to domestic pets	Biodiversity and conservation of native terrestrial species
	Protect existing key habitats from development	Land purchases, fee title acquisitions, conservation easements, land exchanges	Biodiversity and preservation of habitat connectivity for terrestrial species
Terrestrial Objective 59A. Reduce the impacts of the transportation system and motorized access on wildlife and fish population and habitats	Restore areas highly impacted by the transportation system for restoration	Road densities, sediment production, surface erosion, landslide susceptibility	Reduction of road impacts while maintaining habitat quality, quantity, and connectivity for aquatic and terrestrial species
	Protect roadless areas	Acres and number of roadless areas, invasive exotics, species composition and abundance	Conservation of diverse communities and habitat quality for aquatic and terrestrial species
Terrestrial Objective 60A. Restore and conserve ecosystem integrity across the landscape through restoration of natural processes, using methods including prescribed fire, wildfire use for resource	Enhance public awareness of the fundamental importance of fire	Educational programs	Public awareness and understanding of the importance of fire in an ecosystem
	Use fire and other management tools to reestablish natural fuel loads in focal habitats	Ground cover, woody debris, shrub cover, canopy cover, invasive exotics, species composition	Restoration and preservation of focal habitats and associated terrestrial species

Objectives	Strategies	Key Performance Measures	Biological Outcome
benefit (WFURB), and mechanical methods (thinning and harvest)	Assess for each site the combination of techniques (thinning, prescribed fire, etc.) necessary to restore or maintain desirable plant community attributes including fuel levels, as well as ecological processes.	Ground cover, woody debris, shrub cover, invasive exotics	Effective restoration and maintenance of focal habitats
	Use low impact equipment and alternative harvest techniques	Soil compaction, species composition, survival of native vegetation	Restoration of focal habitats without destruction of remaining native vegetation
Terrestrial Objective 61A. Restore forest ecological integrity, including structure, function, and composition	Increase public awareness about vegetation diversity through interpretive and education programs that address species, communities, ecosystems and their processes	Interpretive and education programs	Public awareness and support of healthy forest conditions
	Promote natural stand structure through thinning and prescribed fire	Canopy cover, basal area, ground vegetation, species composition	Increased habitat for terrestrial species through the restoration of focal habitats
	Use low impact equipment and alternative harvest techniques	Soil compaction, species composition, survival of native vegetation	Restoration of focal habitats without destruction of remaining native vegetation
	Design timber harvest and associated road construction to minimize habitat degradation	Erosion, sediment production, habitat connectivity	Management practices that reduce impacts to forest habitats and their associated species
	Avoid timber harvest in riparian areas or areas that will have direct impact on aquatic habitats or water quality	Erosion, sediment production, water temperature, vegetation cover, species composition	Management practices that reduce impacts to riparian habitats and their associated species
Terrestrial Objective 62A. Restore natural nutrient input cycles and mitigate for damages to aquatic and terrestrial populations due to the loss of these nutrients	Implement projects to restore nutrients to upland areas	Stem height, plant tissue N and P, aboveground biomass, native riparian community mosaic, net primary productivity, chemical and nutrient content of water, invertebrate community structure, instream-channel carbon load	Increased productivity of aquatic and terrestrial populations

We encourage collaboration between University scientists and relevant entities (e.g., state and federal agencies, tribal, private landowners) for the development of sampling design and setting of performance standards. Because the scope of this plan is broad, experts in relevant fields are most qualified to design individual projects addressing monitoring objectives. For well studied habitats and species (e.g., sage grouse), performance standards may be available in peer reviewed literature. Building on existing knowledge established across the range of a focal habitat or species is encouraged.

Data management and information dissemination are critical for an effective monitoring program. The Idaho Conservation Data Center (IDCDC) serves as a central repository and provider of information on rare terrestrial species. For many of terrestrial monitoring objectives, the IDCDC will most effectively manage the data. StreamNet (http://www.streamnet.org/) is a repository for regional fisheries data. Monitoring projects will likely span multiple jurisdictions and cover objectives that do not necessarily pertain to rare species. The development of an interagency database would facilitate consistency in data entry and allow access by multiple stakeholders to monitoring data. Interagency Species Management System (ISMS) was developed to "achieve efficiencies in implementing the Northwest Forest Plan by facilitating the sharing of species data among survey & management, watershed analysis, monitoring, and other cooperating agency programs" (see http://www.reo.gov). This system can serve as a model for the development of a central database for the Salmon subbasin. In the development of all research and monitoring projects, technical reports and peer reviewed publication preparation should be included in the budgets and timelines. Availability and use of research and monitoring results are the ultimate measure of success for this RM&E Plan.

5 Coordination with Existing Programs

For a subbasin plan to be adopted by the NPCC, the plan must conform to existing federal guidelines of the Endangered Species Act (ESA) and Clean Water Act (CWA). The status of listed species and of water quality conditions are discussed in assessment section 2.3.8: Species Designated as Threatened or Endangered and assessment section 1.7.1: Water Quality. Planning must be reflective of, and integrated with, recovery plans for listed species within the subbasin, performance measures described in the Federal Columbia River Power System Biological Opinion, and the Water Quality Management Plan of the state (NPCC 2001). A description of ESA and CWA considerations and how recommended objectives and strategies conform to these federal guidelines follows.

5.1 Endangered Species Act Considerations

The Salmon subbasin contains species listed as threatened or endangered under the Endangered Species Act (ESA) (16 U.S.C. §§ 1531–1544). The ESA, amended in 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Fisheries Service (NOAA Fisheries), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitats.

Section 7 of the ESA also makes it clear that all federal agencies should participate in the coordination of programs that involve endangered species. Under this provision, federal agencies often enter into partnerships and memoranda of understanding with the USFWS for implementing and funding conservation agreements, management plans, and recovery plans developed for listed species. The development of these partnerships is encouraged as such planning efforts enable proactive approaches for managing listed species.

USFWS has developed, and is in the process of developing, recovery plans for species listed under the ESA in the Salmon subbasin. Actions called for in the *Salmon Subbasin Management Plan* should be coordinated, consistent, and integrated with these recovery plans, and with any applicable performance measures from the Federal Columbia River Power System Biological Opinion (BiOp) (NPCC 2001). It is important to note, however, that the BiOp is currently undergoing revision due to a court order.

5.1.1 Consistency with Applicable Performance Measures in BiOp.

The *Salmon Subbasin Management Plan* should be coordinated with habitat actions and ecological objectives in the Federal BiOp. Habitat actions described in the BiOp are intended to accelerate efforts to improve survival in priority areas in the short-term, while laying a foundation for long-term strategies through subbasin assessment and planning (NMFS 2000). The long-term habitat strategy in the BiOp has three overarching objectives: 1) protect existing high quality habitat, 2) restore degraded habitats on a priority basis and connect them to other functioning habitats, and 3) prevent further degradation of tributary habitats and water quality. These are consistent with rules developed by Technical Team members during subbasin planning prioritization exercises (see section 6: Prioritization) as well as objectives for focal habitats in the Salmon subbasin (see section 3: Problem Statements, Objectives, and Strategies).

The following objectives were more specifically described in the BiOp (NMFS 2000) as necessary for tributary habitat improvement efforts benefiting the Technical Recovery Team (TRT) defined populations residing in the Salmon. Related objectives and associated strategies in this plan are in Section 3.2.2: Environmental Components.

- Water quantity—increase tributary water flow to improve fish spawning, rearing, and migration.
- Water quality—comply with water quality standards, first in spawning and rearing areas, then in migratory corridors.
- Passage and diversion improvements—address in-stream obstructions and diversions that interfere with or harm listed species.
- Watershed health—manage both riparian and upland habitat, consistent with the needs of the species.
- Mainstem habitat—improve mainstem habitat on an experimental basis and evaluate the results.

In the long term, habitat recovery and watershed rehabilitation for non-Federal public, Tribal, and private lands require state and local stewardship. An overall framework for this stewardship can be created through subbasin plans and recovery plans which establish goals, objectives, and priority actions that are coordinated across Federal and non-Federal ownerships and programs (NMFS 2000). The *Salmon Subbasin Management Plan* provides an important context for classifying and prioritizing areas for protection and rehabilitation. The Plan also provides a foundation for ESA recovery planning.

Performance standards and measures are described in the "All H Strategy" (Habitat, Hatcheries, Harvest, Hydropower), which is the "umbrella" under which the BiOp falls (Federal Caucus 2000), and in the aquatics RM&E section (see section 4: Research, Monitoring, and Evaluation Plan). Of the 4 H's, coordination with habitat standards and measures in the BiOp is of primary importance as development of strategies to address habitat concerns is a major objective of subbasin planning (NPCC 2000). Habitat performance standards are: 1) prevent habitat degradation, 2) restore high quality habitat, and 3) restore/increase habitat complexity (Federal Caucus 2000). Associated performance measures as described in the "All H Strategy" include (and are presented in the aquatics RM&E (Section 4: Research, Monitoring, and Evaluation Plan in this document):

- Increased stream miles meeting water quality standards (temperature and sediments).
- Increased stream miles with adequate instream flows.
- Increased stream miles opened to fish access.
- Increased number of diversion areas screened.
- Increased acres and/or stream miles of habitat protected or restored.

For species limited by habitat, the ultimate performance standard for habitat is fish productivity (Federal Caucus 2000). However, this will be difficult to establish, as survival improvements from habitat actions cannot be measured in the short term. Even in the long term, measuring progress toward a biologically based standard will be challenging and expensive. Based on our current understanding of the associations between ecosystem processes and salmonid populations, four habitat factors will influence performance measures throughout the basin (Federal Caucus 2000):

- Instream flows
- Amount and timing of sediment inputs to streams
- Riparian conditions that determine water temperature, bank integrity, wood input, maintenance of channel complexity
- Habitat access

The *Salmon Subbasin Management Plan* addresses each of these measures with detailed objectives and strategies (section 3.2) as well as a research, monitoring, and evaluation plan (section 4: Research, Monitoring, and Evaluation Plan).

5.1.2 Consistency with existing recovery plans

Bull trout (*Salvelinus confluentus*), Chinook salmon (*Oncorhynchus tshawytscha*), Steelhead (*Oncorhynchus mykiss*), and Sockeye salmon (*Oncorhynchus nerka)* are fish species listed under the Endangered Species Act (ESA) currently present in the Salmon subbasin. Other threatened or endangered species in the subbasin include the bald eagle (*Haliaeetus leucocephalus*), lynx (*Lynx canadensis*), Northern Idaho ground squirrel (*Spermophilus brunneus brunneus*), Spalding's catchfly (*Silene spaldingii),* MacFarlane's four o' clock (*Mirabilis macfarlanei*), and a population of wolves (*Canis lupis*), federally designated as "non-essential, experimental" under Section 10j of the ESA (assessment section 2.3.8). The Columbia spotted frog (*Rana luteiventris*), yellow-billed cuckoo (*Coccyzus americanus occidentalis*), and Slender moonwort (*Botrychium lineare*) are currently candidate species under the ESA.

Of the focal species in the Salmon subbasin, four aquatic species, bull trout, chinook salmon, steelhead, sockeye salmon, and one terrestrial species, bald eagle, are listed as "Threatened" or "Endangered" under the ESA. The remaining species listed under the ESA were not included as focal species for the priority habitat types, but are included in the assessment (assessment section 2.3.8) as they affect future management actions or projects. The following ESA species have recovery plans (or conservation strategies), existing or in development:

*5.1.2.1 Chinook (*Oncorhynchus tshawytscha*)*

Spring, summer, and fall Chinook salmon in the Salmon subbasin are part of the Snake River Chinook salmon Evolutionarily Significant Unit (ESU)[12] that were listed as threatened under the

[12] The policy by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) stipulates that a salmon population (or group of populations) will be considered "distinct" for purposes of the ESA if it represents an Evolutionarily Significant Unit (ESU) of the biological species. An ESU is defined as a population that 1) is reproductively isolated from conspecific populations and 2) represents an important component in the evolutionary legacy of the species. (Waples 1991.)

ESA on April 22, 1992 (57 Federal Register [FR] 14653). Snake River spring and summer Chinook salmon are listed together under the ESA as an ESU, separate from the fall Chinook salmon ESU. Snake River fall Chinook salmon are considered distinct from other Chinook salmon due to their differences in genetic and life history characteristics (assessment section 2.2.1.1).

Critical habitat was designated for spring and summer Chinook salmon in 1993 (58 FR 68543), and revised on October 25, 1999 (64 FR 57399) to exclude areas above Napias Creek Falls (in the Middle Salmon–Panther hydrologic unit). Critical habitat was designated for fall Chinook salmon on December 28, 1993 (58 FR 68543). On August 18, 1994, NOAA Fisheries reclassified the Snake River spring, summer, and fall runs of Chinook salmon from threatened to endangered status under an emergency provision of the ESA (59 FR 54840). This provision lapsed on May 26, 1995, and the status of these runs returned to threatened (assessment section 2.2.1.1).

The Interior Columbia Technical Recovery Team identified 22 individual populations of Chinook salmon in the Salmon subbasin. Best available information on genetics, spawning distribution, life history variation, morphology, and habitat were used to identify individual populations (assessment section 2.2.1.1). Biological (section 3.2.1) and Environmental Objectives (section 3.2.2) in this document support recovery efforts, in addition to actions coordinated with performance measures in the BiOp as described in the previous section.

*5.1.2.2 Steelhead (*Oncorhynchus mykiss*)*

Summer steelhead, an anadromous form of redband trout, are native to the Salmon subbasin (assessment section 2.2.1.2). The Snake River steelhead (*O. mykiss* [Walbaum, 1792])[13], of which spawning populations in the Salmon subbasin are a part, was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). NOAA Fisheries first designated the critical habitat for the Snake River steelhead on February 16, 2000 (65 FR 7764. This designation was withdrawn on April 30, 2002. Known populations of resident redband trout (above natural barriers) in the subbasin are excluded from listing (assessment section 2.2.1.2). Biological (section 3.2.1) and Environmental Objectives (section 3.2.2) in this document support recovery efforts, in addition to actions coordinated with performance measures in the BiOp as described in the previous section.

*5.1.2.3 Sockeye (*Oncorhynchus nerka*)*

Snake River sockeye salmon (*O. nerka* [Walbaum, 1792]) were listed as endangered under the ESA on November 20,1991 (56 FR 58619). Snake River sockeye salmon were listed as an Evolutionarily Significant Unit (ESU) due to their uniqueness as the southernmost spawning population that also travels the farthest inland (> 1,400 km) and to the highest elevation (> 1,980 m) of any sockeye salmon population in the world. Prior to their listing as endangered, the Snake River Sockeye Salmon Captive Broodstock Program was started. Under NOAA Fisheries' interim policy on artificial propagation (58 FR 17573), the progeny of fish from a listed

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[13] Formerly *Salmo gairdneri* [Richardson, 1836]. The species *Oncorhynchus mykiss* probably consists of multiple subspecies, none of which have been formally recognized. The most recently published treatise on the species, Behnke (1992), proposed three subspecies: *O.m. irideus*, or coastal rainbow and steelhead; *O.m. gairdneri,* or inland Columbia Basin redband and steelhead; and *O.m. newberrii*, or Oregon Basin redband trout.

population that are propagated artificially are considered part of the listed species and protected under the ESA. So, although not specifically designated in the 1991 listing, Snake River sockeye salmon produced in the captive broodstock program are included in the listed ESU (assessment section 2.2.1.4). Biological (section 3.2.1) and Environmental Objectives (section 3.2.2) in this document support recovery efforts, in addition to actions coordinated with performance measures in the BiOp as described in the previous section.

*5.1.2.4 Bull trout (*Salvelinus confluentus*)*

Bull trout (*S. confluentus* [Suckley 1858]) were listed under the ESA as threatened on November 1, 1999 (64 FR 58910). Earlier rule designations had listed distinct population segments of bull trout as threatened in the Columbia, Klamath, and Jarbidge river basins (63 FR 31647, 63 FR 42747, 64 FR 17100). The Bull Trout Technical Recovery Team developed a draft recovery plan that provided a framework for implementing recovery actions for the species. The bull trout draft recovery plan was also used as the principal basis for identifying critical habitat for species. The proposed designation of critical habitat was published on November 29, 2002 (67 FR 71236), and includes streams within the Salmon subbasin (assessment section 2.2.1.3).

Bull trout are well distributed throughout most of the Salmon subbasin in 125 identified local populations located within 10 core areas (assessment section 2.2.1.3). Seasonal barriers isolate many small populations of bull trout, and some bull trout populations in the subbasin are locally depressed. Population information is extremely limited (assessment section 2.2.1.3).

Additional populations exist in major tributaries to the Snake River, including the Bruneau, Boise, Weiser, Malheur, Payette, Powder, Grand Ronde, Imnaha, and Clearwater Rivers. Historic and current interaction among these populations is unknown, although presumably all historic bull trout populations periodically interacted with other populations in the Snake River basin. Currently, interaction is difficult or impossible as most populations are isolated by fish barriers, primarily dams (USFWS 2002).

Bull trout appear to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, substrate for spawning and rearing, and migratory corridors (USFWS 2002). The *Salmon Subbasin Plan* provides mechanisms to reduce factors limiting bull trout. Biological (section 3.2.1) and Environmental Objectives (section 3.2.2) in this document support recovery efforts by recommending strategies to increase population connectivity, reduce stream temperatures, and increase habitat complexity.

*5.1.2.5 Bald eagle (*Haliaeetus leucocephalus*)*

Bald eagles were listed under the ESA as threatened July 12, 1995 (60 FR 35999), but are being considered for de-listing by USFWS as of July 4, 1999 (64 FR 128). Their population status is described as in recovery, with the breeding population doubling every 6-7 years (USFWS 1986). In the Pacific region, development-related habitat loss was identified to be a major factor limiting the abundance and distribution of bald eagles (assessment section 2.3.8). Loss of prey and human disturbance are the threats to bald eagle populations (USFWS 1986).

Bald eagles nest in forested areas near the ocean, along rivers, and at estuaries, lakes, and reservoirs. Eagles usually nest in mature conifers with gnarled limbs that provide ideal platforms for nests. Ponderosa pine, Douglas fir, and black cottonwood are preferred nest trees in the Pacific recovery area (USFWS 1986). This plan supports improvements in bald eagle habitats through objectives and strategies that improve livestock grazing practices in riparian areas, snag maintenance in mature pine/fir forests (to provide perches and/or nest trees), restoration of fire regimes to maintain large tree species preferred by bald eagles (ponderosa pine and Douglas fir respond to periodic burns), and efforts to protect and restore anadromous fish runs (prey base) (section 3.2.2).

*5.1.2.6 Lynx (*Lynx canadensis*)*

On March 24, 2000, the North American lynx (*Lynx canadensis*) was federally listed as threatened (65 FR 16051) under the ESA. Critical habitat has not been designated as no recovery plan currently exists for lynx. However, the *Canada Lynx Assessment and Strategy* (Ruediger et al. 2000) describes conservation measures and objectives (M. Hemker, USFWS, personal communication, April 6, 2004). In accordance with this interagency strategy, the USFWS, BLM, and USFS have cooperated to identify lynx analysis units (LAUs).

The lynx is a focal species in mesic forest habitats in the Salmon subbasin. The snowshoe hare and lynx require a mix of early and late seral habitats to meet their food and cover needs. The presence of cover, the primary determinant of habitat quality for snowshoe hares, is more significant than food availability. (assessment section 2.3.3, Table 2-16).

In the western mountains, lynx are associated with coniferous forests and upper elevations using early successional forest stands for foraging and mature forest stands containing large woody debris for denning. Lynx can be managed by managing for snowshoe hare (*Lepus americanus*), as they comprise up to 83% of the lynx diet. Hare populations increase dramatically following disturbance, particularly fire that creates hare cover and food, generally benefiting lynx (Ruediger et al. 2000).

Restoring fire as an ecological process was listed in the *Canada Lynx Assessment and Strategy* as a conservation measure addressing risk factors affecting lynx productivity. It was suggested that fire be used to move toward landscape patterns consistent with historical succession and disturbance regimes using mechanical pre-treatment and management ignitions as necessary. Section 3.2.2.2 describes objectives for the terrestrial ecosystem. The objective regarding fire is to restore and conserve ecosystem integrity across the landscape through restoration of natural processes, which is consistent with conservation measures for lynx.

Timber management modifies the vegetation structure and mosaic of forested landscapes and can be used as a disturbance process to create and maintain lynx habitat, and that of their prey (red squirrel and snowshoe hare). Greater emphasis has been placed on retention of live and dead trees and coarse woody debris, important habitat components (Ruediger et al. 2000). Dense horizontal cover of conifers, just above the snow level in winter, is critical for snowshoe hare habitat. This structure may occur either in regenerating seedling/sapling stands, or as an understory layer in older stands. Relatively few snowshoe hares are found in large openings, and thus lynx do not spend much time hunting in open areas, especially in winter. Clearcuts, shelterwood cuts, seed tree cuts, and diameter-limit prescriptions that result in distance to cover greater than 100 m (325 feet) may restrict lynx movement and use patterns until forest regeneration occurs. It may take approximately 15 to 30 years following forest management practices or fire for conifers and/or brush species to regenerate to heights sufficient to extend above average winter snow levels and create high quality habitat for snowshoe hare (Ruediger et al. 2000). Terrestrial Objectives to restore forest ecological integrity, including structure, function, and composition support needs for lynx (section 3.2.2.2). Unless other information becomes available, actions should remain consistent with standards and guidelines in *Canada Lynx Assessment and Strategy* (M. Robertson, USFWS, personal communication, May 14, 2004). As most habitats are in headwater systems, management should also be consistent with recommendations in the Sawtooth National Forest Land Management Plan (USFS 2003) (M. Robertson, USFWS, personal communication, May 14, 2004).

The main sources of lynx mortality are starvation (prey scarcity) and harvest by humans, which is no longer legal. It is also speculated that habitat fragmentation facilitating access by interspecific competitors may affect the structure and function of lynx populations. Plowed roads and groomed over-the-snow routes may allow competing carnivores such as coyotes and mountain lions to access lynx habitat in the winter, increasing competition for prey. Planning objectives in the *Canada Lynx Assessment and Strategy* (Ruediger et al. 2000) suggest the following to manage for recreational activities while protecting the integrity of lynx habitat:

a) Maintain the natural competitive advantage of lynx in deep snow conditions by minimizing snow compaction in lynx habitat.
b) Concentrate recreational activities within existing developed areas, rather than developing new recreational areas in lynx habitat.
c) On federal lands, ensure that development or expansion of developed recreation sites or ski areas and adjacent lands address landscape connectivity and lynx habitat needs.
A Terrestrial Objective in section 3.2.2.2 recommends actions to minimize the negative impact of current and future development on native terrestrial species and their habitats in the subbasin. Strategies include the identification, mapping, and prioritization focal habitats and travel corridors important to aquatic and terrestrial species for protection and to provide such information to regional planners and natural resource managers. Additional objectives and strategies were developed to guide efforts to reduce the impact of the transportation system and motorized access on wildlife and fish populations and habitats. Each of these objectives and strategies will support the needs of lynx.

*5.1.2.7 North Idaho ground squirrel (*Spermophilus brunneus brunneus*)*

The northern Idaho ground squirrel was federally listed as a threatened species on April 5, 2000 (65 FR 17779). One of the rarest of North American ground squirrels, this species inhabits 24 sites in the Little Salmon watershed (i.e., Adams and Valley counties) (assessment section 2.3.8).

The entire range of this subspecies of ground squirrel is about 32 by 108 kilometers (20 by 61 miles), and as of 2002, 34 of 40 known population sites were extant. The subspecies declined from an estimated 5,000 individuals in 1985, to less than 1,000 by 1998, when it was proposed for listing (USFWS 2003). By the year 2000, preliminary surveys indicated that only about 350 individuals remained at known population sites. Based on more extensive census data collected in the spring of 2002, the population was estimated to be 450 to 500 animals (USFWS 2003). Delisting may be considered when recovery criteria have been met. Namely, when 10 of the 17 potential metapopulations have been identified within the probable historical distribution, each maintaining an average effective population size of greater than 500 individuals for 5 consecutive years (USFWS 2003).

The northern Idaho ground squirrel occurs in shallow, dry rocky meadows usually associated with deeper, well-drained soils and surrounded by ponderosa pine and Douglas-fir forests at elevations of about 915 to 1,650 meters (3,000 to 5,400 feet). Similar habitat occurs up to at least

1,830 meters (6,000 feet). Consequently, ponderosa pine/shrub-steppe habitat association with south-facing slopes less than 30 percent at elevations below 1,830 meters (6,000 feet) is considered to be potentially suitable habitat (USFWS 2003). Environmental Objectives in section 3.2.2.2 will support recovery criteria by conserving and maintaining mature/old growth “open” stands of ponderosa pine and Douglas fir forest habitats, and supporting the ecological integrity of native grassland remnants.

The northern Idaho ground squirrel is primarily threatened by habitat loss due to forest encroachment into former suitable meadow habitats. Forest encroachment results in habitat fragmentation, eliminates dispersal corridors, and confines the northern Idaho ground squirrel populations into small isolated habitat islands. The subspecies is also threatened by land-use changes, recreational shooting, poisoning, genetic isolation and genetic drift, random naturally occurring events, and competition from the larger Columbian ground squirrel (*S. columbianus*) (USFWS 2003).

The primary cause of habitat loss is meadow invasion by conifers. Fire suppression has allowed conifers to invade once suitable meadow habitats. The dense regrowth of conifers resulting from past logging activities have also significantly reduced meadow habitats for ground squirrels over the past 40 years. As the amount of meadow habitat has been reduced, ground squirrel dispersal corridors have been reduced or eliminated, further constricting the subspecies into smaller isolated areas (USFWS 2003). Environmental Objective in section 3.2.2.2 to manage fire on the landscape to achieve natural ecosystem processes and succession supports Northern Idaho ground squirrel recovery efforts.

For the past 70 years, agricultural conversion and rural housing developments near the communities of Round Valley, New Meadows, and Council, Idaho, have fragmented some suitable habitat formerly occupied by the northern Idaho ground squirrel. Various other types of developments continue to threaten remaining occupied sites in Adams and Valley Counties. Following completion of a golf course and associated housing development, ground squirrels were eradicated due to their impacts to the fairways and golf greens (USFWS 2003). Environmental Objectives to minimize the potential negative impacts of current and future development on native species and habitats in the subbasin will support recovery criteria for ground squirrels. Especially helpful will be a strategy to work with city and county governments to include consideration of critical habitats in the planning process, while providing information on the impacts of development on species and habitats.

Some activities or lack of management on private property appear to pose a threat to northern Idaho ground squirrels. Of the 34 extant population sites, 13 are entirely on private property, 2 are on both private and Federal property, and 1 is on both private and State property. Implementing management or survey activities for northern Idaho ground squirrels requires cooperation from private landowners making consideration of Socioeconomic Objectives (section 3.2.3) of considerable importance. Controlled burning and reseeding with suitable native forbs and grasses is important to establish appropriate food sources for ground squirrels and other animals. These are factors crucial to the continued survival and recovery of northern Idaho ground squirrels, but are often difficult to implement on private lands (USFWS 2003).

*5.1.2.8 Spalding's catchfly (***Silene spaldingii***)*

Spalding's catchfly (sometimes called Spalding's silene), a member of the pink or carnation family, was listed as a Threatened species on October 10, 2001 (66 FR 51598) (Hill and Gray 2004). A recovery plan is in early stages of development and has not yet been released. The 2004 Conservation Strategy for Spalding's Catchfly (Hill and Gray 2004) is a useful interim guide for describing limiting factors, protection and restoration priorities, and additional survey needs (M. Hemker, USFWS, personal communication, April 6, 2004).

Seven populations occur in Idaho in the Lower Salmon and Middle Salmon–Chamberlain watersheds (i.e., Idaho, Lewis, and Nez Perce counties) (assessment section 2.3.8). Spalding's Catchfly prefers open native grassland habitats and is associated with Idaho fescue (*Festuca idahoensis*), rough fescue (*F. scabrella*), or bluebunch wheatgrass (*Pseudoroegneria spicata*, formerly called *Agropyron spicatum*). Scattered individuals of ponderosa pine may also be found in or adjacent to Spalding's catchfly (Hill and Gray 2004).

Weed invasion is the major cause of Spalding's catchfly habitat degradation. Disturbances to soil and vegetation, both natural (fire, soil slumps, animal burrowing and trailing, etc.) and anthropogenic (livestock grazing and trampling, cultivation, road-building, fire suppression activities, off-road recreational use, etc.) are also major contributing factors (Hill and Gray 2004). Terrestrial Objectives in section 3.2.2.2 to prevent the introduction of exotic invasive plant species into native habitats and to reduce the extent and density of established exotic invasive plant species will support recovery efforts.

Livestock grazing has major negative effects on Spalding's catchfly and its habitat (Hill and Gray 2004). Prolonged heavy grazing pressure from domestic livestock in some areas has resulted in major alterations of the structure, function and composition of the fescue bunchgrass communities that support Spalding's catchfly and has also promoted weed invasion. Terrestrial Objectives in section 3.2.2.2 to reduce impacts of livestock interactions with vulnerable terrestrial species populations and to restore ecological integrity in upland grasslands, riparian areas, and forest habitats supports recovery efforts.

Life histories of native plant species are often fine-tuned to a particular regime of fire frequency, intensity and seasonal distribution (Hill and Gray 2004). Alterations of fire regimes, including fire suppression, increasing fire severities and frequencies, and out-of-season fires, have potential to degrade Spalding's catchfly habitat. A Terrestrial Objective in section 3.2.2.2 is to restore and conserve ecosystem integrity across the landscape through restoration of natural processes, using methods including prescribed fire, wildfire use for resource benefit (WFURB), and mechanical methods (thinning and harvest).

Fifty-two percent of Spalding's catchfly populations occur on private lands; not including the 12% of populations in which a private individual or corporation is a part-owner (Hill and Gray 2004). As a result, integration of Socioeconomic Objectives and associated strategies in section 3.2.3 are important for successful implementation of Spalding's catchfly protection and restoration activities.

The conservation recommendations for Spalding's catchfly focus on protection of existing populations and habitats, and maintenance of potential habitat (Hill and Gray 2004). The following recommendations were summarized by Hill and Gray (2004) to reduce the most imminent and pervasive threats to Spalding's catchfly and its habitat. In order of priority, recommendations address the following issues (additional details can be found in Hill and Gray 2004): 1) habitat degradation from non-native invasive plants, and major contributing disturbance factors, livestock grazing and fire (see additional guidelines for effective weed, livestock, fire management, and habitat restoration), 2) inventory of potential unsurveyed habitat (specific recommendations identify areas with immediate survey needs), 3) habitat fragmentation (specific recommendations are given to help protect pollinators, reduce further habitat fragmentation, protect small populations on isolated habitat fragments, retain genetic diversity of threatened small populations, and suggest areas that would allow protection of groups of small populations), 4) monitoring (recommendations identify priority monitoring needs and provide suggestions of appropriate monitoring methodology), and 5) reporting and record-keeping (recommendations are made to help standardize and improve reporting and record-keeping across the four-state region of Spalding's catchfly known distribution). The aquatic and terrestrial priorities (section 6) in the Salmon subbasin to protect existing habitat and build from strength are consistent with recommendations for Spalding's catchfly conservation.

*5.1.2.9 MacFarlane's four o'clock (***Mirabilis macfarlanei***)*

MacFarlane's four o'clock was originally listed as endangered in 1979 (44 FR 61912). Due to the discovery of additional populations and ongoing recovery efforts, the species was downlisted to threatened in March 1996. MacFarlane's four o'clock is endemic to the low-elevation grassland habitats in the Imnaha, Snake and Salmon river canyons of Wallowa County, Oregon, and Idaho County, Idaho. It is currently found in 11 populations in Idaho and Oregon. As part of the 1985 recovery plan objectives, one new population was established at Lucile Caves along the Salmon River canyon. This colony appears to be stable (assessment section 2.3.8). MacFarlane's four o'clock and its habitat have been, and continue to be, threatened by a number of factors, including herbicide and pesticide spraying, landslide and flood damage, disease and insect damage, exotic plants, livestock grazing, off-road vehicles, and possibly road and trail construction and maintenance (USFWS 2000). Care should be taken to protect MacFarlane's four o' clock during noxious weed or other invasive exotic treatments (Terrestrial Objective in section 3.2.2.2).

*5.1.2.10 Wolf (***Canis lupus***)*

The gray wolf (*Canis lupus*) was listed as endangered under the ESA on March 9, 1978 (43 FR 9607). On November 22, 1994, areas in Idaho, Montana and Wyoming were designated as non-essential experimental populations in order to initiate gray wolf reintroduction projects in central Idaho and the Greater Yellowstone Area (59 FR 60252, 59 FR 60266). Special regulations for the experimental populations allow flexible management of wolves, including authorization for private citizens to take wolves in the act of attacking livestock on private land (USFWS 1987). Recovery criteria for wolves in the Central Idaho Recovery Area are a minimum of 10 breeding pairs (or about 100 wolves) for a minimum of three successive years (USFWS 1987). Wolves reintroduced in Idaho traveled widely and generally northward, but most remained on public land within the core reintroduction area (Bangs and Fritts 1996). The Salmon subbasin are in the Central Idaho Recovery Area (USFWS 1987).

A Terrestrial Objective in section 3.2.1 aims to increase understanding of existing and historic composition, recent population trends, habitat conditions and trends, and limiting factors of the terrestrial species of the Salmon subbasin. This objective and associated strategies support the actions or "tasks" needed to recover the Northern Rocky Mountain Wolf (USFWS 1987).

Recommended actions are to determine the present status and distribution of gray wolves in the Northern Rocky Mountains and devise a systematic approach for compiling observations and other data on the wolf (USFWS 1987), which is consistent with Strategies 13A1, 2, 5, and 6 in this subbasin plan. Specific tasks that should be considered are to: 1) determine the size of home range for packs, pairs, and lone wolves, 2) estimate the numbers of packs, pairs, and individuals in each area, 3) estimate pup/adult ratios, 4) estimate numbers of litters and litter sizes, 5) determine population trends over time, and 7) further understanding of wolf ecology by evaluating prey requirements, habitat requirements, and interactions with other carnivores (USFWS 1987). It is likely that general habitat management actions in this plan (weeds, fire, etc.) will have little effect on wolves themselves. Effects on their main prey source, elk and deer, should be considered (M. Robertson, USFWS, personal communication, May 14, 2004).

5.2 Clean Water Act Considerations

Formed in 1970, the U.S. Environmental Protection Agency (USEPA) administers the federal Clean Water Act (CWA), requiring enforcement of water quality standards by states. These standards are segregated into *point* and *nonpoint* source water pollution, with point sources requiring permitting. Although controversial, this segregation means that most farming, ranching, and forestry practices are considered nonpoint sources and thus do not require permitting by the USEPA. A TMDL, or total maximum daily load, is a tool for implementing water quality standards where impairment of beneficial uses exists (section 5.2.2) (USEPA 2004). The USEPA provides funding through Section 319 of the CWA for TMDL implementation projects. Section 319 funds are administered by IDEQ in Idaho (USEPA 2004).

In satisfaction of the nonpoint source pollution (NPS) control program update mandate, generally referred to as Section 319 of the CWA, the state of Idaho completed the Idaho Nonpoint Source Management Program Plan. The document represents a unified approach reflecting the State's intention to continue to plan, implement and prioritize actions to address NPS problems on a statewide basis, while avoiding undue duplication of effort (ODEQ 2000).

The Idaho Nonpoint Source Control Program Plan is an "umbrella" under which all CWA activities in Idaho are consistent. Objectives and strategies in the *Salmon Subbasin Management Plan* will be consistent and integrated with the water quality management plans in the state (NPCC 2001).

5.2.1 Consistency with Idaho State's Water Quality Management Plan

The revised 1999 Idaho Nonpoint Source Management Program Plan outlines the state's strategy to meet the EPA's revised Clean Water Act 319 program guidance dealing with nonpoint source pollution (IDEQ 1999). The primary purpose of the Nonpoint Source Assessments and Management Programs is to provide the states and tribes with a new blueprint for implementing integrated programs to address priority nonpoint source water quality problems. The focus is needed in order to identify innovative funding opportunities and to effectively direct limited resources toward the highest priority issues and water bodies. Subbasin planning efforts should be consistent and coordinated with the State's Water Quality Management Plan (NPCC 2001).

The Idaho Nonpoint Source Management Program seeks to incorporate nine elements identified as necessary components for nonpoint source programs (IDEQ 1999):

1. Explicit short and long-term goals, objectives and strategies to protect surface and groundwater.

2. Strong working partnerships and collaboration with appropriate state, tribal, regional, and local entities, private sector groups, citizens' groups, and federal agencies.

3. A balanced approach that emphasized both statewide nonpoint source programs and on-the-ground management of individual watersheds where waters are impaired or threatened.

4. The program (a) abates known water quality impairments resulting from non-point source pollution, and (b) prevents significant threats to water quality from present and future activities.

5. An identification of waters and watersheds impaired or threatened by nonpoint source pollution and a process to progressively address these waters.

6. The State reviews, upgrades, and implements all program components required by §319 of the Clean Water Act and establishes flexible, targeted, interactive approaches to achieve and maintain beneficial uses of waters as expeditiously as practicable.

7. Identification of Federal lands and objectives which are not managed consistently with State program objectives.

8. Efficient and effective management and implementation of the State's nonpoint source program, including necessary financial management.

9. A feedback loop whereby the State reviews, evaluates, and revises its nonpoint source assessment and its management program at least every five years.

General long-term goals were developed by incorporating these elements. These goals were meant to focus implementation efforts and measures identified in approved TMDL and Watershed Restoration Action Strategies (WRAS) to protect and restore beneficial uses. Additional efforts include preventing significant threats from present and future activities from degrading water quality. Finally, long-term goals were to target nontraditional partners and incorporate their roles into planning and implementation activities. These partners potentially include the Idaho Cattle Association, or irrigation and canal districts, for example (IDEQ 1999). The following are goals for nonpoint source management in Idaho (IDEQ 1999).

1. Develop and implement coordinated restoration and water quality improvement plans (TMDL/WRAS/ or other implementation plans) which include appropriate BMP design, implementation, monitoring, and maintenance schedules for nonpoint source impacted surface and ground waters that help to restore, protect, or remediate (where appropriate) existing or designated beneficial uses of the State's surface and ground waters (#/yr).

2. Implement nonpoint source BMPs to meet approved TMDLs, TMDL implementation plans, and ground water standards.

3. Provide technical assistance in the development of surface and ground water BMPs and pollution prevention strategies for nonpoint source categories which are not currently listed as approved in the water quality standards.

4. Confirm that all agencies are implementing the nonpoint source management feedback loop in a manner consistent with the nonpoint source management program and, where appropriate, are revising and/or maintaining BMP catalogs and effectiveness protocols.

5. Support ground or surface water monitoring efforts which provide needed data for contaminant transport modeling and investigation work.

6. Integrate ground and surface water quality concerns within basins and watersheds to provide for better protection and restoration (where appropriate) of ground and surface water beneficial uses.

7. Develop and implement pollution trading approaches.

8. Implement measures to protect drinking water from the effects of nonpoint source activities.

9. Update and maintain the Nonpoint Source umbrella Memorandum of Understanding and appendices.

The vision of the Idaho Nonpoint Source Management Program is that all long-term goals and short-term objectives be implemented in a manner to protect or restore (where possible) the beneficial uses of the State's surface and ground water (IDEQ 1999). The continuing focus for the State of Idaho within the foreseeable future will be to develop and implement TMDLs/WRASs for §303(d) listed water bodies. The state of Idaho has committed to the completion of TMDL implementation plans within an 18 month period following the EPA approval of a TMDL (IDEQ 1999).

The vision and guiding principles (sections 2.1 and 2.2) and biological, environmental, and socioeconomic objectives (section 3) in the *Salmon Subbasin Management Plan* are consistent and supportive of the key elements of the Idaho Nonpoint Source Management Program. Long and short-term goals have been established. Monitoring and evaluation activities (section 4: M&E) describe measurable short-term outcomes and expected biological response of implementation strategies. Working partnerships and collaborative efforts have been developed during subbasin planning and public involvement meetings (section 1.2). Local involvement during activities in impaired watersheds has been recommended (section 3.2.3: Socioeconomic objectives). Data gaps, research needs and monitoring activities are recommended and a feedback loop for adaptive management described (section 4: Research, monitoring, and evaluation).

5.2.1.1 303(d) Listed Segments

Section 303(d) of the CWA requires that water bodies violating state or tribal water quality standards be identified and placed on a 303(d) list. Water bodies that do not meet water quality standards with implementation of existing management measures are listed as impaired under §303(d) of the CWA. It is each state's responsibility to develop its respective 303(d) list and establish a TMDL for the parameter(s) causing water body impairment (USEPA 2004).

Eighty-nine water bodies in the Salmon subbasin are classified as impaired under the guidelines of Section 5 of the 2002 Integrated Report (IDEQ 2003) (Figure 1-15). The primary parameters of concern are sediments (88 cases), nutrients (17 cases), flow alteration, maximum temperatures, and habitat alteration (assessment section 1.7.1, Table 1-15).

5.2.2 TMDLs in Salmon subbasin

A TMDL, or total maximum daily load, is a tool for implementing water quality standards and is based on the relationship between pollution sources and in-stream water quality conditions. The TMDL establishes the allowable loadings or other quantifiable parameters for a water body and thereby provides the basis to establish water quality-based controls. These controls should provide the pollution reduction necessary for a water body to meet water quality standards (USEPA 2004).

Total maximum daily load (TMDL) standards were approved for the Lemhi (IDEQ 1999), Middle Salmon–Panther (IDEQ 2001a), Pahsimeroi (IDEQ 2001b), and Upper Salmon (IDEQ 2003) watersheds. Watershed assessments and TMDL standards are to be developed for the Lower Salmon and Little Salmon watersheds in 2004 and the Middle Fork Salmon watershed in 2005 (assessment section 1.7.1). The primary parameters of concern (sediments, nutrients, flow alteration, temperature, and habitat alteration) are addressed as watershed level problems in section 0.

6 Prioritization

The following section prioritizes needed actions and then makes recommendations for implementing the actions.

The scale of limiting factors impacting species and habitats in the Salmon subbasin dwarfs the financial resources available over the short-term for protection and rehabilitation efforts. Clearly, as not all problems can be fixed immediately with existing and potential resources, the limited resources available must be used as efficiently and effectively as possible. The number of issues and diversity of species and habitats impacted make prioritization a major task that must be periodically repeated and fine-tuned based on new information. Filling key data gaps (section 6.1) will further improve the accuracy of prioritization processes.

Data is constantly being collected to fill data gaps and to show that activities improve problems. This new data must be integrated into an ongoing process of evaluation and improvement of implementation activities. Implementation activities should not be stalled until this prioritization takes place. The limited resources available need to be used as efficiently as possible. The great diversity of issues and factors that need to be considered make prioritization a large task that will need to be frequently repeated and fine-tuned based on new information.

6.1 Aquatic Prioritizations

6.1.1 Prioritization Discussion

The general agreement among the Technical Team members was that to conduct a scientifically valid prioritization, certain information that is not currently available would be needed (e.g., basic egg to fry, parr, presmolt, and smolt survival information, population-specific adult abundance and productivity key performance data). The Fisheries Technical Team also felt that our prioritization attempts would be more or less meaningless until out-of-basin effects were addressed. Perhaps the biggest problem with prioritizing by species or by geographic area in a subbasin the size of the Salmon is that of scale; while it may be possible to prioritize where actions should occur first and for which species in a system the size of Asotin Creek or the Imnaha River, it becomes unrealistic to do so when dealing with ten 4th field HUCs, each of which differs significantly in geographic characteristics, land-use issues, and population-specific differences.

Prioritization of specific actions needed to recover aquatic focal species in the Salmon subbasin was carried out by the Fisheries Technical Team. The following steps were taken to prioritize limiting factors:

1. The technical team evaluated the condition of 13 key aquatic ecosystem environmental/habitat components

2. The assessments were based on a combination of sources, including the literature, direct observation, local knowledge, and professional judgment.

3. Components were spatially ranked in terms of their current condition relative to a reference, or potential condition. Altered ecosystem components were ranked from 1 (least influence on ecosystem or populations) to 3 (greatest influence on ecosystem or population). The team

agreed that the highlighting of one component did not necessarily imply that all others were functioning appropriately, and that it is likely that the highest ranked component represented a cumulative effect of other altered components.

Upon generating a list of prioritized limiting factors affecting focal species within watersheds (subdivided by drainage or tributary where necessary), the Technical Team discussed ways in which to prioritize among watersheds. The considerations associated with a "between-watersheds" ranking include (but are not exclusive of) the following:

- Relative degree of human impact in the respective assessment units (e.g., restoration potential)
- Weighting of species/population importance (e.g., socioeconomic considerations, cultural considerations, ecologic considerations, status, etc.)
- Spatial structure
- Hatchery influence
- Abundance
- Productivity
- Diversity

Based on the review of these and other complexities, the Technical Team agreed that prioritization between watersheds was not feasible. The group therefore agreed to use the within-watershed, environmental/habitat action prioritization initially conducted for the assessment (section 3.1). Actions indicative of highest priority are shown in Table 7 and Table 8. The weakness in this approach, however, is that the focus on environmental limiting factors and problem statements does not adequately address or balance biological limiting factors within the prioritization framework.

The upper Salmon technical team supported the use of additional ranking criteria (see below) for projects in the upper Salmon subbasin. In the event where a project planner were to encounter more than one "high priority" limiting factor (e.g., multiple scores of 3 occurring in one column) in a given analysis unit, the Technical Team agreed that an additional ranking criteria would be warranted. The project ranking criteria developed for the Upper Salmon Model Watershed Council facilitates this need by factoring in multi-species benefits, habitat benefits, species status, long-term effectiveness, and other information that would provide for the additional level of prioritization. The questionnaire below is based on a total of 115 possible points:

A. Fish species that are expected to benefit from the project (15 points)
   1. Anadromous and bull trout and westslope cutthroat trout (15 points)
   2. Anadromous or bull trout or other listed (10 points)
   3. Other native fish species, or native fish benefit indirectly (5 points)
   4. No native fish will benefit (0 points)
   5. No target fish species will benefit (project ineligible)

B. Project is expected to protect or increase available habitat (20 points): (**Note**: Score greater alternatives. For example, project benefits are in <10% of watershed (5 pts) but in >2.0 miles of stream (15 pts), score as 15 points.)
   1. Greatly (20 points) on a watershed scale*
   2. Moderately (15 points): in >2.0 miles of stream or >25% of watershed
   3. Somewhat (10 points): in 0.5–2.0 miles of stream or 10–25% of watershed
   4. Limited (5 points): in <0.5 miles of stream or <10% of watershed
   5. No protection increase (project ineligible)

C. What is the immediacy of threatened impacts at the site? (10 points)
   1. High potential threat of loss/impact (10 points)
   2. Potential threat of loss or impact (5 points)
   3. No evidence or minimal threat (0 points)

D. Long-term effectiveness of the project (15 points)
   1. Project solves original problem and benefits/addresses other problems (15 points)
   2. Project solves original problem (10 points)
   3. Project partially solves original problem, other factors compromise effectiveness (5 points)
   4. Project does not deal with the cause of problem, or potential effects are uncertain (0 points)

E. Project will benefit target fish species by protecting, restoring, or enhancing (15 points maximum—score all that apply)
   1. Stream channel—dredging, habitat complexity (pools, root wads, etc.) (2 points)
   2. Stream banks—armoring, barbs, bioengineering, stabilization, etc. (2 points)
   3. Spawning and rearing habitat—opening sidechannels, water quality (sediment/chemical), etc. (4 points)
   4. Fish passage, connectivity—removal of barriers, increased flow, etc. (5 points)
   5. Bank and channel cover—vegetation, shading, etc. (2 points)

F. Expected benefits relative to cost (10 points)
   1. Project benefits high relative to cost (10 points)
   2. Project benefits substantial to cost (7 points)
   3. Project benefits about equal to cost (5 points)
   4. Project cost somewhat exceeds benefits (3 points)
   5. Project cost greatly exceeds benefits (0 points)

G. Cost sharing or in-kind services (10 points)
   1. Multiple funding sources with financial and/or in-kind support from landowner (10 points)
   2. Available funding with financial and in-kind support from landowner (7 points)
   3. Available funding with financial or in-kind support from landowner (5 points)
   4. Solely funded by BPA no landowner cost-share (3 points)
   5. Project does not fit criteria for available funding sources (0 points)

H. Project compliments existing or proposed projects or land management concerns (10 points)

1. Project compliments two or more existing or proposed projects or land management concerns (10 points)
2. Project compliments one other existing or proposed projects or land management concerns (5 points)
3. Project addresses other land management concerns (TMDL, etc.) (3 points)

I. When will project benefits be realized (10 points)
1. 0–2 years (10 points)
2. 2–10 years (7 points)
3. 10–20 years (5 points)
4. 20+ years (3 points)

6.2 Terrestrial Prioritizations

The Terrestrial Technical Team collaboratively prioritized the terrestrial components of the Salmon Subbasin Management Plan. The Technical Team ranked the impacts of the six limiting factors for each watershed in the Salmon subbasin (

Table 17). The results suggest that the Upper Middle Fork, Lower Middle Fork, and Middle Salmon–Chamberlin watersheds are impacted the least by the six limiting factors. Middle Salmon–Panther, Lemhi and Upper Salmon watersheds are impacted the most by the six limiting factors. Altered fire regime has resulted in the greatest impacts across all watersheds in the Salmon subbasin, followed by the introduction of exotic invasive plant species, altered hydrologic regimes, grazing and browsing by domestic animals, land-use conversion, and timber harvest (see Assessment section 3.1). The Technical Team developed guiding principles for prioritization for both protection and restoration based on this ranking exercise and through a brainstorming exercise. The Technical Team then proceeded by discussing the limiting factors in terms of the guiding principles. This discussion was systematic (in terms of discussing each principle) and cumulative (in terms of discussing outcomes of simultaneous application of multiple principles). Through this exercise, the Technical Team developed a consensus statement outlining terrestrial priorities for protection and restoration in the Salmon subbasin.

Table 17. Ranking by the Fisheries Technical Team of the impacts of limiting factors for each watershed in the Salmon subbasin (0 = none to insignificant, 1 = low, 2 = moderate, and 3 = high). ([a] Historically, timber harvest was high in this watershed).

Watershed	Altered Fire Regime	Grazing/ Browsing	Altered Hydrologic Regime	Timber Harvest	Land-Use Conversion	Invasive/ Exotics
UPS	3	3	3	2	3	2
PAH	3	3	3	1	3	2
LEM	3	3	3	2[a]	3	3
MFL	2	1	1	0	0	2
MFU	2	1	1	0	0	1
MSC	2	1	1	0	0	2

MSP	3	3	3	2	3	3
SFS	3	2	1	1 [a]	0	2
LOS	3	3	2	2	1	3
LSA	3	3	3	2	2	2

The ranking exercise provided the following results that were used to determine priority areas for restoration and protection as well as the priority limiting factors to be addressed in those areas

Most impacted watersheds:

1. Middle Salmon–Panther (MSP)
2. Upper Salmon (UPS)
3. Lemhi (LEM)
4. Little Salmon (LSA) **and** Pahsimeroi (PAH)
5. Lower Salmon (LOS)
6. South Fork Salmon (SFS)
7. Lower Middle Fork (MFL) **and** Middle Salmon–Chamberlain (MSC)
8. Upper Middle Fork (MFU)

Impact of limiting factor across all watersheds:

1. Altered fire regime
2. Invasive/Exotics
3. Altered hydrologic regime
4. Grazing/browsing
5. Land-use conversion
6. Timber harvest

The Salmon Terrestrial Technical Team developed the following guiding principles for prioritization of activities in the Salmon subbasin:

1. Prioritize areas for protection and restoration at the watershed scale. It is too expensive and impractical to address a particular limiting factor across the entire subbasin, so the limiting factors should be addressed by watershed. Figures from the assessment were used to start discussion about which limiting factor was most important in each watershed.

2. Build from strength. For protection, work from the areas in the best condition outward. Guidance from the 2000 Columbia River Basin Fish and Wildlife Program suggests that efforts to improve the status of fish and wildlife populations in the basin should protect habitat that supports existing populations that are relatively healthy and productive. Next, efforts should expand to adjacent habitats that have been historically productive or have a likelihood of sustaining healthy populations by reconnecting or improving habitat. The efforts should try to conserve the best areas of the subbasin and then build into areas with high need.

3. Prioritize for multiple species and benefits. Restoration projects that benefit multiple species in single or multiple habitat types should receive priority.

4. Prioritize according to expected biological benefits. Choose restoration projects that get the most "bang for the buck."

5. Maximize overlap between terrestrial and aquatic benefits. Efforts should address areas and limiting factors that provide the greatest benefit to both terrestrial and aquatic species and habitats.

6. Prioritize projects that benefit fish and wildlife **and** local communities. When selecting among projects that offer similar biological benefit, choose projects that provide the most benefit to local communities.

7. Prioritize strategies and activities that are practical and possible. Consider where a project or strategy is cost-efficient, whether it has beneficial or acceptable economic and social impacts, and whether it is likely to provide significant benefits within the scale of the limiting factors.

8. Prioritize strategies that address programs such as ESA recovery goals and species conservation agreements. Projects that benefit ESA targeted species and habitat should be prioritized over projects that do not. This often will serve as an additional layer when prioritizing projects that benefit multiple species, with ESA benefits adding additional weight to particular options.

Unlike other subbasins in the Columbia River Basin, the Salmon subbasin has large areas where the composition, structure and function of the aquatic, wetland and riparian ecosystems have been relatively undisturbed by anthropogenic effects (see Assessment section 3.1). The three watersheds identified by the ranking exercise as being least impacted by the six limiting factors are the watersheds that contain the Frank Church River of No Return Wilderness (MSC, MFL, MFU). The Upper Middle Fork, Lower Middle Fork, and Middle Salmon–Chamberlin watersheds were determined to provide a "core" area of high quality habitat. The team used the "build from strength" guiding principle to determine that the "core" area, which contains the most intact and continuous habitat as well as supports existing populations that are relatively healthy and productive, should have first priority for protection. The second priority area for protection was determined to be those watersheds directly abutting the "core" area, which include MSP, UPS, SFS, and LOS.

Priority areas for restoration were determined to be those areas that are critical for terrestrial and aquatic species of special status. The LEM and PAH watersheds were identified as being priority areas for restoration due to their importance for salmonid spawning and sage grouse habitat. LEM and PAH are among the watersheds being more impacted by the limiting factors.

The following structure provided a guide during prioritization discussions:

1. Identify watershed(s) to be protected.
2. Identify habitat(s) to be focused on (optional).
3. Identify limiting factor(s) to be addressed.
4. Rank strategies to address the limiting factor(s).

Through application of the guiding principles for prioritization, the Technical Team derived the following recommendations for prioritization of restoration and protection activities in the subbasin:

Priority 1: Target prevention and reduction of exotic invasive plant species in "core" area (first priority) and all other watersheds.

WATERSHED(S): MSC, MFL, MFU (first priority), and all other watersheds

HABITAT(S): See Frank Church- River of No Return Wilderness, Cooperative Weed Management Area (FC-RONRW CWMA) Strategic Plan and other local CWMAs
LIMITING FACTOR(S): Exotic invasive plant species
STRATEGIES: See Frank Church- River of No Return Wilderness, Cooperative Weed Management Area (FC-RONRW CWMA) Strategic Plan and other local CWMAs

Comments: Many exotic invasive plant species, including spotted knapweed and rush skeletonweed have invaded this wilderness area and are threatening many of the native habitats. The "core" area is not currently protected from exotic invasive plant species. The "core" area is being invaded by exotic invasive plant species because insufficient resources have been allocated to address protection from and reduction of exotic invasive plant species. Treatment of exotic invasive plant species in the core area will inhibit these species from spreading to the watersheds that are currently not infested. Protecting the "core" from exotic invasive plant species and reducing exotic invasive plant species that are already established is an activity that is practical and possible and should be the top priority within the Salmon subbasin. The FC-RONRW CWMA Strategic Plan should be used to identify habitats, areas, and activities that should be given top priority within the FC-RONRW.

Following prevention and reduction of exotic invasive plant species in "core" area, priority should be given to prevent and reduce exotic invasive plant species in all other watersheds. Targeting the prevention and treatment of exotic invasive plant species in all watersheds is crucial for the protection of the "core" area from exotic invasive plant species. Prevention and treatment of exotic invasive plant species across the subbasin is practical and possible and should be a priority within the Salmon subbasin. Local CWMA's should be used to identify habitats, areas, and activities that should be given top priority within each watershed.

Priority 2: Restore natural disturbance regimes.

WATERSHED(S): LOS, LEM, UPS, MSP, PAH
HABITAT(S): Dry pine, aspen, shrub-steppe
LIMITING FACTOR(S): altered fire regime
STRATEGIES: Prioritized strategies for restoring natural disturbance regimes include the following:

1. Support ongoing efforts
2. Focus on dry pine, aspen, and shrub-steppe habitat types
3. Identify habitats most in need of restoration and areas which will result in the greatest benefit to multiple species

Comments: Restore natural disturbance regimes by use of fire or mechanical means. Areas to restore natural disturbance regime were prioritized by using assessment section 3.1 to determine which areas in the subbasin have the highest departure from natural fire regime, and which areas are at the greatest risk for severe burns. The Lower Salmon was as having the highest departure from natural fire regime and consequently is at highest risk of severe burns. Restoration of natural disturbance regimes should include projects directed toward fuel reduction by fire or mechanical means and prevention of encroachment by conifers into shrub-steppe and aspen habitats. Priority for restoration should be given to areas identified as being most critical for wildlife species. Identified priority areas for restored disturbance regime should the greatest benefit for multiple species. Priority areas could be areas with large ponderosa pine patches, large diameter trees, or areas with a lot of encroachment. Restoration efforts should be focused on public lands.

The FC-RONRW was not considered as a priority area because the Payette, Salmon, and Challis areas have burned recently. To restore natural fire regime within the FC-RONRW see the FC-RONRW Management Plan.

Priority 3: Minimize grazing impacts.

WATERSHED(S): LEM, LSA, LOS, UPS, PAH, MSP
HABITAT(S): Riparian and wetland
LIMITING FACTOR(S): Grazing and browsing
STRATEGIES: The following strategies are taken from objective 57A2 and have not been ranked in order of importance:

57A1. Identify and prioritize areas impacted by grazing for protection and restoration.

57A2. Implement proper grazing management --encourage establishment of riparian pasture systems, exclusion fences off-site watering areas, or riparian conservation easements. Adjust seasonal timing of livestock grazing to minimize soil compaction, erosion and noxious weed propagation.

57A3. Prevent seed dispersal--minimize the potential for livestock to facilitate the spread of exotic invasive plant species through weed-free hay programs, quarantine requirements, and other actions

57A4. Monitor and evaluate the effort to protect and restore habitats from grazing impacts. Integrate new information into Strategy 9A1 and modify implementation strategies as necessary.

Comments: The assessment section 3.1 was used to determine which watersheds have been most impacted by grazing. All the watersheds with the exception of MFU, MFL, MSC, and SFS were identified as priority areas for restoration efforts to minimize the impacts of grazing. Riparian and wetland habitats are most impacted by grazing and therefore should be priority areas for restoration efforts. Priority areas within each watershed should be identified and current restoration and prevention activities should be supported.

Priority 4: Travel management and access.
WATERSHED(S): all watersheds
HABITAT(S): all habitats
LIMITING FACTOR(S): motorized access
STRATEGIES: The following strategies should be considered for travel management (strategies have not been ranked in order of importance):

1. Research to determine if all access routes are necessary

2. Look at travel management across the subbasin and identify habitats where negative impacts are excessive
3. Manage access so that off road vehicles are restricted to certain areas
4. Prioritize areas and seasons of the year that wildlife is most vulnerable, i.e., calving and nesting sites in spring and winter range

Comments: Efforts should be made to reduce the impact of the transportation system and motorized access on wildlife and fish populations and habitats. Motorized access has impacted wildlife security, especially in natal and wintering areas and seasons, and in high elevation habitats. Limit human disturbance of wildlife, especially at times and in seasons that wildlife is most vulnerable.

7 Recommendations and Conclusions

The Planning Team developed the following recommendations to help guide implementation of this plan in the Salmon subbasin.

7.1 General Recommendations

The purpose of the NPCC Fish and Wildlife program is to mitigate the impacts of the federal hydropower system on fish and wildlife resources. The purpose of this plan is to maintain "a productive and sustainable ecosystem which is resilient to natural and human disturbance, with diverse, native aquatic and terrestrial species, which will support long-term sustainable resource-based activities and harvest goals, while managing the impacts and needs of a growing human population" (Salmon Subbasin Vision Statement).

The Planning Team believes that implementing this plan will provide opportunities for local natural resource-based economies to coexist and participate in recovery of aquatic and terrestrial species and habitats. Critical to the successful implementation of this plan is the increase in local participation and contribution to information, education, problem solving, and subbasin wide conservation efforts. It is important to promote the understanding and appreciation of healthy and properly functioning ecosystems with residents and stakeholders in the subbasin.

The Planning Team also believes a scientific foundation is needed to diagnose ecosystem problems, and to design, prioritize, monitor and evaluate management to achieve plan objectives. The *Salmon Subbasin Management Plan* provides a next step in the process, but the restraints of a short time frame and limited funding reduced the ability of this iteration of subbasin planning to provide a thorough scientific foundation and to integrate that foundation throughout the planning process. This information will also provide the scientific basis for the public involvement and education activities called for in this plan.

The Planning Team emphasizes that this plan is meant not only to recover ESA species, but also to enhance populations to healthy, harvestable levels that support tribal and public goals for fish, wildlife and plants.

7.2 Summary and Synthesis of Plan

The Salmon Fisheries Technical Team considered structural barriers and tributary connectivity to be among the most important and readily addressable factors currently limiting aquatic focal species in the subbasin. The expected biological benefits to cost ratio likely would be favorable and biologic response would be immediate. Protecting existing riparian function, and improving or enhancing conditions where limited was also considered very important. Although salmonid response would be less immediate, the expected biological benefits to cost ratio would be high. The reestablishment of a more natural hydrograph in the Upper Salmon is an important issue, and would be partially addressed by tributary reconnection. Alternative irrigation approaches, diversion consolidation, and improvements in water conveyance would further this need. Sedimentation is a concern throughout the subbasin, and is considered one of the highest priority limiting factors in geologically unstable areas. Although reductions in the amount of in-channel fine sediments have occurred, agricultural, forestry, and access management BMPs are still needed.

The Salmon Terrestrial Technical Team considered exotic invasive species to be the most important and readily addressable factors currently limiting terrestrial focal species in the subbasin. The expected biological benefits to cost ratio likely would be very favorable and biologic response would be immediate. The need to restore natural disturbance regimes, minimize grazing impacts, and manage motorized vehicle access is also a high priority. The Upper Middle Fork, Lower Middle Fork, and Middle Salmon–Chamberlin watersheds were determined to provide a "core" area of high quality habitat. The team used the "build from strength" guiding principle to determine that the "core" area, which contains the most intact and continuous habitat as well as supports existing populations that are relatively healthy and productive, should have first priority for protection. Priority areas for rehabilitation were determined to be those areas critical for terrestrial and aquatic species of special status. The LEM and PAH watersheds were identified as priority areas for rehabilitation due to their importance for salmonid spawning and sage grouse habitat.

7.3 Social Impacts Conclusion

This section was collaboratively developed by the Planning Team during two exercises involving filling in a social impacts worksheet. The information from these worksheets was discussed and summarized by the Lower Salmon Planning Team at a meeting in April. These exercises produced the following results.

The planning team determined that successful implementation of this plan will benefit anglers, hunters and wildlife watchers by helping preserve and/or improving fish and wildlife populations and habitats.

Objectives and strategies affecting riparian, flood plain and wetland areas have the potential for both positive and negative economic impacts. Potential negative impacts include the loss of forage, loss of access for recreationists, increased pest habitat, and increased need for maintenance, all of which could lead to loss of income. Potential positive impacts include improved animal health, reduction in exposure to ESA and CWA regulatory activities, decreased impacts from flooding, improved forage and water availability. The negative impacts can be overcome through education and incentives.

Maintaining a viable farming and ranching industry is an important value to the Planning Team. The alternatives to ranching include much more catastrophic impacts from land-uses changes such as subdivided housing. A number of terrestrial and aquatic objectives include recommendations that potentially impact grazing practices. Grazing is a land use in the subbasin with important economic and multigenerational cultural traditions.

During the social and economic impacts assessment exercise, a number of concerns were noted about the potential impacts of objectives and strategies of this plan depending on how they are implemented. One concern identified by the Planning Team is that negative impacts to the ranching community could occur if there was an attempt to implement this plan too quickly and without adequate involvement of the affected ranchers. Many BMPs are widely accepted as general strategies. Implementation projects need to be developed in concert with livestock producers with enough time in the process to allow successful transitions without major operational impacts. Many livestock producers are not opposed to proper grazing practices; they are opposed to rapid, sudden required shifts that do not allow time to adjust operations with minimum disruption and economic consequences.

The Planning Team recognizes the value of the timber industry to economies and cultures of the Salmon subbasin. Timber management through proper forest practices will positively impact a number of objectives and strategies in this plan, e.g., sediment reduction, fuel load reduction, and control of insects and disease. This plan makes recommendations but does not dictate forest practices. This plan will not have a significant negative impact on the timber industry, while potentially providing supplemental funds to reduce problems impacting aquatic and terrestrial resources.

Restoring altered fire regimes to a more historic trend will benefit long-term ecosystem processes as well as stakeholders. Reducing impacts of catastrophic wildfire on forage resources is important to maintaining a stable local agriculture. These fires destroy the forage base and provide an avenue for exotic invasive plant invasion. Catastrophic fires cause economic impacts by reducing short-term forage resources and, through weed invasion, reducing long-term forage. Reducing the impact of catastrophic fire will also benefit individuals living in the subbasin, by reducing the threat of loss of life and property.

Exotic invasive plants were identified as the most important problem to be addressed by this plan for the terrestrial portions of this plan. Exotic invasive plants invade habitats after fire and other disturbances, and impacts agriculture, recreationists, and all other identified stakeholders. A need exists for more effective implementation of exotic invasive plant strategies in the subbasin. The entire scale of current exotic invasive plants control efforts needs to grow; there is a need for more funding, more projects, and more programs and activities to address current problems. Implementing the objectives and strategies in this plan will benefit all stakeholders. One concern is that some implementation strategies can impact culturally important plants. This concern needs to be integrated into planning and implementation of exotic invasive plant strategies. Another identified concern is that in the short-term, efforts to control exotic invasive plants potentially could require increased costs and maintenance for agencies and producers. Although over the long run, decreased exotic invasive plant problems will result in less costs and maintenance along with improved habitat and watershed health.

An important positive benefit of implementing many strategies of this plan is the likely benefit to current ESA listed species and the avoidance of potential additional listings. ESA processes can have negative economic impacts on individuals, industries and communities. The many objectives in this plan that protect and improve habitats and associated species will lessen future effects of ESA processes in the subbasin, limiting potential future economic impacts.

Overall, implementing this plan should provide multiple positive social and economic benefits to the Salmon subbasin in both the short and long term. Long-term positive benefits include increased local incomes, increases in recreational opportunities and the services that support recreation, improved water quality and associated reductions in the cost of addressing water quality problems, increased comprehensive planning with associated increased efficiencies and effectiveness of implementation activities, increased opportunities to catch and harvest anadromous fish and big game species, and decreased exposure to ESA costs.

A number of potential short-term negative impacts to the ranching community and other landowners were identified, including loss of access, increased cost of maintenance, and loss of acreage for economic activities. The objectives and strategies identified in this plan were thought to be generally acceptable to landowners provided that information and incentives are provided as part of the process. Key among these incentives is the need to provide funding to implement the projects and to avoid or compensate for short-term economic impacts. The Planning Team recognizes there are short-term adverse economic impacts to some landowners. Compensating these landowners would minimize the cost and could prevent adverse impacts to aquatic and terrestrial species and habitats resulting from subdividing these lands. The Planning Team believes it is critical to provide compensation or incentives to implement changes in management and avoid drastic changes in land use (e.g., from ranching into subdivided housing).

7.4 Final Comments

In addition to the recommendation in this chapter, the Upper Salmon Planning Team developed additional recommendations after the final Planning Team meeting, and after the point in the process where their recommendations could be reviewed by the Lower Salmon Planning Team. These recommendations are included as Appendix J.

The Planning Teams were concerned that future comments generated by reviewers and the public are incorporated into this plan through a process that includes Planning Team involvement and oversight. This will include funding for Planning Team involvement, facilitation and to review and update of the plan. The timeline for this process has been too limited. Planning Team members had little or no time to review assessment and plan products. Insufficient time existed for this to be a fully integrated planning process that allowed policy makers and public to integrate with the technical committees.

The Planning Team believes this process has provided positive interaction with stakeholders and has resulted in information to direct the next round of implementation activities in the subbasin. Historically, most funding for the subbasin has been directed towards the upper Salmon subbasin. This plan provides the rationale for increasing funding to activities in the lower Salmon subbasin. This plan provides an adequate foundation for prioritization and implementation of activities in the subbasin while pointing towards the need to develop additional information and planning to refine future activities.

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9 Technical Appendices

Appendix A—Participation Summary

PLANNING TEAM PARTICIPATION SUMMARY

Lower Salmon Planning Team Recruitment and Participation

The NPCC directed that subbasin planning include local elected officials, property owners and land managers from the private sector along with the federal, state and tribal fish and wildlife managers.

As part of the public involvement process, the Idaho Council on Industry and Environment actively recruited a wide variety of stakeholders and local elected officials to participate in the process as members of the Planning Team. In addition, the Technical Teams also welcomed participation by the private sector. Both Technical Team and Planning Team meetings were open to the public, as well.

ICIE used mail, fax and e-mail invitations to recruit Planning Team members.

- County commissioners for each county within the Lower Salmon section of the subbasin received a letter asking that they participate as a member of the Planning Team and a packet of introductory material on the subbasin planning process with the date and location of the first meeting. All or portions of the following counties are included in the Lower Salmon portion of the subbasin: Adams, Idaho, Lewis, Nez Perce, and Valley

- ICIE identified a number of groups, associations, landowners, and businesses who would be interested in subbasin planning and requested names of individuals who might serve on the Planning Team. Groups, associations and businesses included the following: Idaho Association of Soil Conservation Districts, Idaho Cattle Association, Idaho Farm Bureau Federation, Idaho Women in Timber, individual ranchers, landowners, and recreationists.

- ICIE also identified sportsmen groups and environmental groups with members in the Lower Salmon subbasin and contacted them with the same request for participation. These included the following: Idaho Conservation League, Idaho Rivers United, the Nature Conservancy, Idaho Wildlife Federation, Concerned Sportsmen of Idaho, Ducks Unlimited, Idaho Chapter of the Sierra Club, the Wilderness Society, Foundation for North American Wild Sheep, Idaho Snowmobile Association, the Idaho Chapter of Safari Club.

- Federal and state agencies operating within this subbasin were contacted about participation as well. Agencies included the following: Payette and Nez Perce National Forests, US Fish & Wildlife Service, Idaho Department of Fish & Game, Idaho Department of Environmental Quality and NOAA Fisheries.

Many of the organizations contacted supplied names of potential members or agreed to participate on behalf of their members. Some groups simply ignored the invitation and the follow-up. Others responded with interest but stated that they did not have enough staff to participate in the project but were interested in being kept informed. ICIE developed an e-mail list that included all those who had been contacted as well as others who expressed interest in following the process.

Upper Salmon Planning Team Recruitment and Participation

The Upper Basin Watershed Project (USBWP) Advisory Committee was selected as the primary entity to function as the Planning Team in the Upper Salmon Basin. The USBWP Advisory Committee is composed of representatives from the following agencies or groups.

- Custer and Lemhi County Landowners
- Recreation
- Idaho Department of Fish and Game
- United States Forest Service
- Bureau of Land Management
- Custer Soil and Water Conservation District
- Lemhi Soil and Water Conservation District
- The Nature Conservancy
- University of Idaho Cooperative Extension System
- Shoshone Bannock Tribes

This Committee provides a cross-section of the resources users and managers in the area. A sub-committee was selected to develop the plan and report back to the entire Advisory Committee. All meetings were open to the public.

Public Meeting Participation Summary

Public meetings were held to introduce the subbasin planning process and provide an opportunity for input from local people and resource managers. Pat Barclay of the ICIE coordinated the public meeting announcements and logistics for the two sets of Lower Salmon subbasin public involvement meetings. Russell Knight, Project Coordinator for the Upper Salmon Basin Watershed Project, coordinated the public meeting announcements and logistics for the two sets of Upper Salmon subbasin public involvement meetings.

Lower Salmon Public Involvement

Two sets of public meetings were held to introduce the subbasin plan and provide an opportunity for input from local people and resource managers. Pat Barclay of the Idaho Council for Industry and the Environment (ICIE) coordinated public meeting announcements and logistics for the Lower Salmon portion of the subbasin.

The meetings were held in different locations in an attempt to allow access to the largest number of people. Overall, not many of the general public attended these meetings.

Locations for the Lower Salmon public meetings were Grangeville, Riggins, and McCall, Idaho.

The meetings were announced through local media and post cards mailed to individuals as well as announcements in various association newsletters. ICIE also notified all those on its subbasin planning lists and broader e-mail list of 600 names across the state.

Daily and weekly newspaper, radio and television stations were notified in Lewiston, Moscow, Kamiah, Orofino, Cottonwood, Grangeville, Nez Perce, McCall, Cascade, and Council.

For the second meeting, flyers were sent to 325 individuals from Latah County on the north through Valley County on the south in an attempt to increase the attendance by explaining the subbasin planning process which was not possible using postcards.

Public Meeting Set #1: The purpose of the first series of public meetings was to introduce subbasin planning to local people living, working, and using land in various ways within the subbasin. In addition, the meeting facilitator sought and documented comments and opinions on the subbasin plan. The comments were taken to the Planning Team and considered in management plan development.

There were questions and comments regarding concerns in the following areas:

1. Participants ask about exact drainages covered by the subbasin and procedural questions about the subbasin planning process.
2. Discussion centered on how BPA money is allocated and whether or not these plans would re-prioritize the funds to make better use of the dollars.
3. Whether or not projects dealing with noxious weeds could be included, whether or not local mills might be supported through funding of projects in the subbasin.
4. Discussion of the impacts on stream banks and private property in the Riggins area because of influx of people fishing for salmon in the area.

Public Meeting Set #2: The purpose of the second series of public meetings was to present the draft subbasin assessment and solicit comment from local land and natural resource users. The comments were used in the draft subbasin assessment.

Questions and comments during this second series arose in the following areas:

1. Whether or not indicator or focal species as outlined in the presentation is the best way to evaluate success of projects on the ground.
2. Discussion of the socioeconomic portions of the plan and whether or some of the figures in the presentation (such as the 80% of spawning ground being on private property) were accurate.
3. Whether the material contained in the assessment was an accurate representation of the conditions in the subbasin.

Overall, attendance at the public meetings remained small, in part because this process was not controversial. There was not enough time to educate people in the rural communities about their stake in this process. The NPCC is very well known among the tribes, groups such as electric cooperatives, federal and state fish and wildlife agencies and some sportsmen groups; however, the general public seems to have little knowledge of the NPCC's programs. The good attendance at both meetings in Riggins may have been the result of that community's dependence on the salmon fishery, while the low attendance in McCall was perhaps because that community depends on other types of tourism than fishing.

In Grangeville, the second meeting was poorly attended because of the timing. The meeting coincided with good conditions for farmers to be working in the fields until dark.

Upper Salmon Public Involvement

Two sets of public meetings were held in the Upper Salmon Basin to provide opportunity for the general public to become involved in the planning process and provide a forum for broader input. These meetings were coordinated by the Upper Salmon Basin Watershed Project (USBWP) staff.

The meetings were held in three locations to allow more of the public access to a favorable location. The meetings were held in Salmon, Challis, and Stanley. Attendance was low at two of the locations and good at one.

The meetings were announced on local radio and in the local newspapers. Postcards were sent to 100 individuals prior to each set of meetings and emails were sent to 106 individuals across the state. Public meetings were also posted on the USBWP website http://www.modelwatershed.org/index.html.

Following each set of public meetings, articles were published in the local newspaper giving updates of the process and comments from the meetings. Articles were also sent to the University of Idaho Cooperative Extension System in both Custer and Lemhi Counties for inclusion in their spring newsletters.

Attendees at each of the meetings were provided with a short questionnaire and stamped, addressed envelop to solicit comments regarding the presentation and any other issues of concern the public may have had.

Public Meeting Set #1 The purpose of the first public meeting was to introduce the subbasin planning process to the local people. Emphasis was placed on the importance of input from the local resource users and managers. Comments were taken and provided to the Planning Team for incorporation into the plan.

The meetings were held in the three major communities in the Upper Salmon Basin, Salmon, Challis and Stanley. The Salmon meeting was held on March 1 at the USBWP office. The Challis meeting was held on March 2 at the Custer Soil and Water District Office and the Stanley meeting was held on March 3 at the Stanley Community Building.

Comments were few at this first set of meetings. Surveys mailed to the USBWP office following the meeting contained the following comments:

1. The presentation in Salmon was poorly done and did not provide enough information.
2. There was not enough information presented in Salmon to define the public role in the planning process.
3. All natural resource uses should be considered.
4. We should be trying to build toward a fishing season.

Public Meeting Set #2 The purpose of the second set of public meetings was to review the planning process and the reasons for public involvement and to review the assessment and the socioeconomic objectives of the plan. Comments were incorporated into the plan.

Attendance at the second set of meetings was lower than at the first set. Comments were very few.

1. Be sure private property rights are given the proper respect.

2. We should be working toward a fishing season.

Attendance at the Salmon and Stanley meetings was low. The Challis meetings were well attended. Despite the good attendance in Challis, few comments were received. The public seemed to have a general lack of interest in this process. The local people are familiar with the anadromous fish rehabilitation activities in this area. The USBWP has developed a reputation of being an organization that can be trusted to find the balance in resource use and resource protection. This may have contributed to the lack of public concern.

Ecovista Website Summary

As the *Salmon Subbasin Management Plan* was developed, draft documents, meeting information, and information was posted on the Ecovista website (2004): http://www.ecovista.ws

Appendix B—Letters of Endorsement

To be submitted post May 28, 2004, due to time constraints.

Appendix C—NOAA Fisheries Delisting Criteria

Appendix Table 1. Interim objectives for listed Snake River spring/summer chinook in the Salmon subbasin[1] (NOAA 2002)

Geographic Spawning Aggregations		Interim Abundance Targets[1]		Interim Productivity Objectives
*ESU/*Spawning Aggregation	Index Areas	Spawning Aggregation	Index Areas	
Little Salmon River Basin		1,800		"For delisting to be considered, the eight-year (approximately two generation) geometric mean cohort replacement rate of a listed species must exceed 1.0 during the eight years immediately prior to delisting. For spring/summer chinook salmon, this goal must be met for 80% of the index areas available for natural cohort replacement rate estimation." (Proposed Snake River Recovery Plan; NMFS 1995)
Mainstem Salmon small tribs		700		
South Fork Salmon (Sum.)		9,200		
	Johnson Cr.		288	
Middle Fork Salmon River		9,300		
	Bear Valley/Elk		911	
	Marsh Cr.		426	
Mainstem Tributaries (Middle Fk. To Lemhi)		700		
Lemhi River		2,200		
Pahsimeroi (Sum.)		1,300		
Mainstem Tributaries (Sum.) (Lemhi to Redfish Lake Cr.)		2,200		
Mainstem Tributaries (Sum.) (Lemhi to Yankee Fork)		2,400		
Upper East Fork Tribs (Spr.)		700		
Upper Salmon Basin (Spr.)		5,100		

[1]/ These interim targets are derived from: Bevan et al., 1994; BRWG 1995; NMFS 1995; and NMFS 1997

[2]/ Eight year, or approx. 2 generations, geometric mean of annual natural spawners. Abundance targets are also provided for smaller scale "Index Areas"

Appendix Table 2. Interim objectives for listed Snake River fall chinook and sockeye in the Salmon subbasin (NOAA 2002)

ESU	Interim Abundance Targets[1, 2]	Interim Productivity Objectives
Snake River Fall Chinook	2,500	"For delisting to be considered, the eight-year (approximately two generation) geometric mean cohort replacement rate of a listed species must exceed 1.0 during the eight years immediately prior to delisting. For spring/summer chinook salmon, this goal must be met for 80% of the index areas available for natural cohort replacement rate estimation." (Proposed Snake River Recovery Plan; NMFS 1995)
Snake River Sockeye	1,000 spawners in one lake: 500 spawners per year in a second lake	The Snake River sockeye ESU is currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0

[1]/ These interim targets are derived from the Snake River Recovery Team recommendations included in the 1995 Proposed Snake River Recovery Plan (NMFS 1995)

[2]/ Eight year, or approx. 2 generations, geometric mean of annual natural spawners in the mainstem Snake
[3]/ The 2000 FCRPS BiOp provided a productivity objective for Snake River sockeye, Snake River and Middle Columbia steelhead populations of "a median annual population growth rate (lambda) greater than 1.0 over a 40-48 year period." (NMFS 2000)

Appendix Table 3. Interim objectives for Snake River steelhead in the Salmon River subbasin[1] (NOAA 2002)

ESU/Spawning Aggregations	Interim Abundance Targets[2]	Interim Productivity Objectives
Lower Salmon	1,700	Snake River ESU steelhead populations are currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0[3]
Little Salmon	1,400	
South Fork	4,000	
Middle Fork	7,400	
Upper Salmon	4,700	
Lemhi	1,600	
Pahsimeroi	800	

[1]/ These interim targets are derived from: Ford et al. 2001; Chilcote 2001; NMFS 1995; ODFW 1995; WDFW 1993; and IDFG 1985
[2]/ The 2000 FCRPS BiOp provided a productivity objective for Snake River sockeye, Snake River and Middle Columbia steelhead populations of "a median annual population growth rate (lambda) greater than 1.0 over a 40-48 year period." (NMFS 2000)
[3]/ Eight year, or approx. 2 generations, geometric mean of annual natural spawners

Appendix D—Numerical Criteria Reviewed to Develop Subbasin Goals for Adult Fish Returns

Appendix Table 4. Comparison of fish management objectives from various plans pertaining to the Salmon River Subbasin. CRITFC = *Spirit of the Salmon*; 1990 Plan = 1990 *Salmon River Subbasin Salmon and Steelhead Production Plan*; NMFS 2002 = NMFS *Draft Interim Abundance Goals*; CRFMP = *Columbia River Fish Management Plan*; IDFG = Idaho Department of Fish and Game.

Species	Long-term Return Objective	Natural Spawning Component	Hatchery Spawning Component	Total Spawning Component	Harvest Component	Overall Goal/Notes
Spring chinook						
CRITFC	128,000	----	----	----	----	Long-term recovery
1990 Plan	119,000	20,000	5,000	25,000	94,000	Long-term recovery
NMFS 2002	----	35,400[1]	----	----	----	Interim Abundance/Delisting
CRFMP	----	25,000[2]	10,000[2]	35,000[2]		Interim goal
IDFG						
Summer chinook						
CRITFC	60,200	----	----	----	----	Long-term recovery
1990 Plan	126,000	11,000	3,000	14,000	112,000	Long-term recovery
NMFS 2002	----	35,400[1]	----	----	----	Interim Abundance/Delisting
CRFMP	----	----	----	----	----	
IDFG						
Fall Chinook						
CRITFC	5,000	2,100[3]	----	----	----	Long-term recovery
1990 Plan	----	----	----	1,000	5,000	Interim goal
NMFS 2002	----	2,500[4]	----	----	----	Interim Abundance Goal (Snake River)
IDFG						
B-run Steelhead						
CRITFC	192,900[5]	----	----	----	----	Long-term recovery
1990 Plan	145,000 (A & B-run)	19,000[5]	----	----	126,000	Long-term recovery
NMFS 2002	----	21,600[6] (11,400)	----	----	----	Interim Abundance/Delisting
IDFG						
CRFMP	13,300[2]	----	----	----	----	Interim Management Goal

Species	Long-term Return Objective	Natural Spawning Component	Hatchery Spawning Component	Total Spawning Component	Harvest Component	Overall Goal/Notes
A-Run Steelhead						
CRITFC	192,900[5]	----	----	----	----	Long-term recovery
1990 Plan	145,000	19,000[5]	4,000	23,000	126,000	Interim Goal
NMFS 2002	----	(10,200) [6]	----	----	----	Interim Abundance/delisting
CRFMP	<62,200[2]	----	----	----	----	Interim Management Goal
Sockeye						
CRITFC	44,500	----	----	----	----	Long-term recovery
1990 Plan	8,000	6,000	----	----	2,000	Interim goal
NMFS 2002	----	2,000[7]	----	----	----	Interim Abundance/delisting
CRFMP	----	----	----	----	----	
IDFG						
Coho						
CRITFC	20,000	----	----	----	----	Long-term recovery
1990 Plan	----	----	----	----	----	
NMFS 2002	----	----	----	----	----	
CRFMP	----	----	----	----	----	
IDFG						

[1] Value represents the sum total of interim abundance targets for spring and summer Chinook salmon populations in the Salmon River subbasin. Targets are an eight-year geometric mean of natural spawners.
[2] CRFMP, which has expired (US v. Oregon), establishes interim management goals for fish passing over the Lower Granite Dam; Snake River specific goals are not defined.
[3] Based on fall chinook salmon spawning habitat quantification in the lower Salmon River by the Nez Perce Tribe.
[4] Represents interim abundance goal for Snake River ESU. Does not define Salmon River subbasin component.
[5] A and B runs not differentiated.
Interim goal is based on historic (late 1960's) counts >30,000 at Lower Snake River dams
[6] NMFS did not differentiate runs: Original value (21,600) includes both A and B runs: Values in parenthesis are run-specific estimates assuming Middle Fork and South Fork are comprised of B run and all other subbasin areas produce A run steelhead.
[7] 1,000 spawners in one lake and 500 spawners in two additional lakes per year.

Appendix E—RM&E Key Performance Measures

Appendix Table 5. Summary of key performance measures in relation to spatial scale, required precision, frequency of sampling, and linkage to the monitoring and evaluation objectives (from Hesse and Harbeck 2004, and Hesse et al. *in prep.*).

	Performance Measure	Spatial Scale	Required Precision[1] (CV)	Desired Precision[1] (+/- 95% CI)	Frequency/ Duration	Monitoring and Evaluation Objectives
Abundance	Adult Escapement to Snake Basin	Subbasinwide			Annual	
	Adult Escapement to Tributary	Primary Aggregates			Annual—ongoing	1a, 1b, 1d, 6b, 7c
	Adult Spawner Abundance	Primary Aggregates			Annual—ongoing	1a, 1d
	Index of Spawner Abundance (redd counts)	Subbasinwide and Primary Aggregates			Annual—ongoing	1a, 1d, 7c
	Spawner Abundance	Primary Aggregates			Annual—ongoing	1a, 1d, 7c
	Hatchery Fraction	Primary Aggregates			Annual—ongoing	1a, 1b, 1d, 6b
	Harvest Abundance in Tributary	Key Areas			Annual	1a, 1d, 5b
	Index of Juvenile Abundance	Subbasinwide			Annual	7b
	Juvenile Emigrate Abundance	Primary Aggregates			Annual	1d, 1e, 7b
	Hatchery Production Abundance	Key Areas			Annual	1a, 6a
	Smolt Equivalents	Primary Aggregates			Annual	1a, 1d, 1e
	Run Prediction	Key Areas			Annual, ongoing	5a, 6b
Survival-Productivity	Smolt-to-Adult Return Rate	Subbasinwide and Key Areas			Annual	1e, 6a, 6b
	Progeny Parent Ratio (lambda, adult-to-adult)	Subbasinwide and Key Areas			Annual for at least 10 years intervals	1a, 1d, 6c
	Recruit/spawner (smolt per female or redd)	Primary Aggregates			Annual	1a, 1d,
	Pre-spawn Mortality	Key Areas			Annual	1a, 1d
	Harvest Rate (ocean and Columbia River)	Primary Aggregates			Annual	
	Juvenile Survival to Lower Granite Dam	Primary Aggregates			Annual	1d, 1e, 6a
	Juvenile Survival to Mainstem (McNary and Bonneville) Dams	Subbasinwide			Annual	7e
	In-hatchery Life Stage Survival	Key Areas			Annual	6a
	Post-release Survival	Key Areas			Annual	1e
	Relative Reproductive Success	Key Areas			Small-Scale Study (5 Years)	1b

	Performance Measure	Spatial Scale	Required Precision[1] (CV)	Desired Precision[1] (+/- 95% CI)	Frequency/ Duration	Monitoring and Evaluation Objectives
Distribution	Adult Spawner Spatial Distribution	Subbasinwide			3-5 year cycle	1c, 7d
	Stray Rate	Key Areas			Annual	4a, 4c
	Juvenile Rearing Distribution	Subbasinwide			Annual (5 year cycle)	7b
	Disease Frequency	Primary Aggregates			Annual, Event Triggered	6c
Genetic	Genetic Diversity	Subbasinwide and Key Areas			Small-scale Study (5 years)	2c, 3a
	Reproductive Success (Nb/N)	Primary Aggregates			Annual (5 year cycle)	2c, 3a
	Effective Population Size (Ne)	Primary Aggregates			Annual (5 year cycle)	2c, 3a
Life History	Age Class Sturcture	Primary Aggregates			Annual - ongoing	1a, 1b, 1d, 6b
	Age–at–Return	Primary Aggregates			Annual	1a, 1d, 2a, 3b, 6b
	Age–at-Emigration	Primary Aggregates			Annual	2b, 3c
	Size-at-Return	Primary Aggregates			Annual	2a, 3b
	Size-at-Emigration	Primary Aggregates			Annual	2b, 3c
	Condition of Juveniles at Emigration	Primary Aggregates			Annual – ongoing	2b, 3c
	Adult Spawner Sex Ratio	Primary Aggregates			Annual - ongoing	1a, 1b, 1d, 2a, 3b
	Fecundity by Age	Key Areas			Annual	1b, 3b
	Adult Run-timing	Key Areas			Annual	2a, 3b, 6a
	Spawn-timing	Key Areas			Annual	1b
	Juvenile Emigration Timing	Primary Aggregates			Annual	2b, 3c
	Mainstem Arrival Timing (Lower Granite)	Subbasinwide			Annual	2b, 3c, 6a
Habitat	Physical Habitat	Subbasinwide and Key Areas			Every three years	7a
	Stream Network	Subbasinwide			10yrs	
	Passage Barriers/Diversions	Subbasinwide			5 yrs	
	Instream Flow	Subbasinwide and Key Areas			Continual (5 plus year cycle)	7a
	Water Temperature	Subbasinwide and Key Areas			Continual (5 year cycles), Event Triggered	7a
	Chemical Water Quality	Subbasinwide			Continual, 3 years	
	Macroinvertebrate Assemblage	Subbasinwide			5 years	

	Performance Measure	Spatial Scale	Required Precision[1] (CV)	Desired Precision[1] (+/- 95% CI)	Frequency/ Duration	Monitoring and Evaluation Objectives
	Fish and Amphibian Assemblage	Subbasinwide			5 year	

[1] Prescription of the required/desired precision is being developed as part of the final M&E plan Step 3 submittal based on observed annual variability, five year evaluation cycles, and number of replicates associated with each performance measure needed to detect biologically/management significant change. Currently used recommendations generally identify CV's of 15 and 25% (Jordan et al. 2002). However these have been established through EMAP type projects on the bases of the number feasible sample size/replication (i.e., 50 sample site). Required precision is related to ability to detect change, whereas desired precision compares population status with management thresholds.

Appendix Table 6. Definitions of key performance measures used to evaluate fish populations and habitat in Salmon monitoring and evaluation efforts (CSMEP unpublished data; CBFWA 2004).

	Performance Measure Primary Data	Definition of Performance Measure
Abundance	Adult Escapement	Derived or raw measure. Number of adult fish that have "escaped" past fisheries to a certain point (e.g., the mouth of the Columbia). Equals *adult spawner abundance* if considering all fisheries (i.e., adults on spawning ground). May be derived using additional data such as harvest information (catch or rates), escapement to spawning ground (from weir or redd counts), upstream conversion rates, etc (e.g., Beamesderfer et al. 1997). It is a raw measure if it is escapement to the spawning ground.
	Fish per Redd	Derived measure. Number of spawners (male + female) /# of counted redds, or the number of females per redd.
	Adult Spawner Abundance	Derived or Raw measure. Direct count of the number of fish on spawning ground (e.g., weir count) (or expanded estimate from redd counts, carcass recovery)
	Index of Spawner Abundance (redd counts)	Raw measure (primary). Counts of redds in spawning areas. This is data from which spawner abundance is estimated (e.g., Snake River spring-summer chinook). Data may be collected in a number of ways for variety of purposes such as index counts (e.g., peak counts on small section of tributary for trends), or extensive area counts over a large portion of a tributary approaching a complete census (absolute abundance), using a probability based sampling approach such as EMAP for presence/absence type surveys.
	Hatchery Fraction	Raw measure (primary): Percent of fish on spawning ground that originated from hatchery and strayed to natural spawning ground. Determined from carcass or weir sampling.
	Harvest	Raw measure (primary). Number of fish caught in ocean, mainstem or tributary fisheries (commercial, tribal, or recreational). Determined from commercial landings, creel surveys, etc.

	Performance Measure Primary Data	Definition of Performance Measure
	Index of Juvenile Abundance (Density)	Raw measure (secondary). Number of fry, parr, or smolts per unit area of rearing habitat.
	Juvenile Emigrant Abundance	Raw measure (primary). Estimates of the total number of fry, parr, or smolts emigrating from tributary streams (e.g., determined from rotary screw trap estimates).
	Hatchery Production Abundance	Raw measure (primary). Number of parr, or smolts released from a hatchery per year.
	Smolt Equivalents	Derived measure. Requires estimating number of smolts to some point in time. For example, converting the number of smolts from a tributary to the number of smolt equivalents at the first mainstem dam. An estimated tributary-to-dam survival rate is multiplied by the estimated smolt abundance for a tributary. Parr abundance can also be expressed in terms of smolt equivalents. This requires an estimated parr-to-smolt-at-dam survival rate, which is multiplied by the estimated number of parr. This latter survival rate includes both overwinter survival and tributary-to-dam survival components.
	Run Prediction	Derived measure. Short-term forecast of expected future adult returns to some point (e.g., mouth of Columbia, or Snake River) based on current data (e.g., # smolts out, prior years adult returns, etc.).
Survival-Productivity	Smolt-to-Adult Return Rate	Raw measure (secondary): Number of adults from a given brood year returning to a point (e.g., LGR dam) divided by the number of smolts that left this point 1-3 years prior, integrated over all return years.
	Parent Progeny Ratio (lambda, adult-to-adult)	Derived measure: Lambda, the median annual population growth rate estimate from adult-to-adult data (BiOp 2000, pg 6-4). Raw or derived measure: adult-to-adult can be either the ratio of return spawner to parent spawner abundance using expanded estimates, or a raw measure using ratio of return redds to parent redds.
	Recruit/spawner (smolt per female or redd)	Derived measure: Production to some life history stage derived as the ratio of returns to some location (e.g., smolts out, or adult returns to Columbia R., adult returns to the Yakima river) divided by the number at some life stage preceding it. For example, smolt production is the ratio of smolt abundance to brood year spawner abundance.
	Pre-spawn Mortality	Raw measure (primary): percent of returning adults that die after reaching spawning ground, but before spawning.

	Performance Measure Primary Data	Definition of Performance Measure
	Juvenile freshwater survival rate (egg-to-fry/parr/smolt, parr-to-smolt)	Derived or raw measure: Derived if estimated using information from independent programs (e.g., redd counts, fecundity estimates, and parr estimates collected in separate studies for the same tributary could be used to estimate an egg to parr survival rate). Raw measure if estimated in studies (e.g., use of instream incubation boxes to estimate survival-to-emergence (an index of egg-to-fry survival), or release of wild adult spawners to fenced-off stream areas followed by estimates of fry or parr abundance from those spawners to estimate egg-to-fry, or egg-to-parr survival rates).
	Juvenile Survival to first mainstem dam	Raw measure (secondary): Survival rate measure estimated from detection of PIT tagged smolts at first mainstem dam, or model derived survival rates based on detections at first and second mainstem dams (e.g., using SURPH, Steve Smith NOAA). Smolts or parr are tagged in the tributary rearing areas.
	Juvenile Survival past Mainstem Dams	Raw measure (secondary): Survival from first dam where stock enters mainstem Columbia or Snake River to Bonneville. Derived from PIT tag detections.
	In-hatchery Life Stage Survival	Raw measure (secondary): egg to fry, parr or smolt survival in hatchery. Ratio of number of eggs spawned to number at life stage.
	Post-release Survival	Raw measure (secondary): Survival from stage released (e.g., parr or smolt) to further sampling points (e.g., rotary screw traps at outlet of tributary, first mainstem dam encountered by smolts, dam encountered on return).
Distribution	Adult Spawner Spatial Distribution (within tributaries)	Raw measure: Tributary spawner distribution - extensive estimates of where spawners are found within a tributary. Subbasin spawner distribution - presence/absence surveys across multiple tributaries within a subbasin.
	Stray Rate	Derived or raw measure (secondary): Carcass surveys of spawning grounds, or weir sampling, looking for marks or tags or taking scale and tissue samples for DNA analysis.
	Juvenile Rearing Distribution	Raw measure: Raw measure at smaller spatial scales, for example Idaho Fish and Game's General Parr Monitoring program which collects parr counts in multiple tributaries and sites within them.
	Disease Frequency	Percent of fish containing particular diseases or presence/absence of a particular disease. (Need to develop a better definition, Paul Kucera suggest contacting Kathy Clemens at the Dworshak fish hatchery).
Genetic	Genetic Diversity	Indices of genetic diversity - measured within a tributary (heterozygosity - allozymes, microsats), or among tributaries across population aggregates (e.g., FST).

	Performance Measure Primary Data	Definition of Performance Measure
	Reproductive Success (Parentage)	Derived measure: determining hatchery:wild proportions, effective population size is modeled.
Life History	Age–at–Return	Raw measure (primary): Age distribution of spawners on spawning ground determined from length or scale analysis from carcass surveys.
	Age–at-Emigration	Raw measure (primary): Age distribution of emigrants (e.g., proportion of emigrants at fry, parr, pre-smolt, and smolt stages) from tributaries determined from rotary screw trap or weir collection, scale collection, or inferences from size.
	Size-at-Return	Raw measure (primary): Size distribution of spawners on spawning ground determined from length or scale analysis from carcass surveys.
	Size-at-Emigration	Raw measure (primary): Size distribution (length, weight) of emigrants (e.g., proportion of emigrants at fry, parr, pre-smolt, and smolt stages) from tributaries determined from rotary screw trap or weir collection.
	Condition of Juveniles at Emigration	
	Adult Spawner Sex Ratio	Raw measure (primary): carcass or weir counts.
	Fecundity	Derived or raw measure (primary): Derived if determined indirectly using existing length-fecundity relationships. Raw measure if based on direct sampling of returning females.
	Adult Run-timing	Raw measure (primary): arrival at mouth of major tributaries. Peak, range, 10th-90th percentiles
	Spawn-timing	Raw measure (primary): within major tributaries. Peak, range and 10th-90th percentiles.
	Juvenile Emigration Timing	Raw measure (primary): within major tributaries. Peak, range and 10th-90th percentiles.
	Mainstem Arrival Timing (first mainstem dam)	Raw measure (primary): Mouth of Columbia (Bonneville dam). Peak, range and 10th-90th percentiles.
Habitat	*Water Quality*	Habitat definitions (based on Hillman 2003, see that ref for fuller definitions).
	Temperature	Water temperature
	Turbidity	Sediment related indicators of water quality,
	Conductivity	Ability of water to conduct an electric current. Measured as microhms/centimeter (μmhos/cm)
	pH	Concentration of hydrogen ions in water (moles per liter)
	Dissolved Oxygen	Amount of dissolved oxygen in water. Usually measure as mg per liter (mg/L).
	Nitrogen	Indicator of nutrient loading.
	Phosphorous	Indicator of nutrient loading.

Performance Measure Primary Data	Definition of Performance Measure
Habitat Access (artificial physical barriers)	
Road Crossings	Artificial physical barrier
Diversion Dams	Artificial physical barrier
Fishways	Artificial physical barrier
Habitat Quality	
Dominant substrate	Most common particle size that makes up the composition of material along the streambed. This indicator describes the dominant material in spawning and rearing areas.
Embeddedness	A measure of the degree to which fine sediments surround or bury larger particles. An indicator of the quality of overwintering habitat for juvenile salmonids.
Depth fines	Depth fines refers to the amount of fine sediment (<0.85 mm) within the streambed. Hillman 2003 recommends estimating it at depth of 15-30 cm (6-12 inches) within spawning gravels.
LWD (pieces/km)	Large Woody Debris (LWD) is large pieces of relatively stable woody material located within the bankfull channel and appearing to influence bankfull flows. Also referred to as Large Organic Debris (LOD) and Coarse Woody Debris (CWD). The definition of LWD varies greatly amongst institutions (see Hillman 2003 page 48).
Pool frequency (pools/km)	Slow water habitat with a gradient <1%, normally deeper and wider than aquatic habitats upstream and downstream from it, must span half the wetted width, include the thalweg, and maximum depth must be at least 1.5 times the crest depth.
Pool quality	Ability of pool to support the growth and survival of fish, based on size (diameter and depth) and amount and quality of cover.
Side channels and backwaters (off channel habitat)	Types of off-channel habitat.
Channel condition	
Width/depth ratio	An index of cross-section shape of stream channel at bankfull level.
Wetted width	Width of water surface measured perpendicular to the direction of flow. Used to estimate water surface area, which is used to calculate density of fish within the site or reach.
Bankfull width	Width of the channel (water surface) at the bankfull stage, which corresponds to the channel forming discharge.
Bank Stability	Streambank stability in an indicator of streambank condition.
Riparian Condition	

Performance Measure Primary Data	Definition of Performance Measure
Riparian structure	Type and amount of various types of vegetation within the riparian zone. Used to evaluate health and level of disturbance of the stream corridor. Provides an indication of the present and future potential for various types of organic inputs and shading.
Riparian disturbance	Presence and proximity of various types of human land-use activities within the riparian area (e.g., walls, dikes, riprap, dams, etc.). Affects the quantity and quality of aquatic habitat for fish.
Canopy cover	Riparian canopy cover over a stream.
Flows and Hydrology	
Streamflow	
Watershed Condition	
Watershed road density (e.g., roads/km^2)	An index of total length of roads within a watershed.
Riparian-road index	Total mileage of roads within riparian areas divided by the total number of stream kilometers within the watershed (e.g., roads falling within federal buffer zones i.e., all areas within 300 ft either side of a fish bearing stream, within 150ft of a permanent nonfish-bearing stream, or within the 100-year floodplain).
Landownership	Index of watershed disturbance. Describes surface status of the basin - delineates the portions of the basin owned by federal, state, county, tribal, and private entities.
Land use	Index of watershed disturbance. Delineates the portions of the basin that are subject to specific land uses (e.g., urban, agriculture, range, forest, wetlands, etc.).

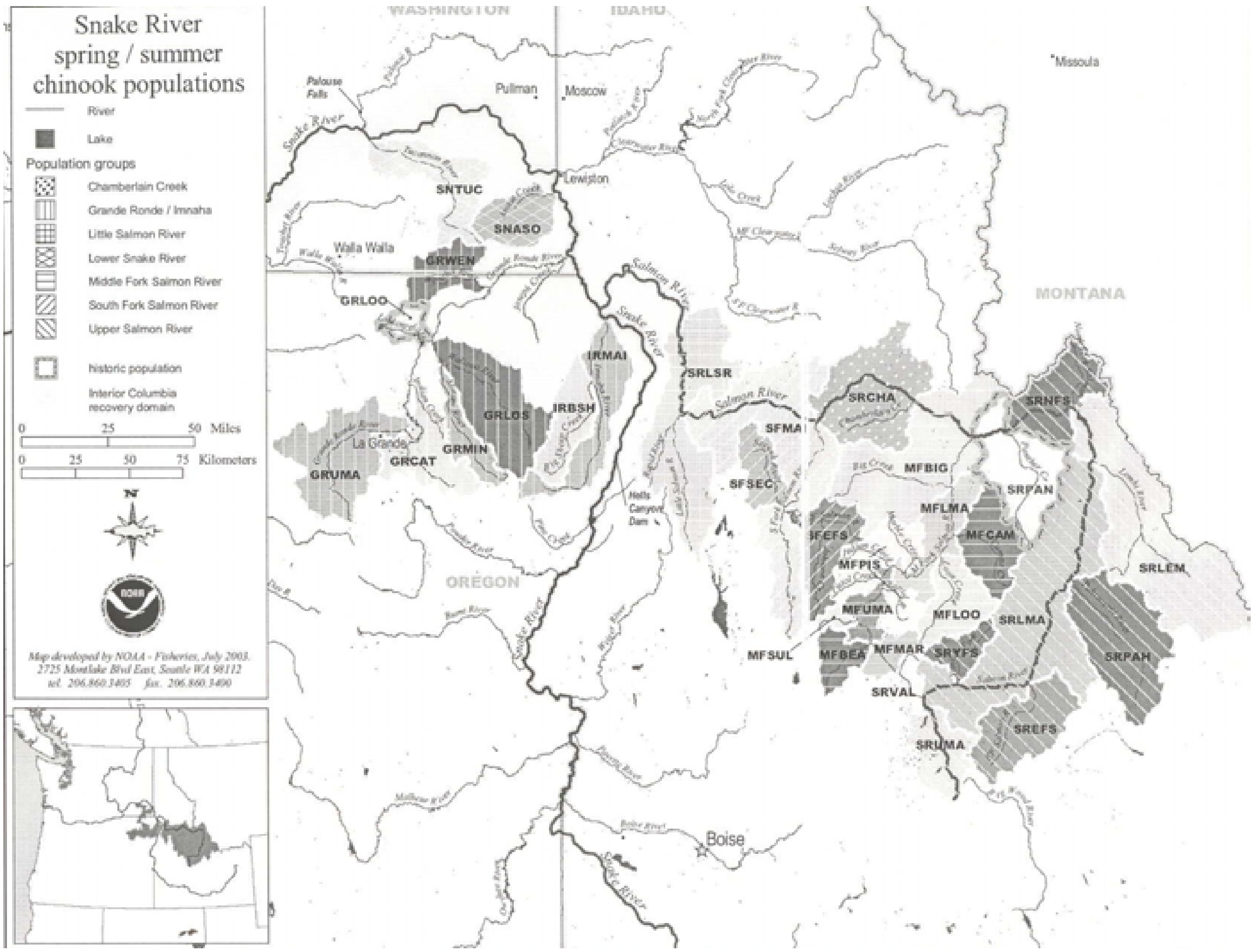
Appendix F—PFC Metrics

Appendix Table 7. Matrix of pathways and indicators (reproduced from NMFS [1996]).

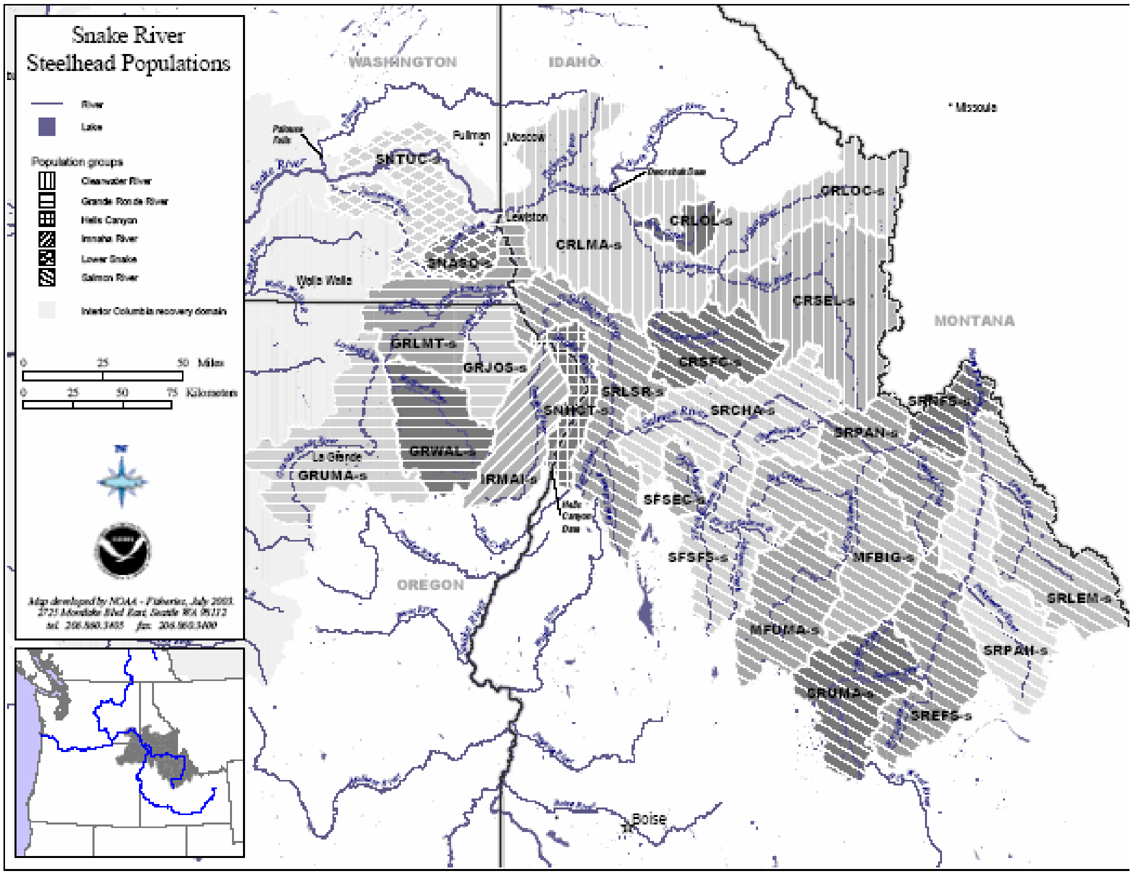
Pathway/Indicators	Properly Functioning	At Risk	Not Properly Functioning
Water Quality			
Temperature (1)	50-57°F (max 7-day average)	57-60°F (max 7-day-spawning) 57-64°F (migration/rearing)	>60°F (max 7-day spawning) >64°F (migration/rearing)
Sediment/Substrate (1)	Embeddedness <20%. Dominant substrate is gravel or cobble. Gravel/cobble bars stable. Turbidity low.	Embeddedness 20-30%. Gravel and cobble is subdominant. Gravel/cobble bars are in the process of stabilizing. Turbidity moderate.	Embeddedness >30%. Bedrock, sand, silt, or small gravel dominant. Gravel/cobble bars very mobile. Turbidity high.
Chemical Contamination	Low levels of chemical contamination; no CWA 303(d) designated reaches.	Moderate levels of chemical contamination; one CWA 303(d) designated reach.	High levels of chemical contamination; more than one CWA 303(d) designated reach.
Habitat Access			
Physical Barriers	Man-made barriers do not restrict fish passage.	Man-made barriers present restrict fish passage at base/low flows.	Man-made barriers present restrict fish passage at a range of flow conditions.
Habitat Elements			
Large Woody Material (1) >20 pieces/mi.	Meets standards (left). Adequate sources for LWM recruitment from riparian areas.	Currently meets standards for properly functioning, but lacks potential sources from riparian areas of LWM recruitment to maintain that standard, *or* Doesn't meet standard, but has recruitment potential.	Does not meet standards for properly functioning and lacks potential LWM recruitment.
Pool Frequency and Quality (1) Width (ft.) Pools/mi. 5 184 10 96 15 70 20 56 25 47 50 26	Meets pool frequency standards (left) and LWM recruitment standards for properly functioning habitat, or has adequate flow and bedrock to maintain pools. Residual (holding) pool depth greater than 3 meters with good cover and cool water. Minor reduction of pool volume by fine sediment acceptable.	Meets pool frequency standards (left) but LWM recruitment standards inadequate to maintain pools over time. Lacks adequate flow or bedrock to form stable pools. Residual (holding) pool depth less than 3 meters with less than adequate cover/temperature. Moderate reduction in pool volume by fine sediment.	Does not meet pool frequency standards. Does not contain deep pools. Pool volumes are reduced by fine sediment.
Off-Channel habitat	Natural potential *or* backwaters with cover and low energy off-channel areas	Some backwater and high-energy side channels.	Few or no backwaters; no off-channel ponds.
Refugia	Habitat refugia exists and are buffered	Habitat refugia exists but are not adequately buffered	Habitat refugia does not exist.
Channel Conditions and Dynamics			
Width:Depth ratio (1)	Meet Rosgen's classification system (Rosgen 1996).	Does not meet Rosgen's classification system, but morphology/vegetation components are in place and system is moving towards meeting this classification.	Does not meet Rosgen's classification system and morphology/vegetation components are not in place.
Streambank Condition (1)	≥90% stable.	80-90% stable.	<80% stable.
Floodplain Connectivity	Off-channel areas are hydrologically connected to the main channel. Overbank flows occur and maintain wetland functions, riparian vegetation and succession, where channel type allows.	Reduced linkage of wetland floodplains. Overbank flows are reduced relative to historic frequency as evidenced by moderate degradation of wetland function, where channel type allows formation of wetlands.	Severe reduction in hydrologic connectivity. Wetland functions degraded, where channel type allows formation of wetlands.
Pathway/Indicators	**Properly Functioning**	**At Risk**	**Not Properly Functioning**

Hydrology/flow			
Changes in Peak/Base Flow	Watershed hydrographs indicated peak flow, base flow, and flow timing characteristics comparable to an undisturbed watershed.	Some evidence of altered peak flow, base flow, and/or flow timing.	Pronounced changes in peak flow, base flow, and/or flow timing.
Increase in Drainage Network	Zero or minimum increase in drainage network density due to roads.	Moderate increases in drainage network density due to roads (5%).	Significant increases in drainage network density due to roads (>20%).
Watershed Conditions			
Road Density and Location	<2 mi/sq.mi.; no valley bottom roads.	2-3 mi/sq.mi.; some valley bottom roads.	>3 mi/sq.mi.; many valley bottom roads.
Disturbance History	<15% ECA with no concentration of disturbance in unstable areas or riparian areas.	<15% ECA with some disturbance in unstable areas or riparian areas.	>15% ECA with disturbance concentrated in unstable areas or riparian areas.
Riparian Reserves	Riparian reserves provide shade, LWM recruitment, habitat protection, and connectivity in all subwatersheds. Riparian plant community has the vigor, health, composition and diversity to support riparian reserve values.	Moderate loss of connectivity or function or riparian reserves. Riparian plant community lacking the vigor, health, composition and/or diversity to support riparian reserve values, but is in an upward trend.	Riparian reserves are fragmented with poor connectivity and little protection of habitats. Riparian plant community lacking the vigor, health, composition and/or diversity to support riparian reserve values, and is in a static or downward trend.

Appendix G—Chinook and Steelhead Population Units in the Salmon Subbasin



Appendix Figure 1. Snake River ESU spring/summer chinook populations (reproduced from NOAA 2003).



Appendix Figure 2. Snake River steelhead populations (reproduced from NOAA 2003).

Appendix H—Socioeconomic Data

INTRODUCTION

This summary provides a brief description of economic, demographic, social, and cultural conditions within the Salmon subbasin. The information included within this section, serves as a generalized overview of important economic activities in the subbasin, connections to natural resources, and levels of related income and employment as outlined in the *Recommendations and Guidance for Economic Analysis in Subbasin Planning* by the Independent Economic Analysis Board (2003). The census data utilized in this summary was obtained from the Idaho Department of Commerce (2002) and the United States Census Bureau (2000). The information presented is organized by the counties that are considered to lie within the Salmon subbasin. These counties include Adams, Blaine, Custer, Idaho, Lemhi, Lewis, Nez Perce, and Valley.

DEMOGRAPHIC AND ECONOMIC SUMMARY

Subbasin Summary by County

Land Area

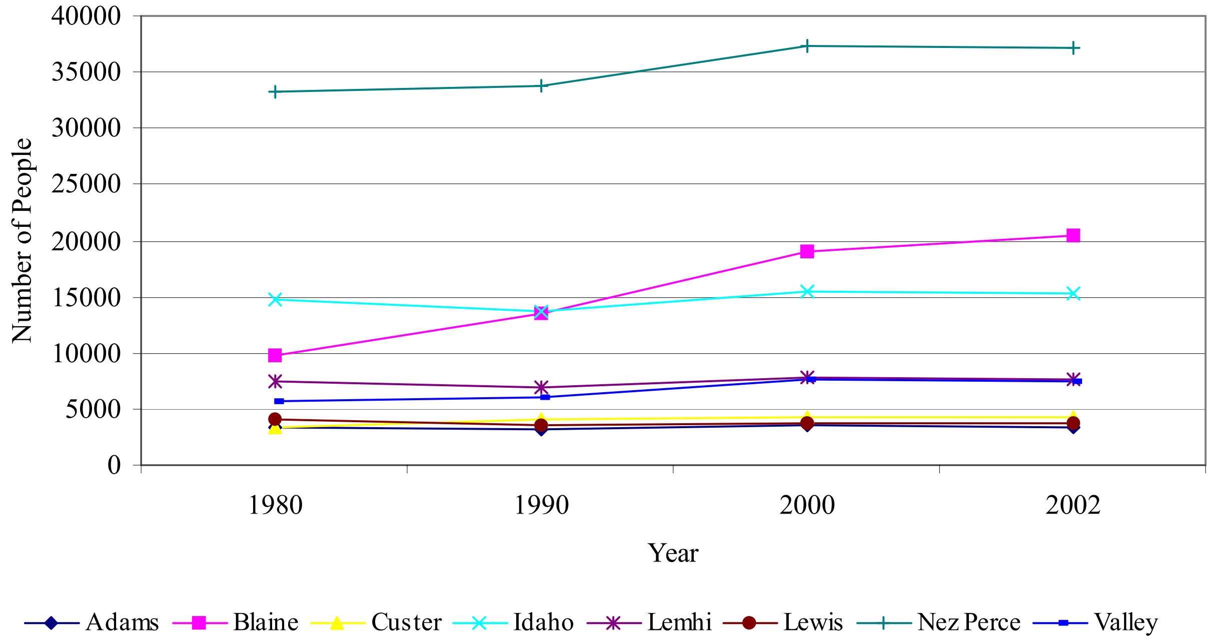
Of the eight counties included in this summary, Lemhi, Custer, and Idaho counties contain the greatest land area within the Salmon subbasin, while Lewis County, with 35,184 acres, has the least area (Appendix Table 1). With the exception of Nez Perce County, the majority of land within the Salmon subbasin is managed by the Federal government. In contrast, Nez Perce County is dominated by private landowners.

Appendix Table 8. Relative land area of counties in the Salmon subbasin (calculated using GIS [ESRI 1999]).

County Name	Acres	% Subbasin in County
Adams	214,015	2.4
Blaine	78,397	0.9
Custer	2,234,686	25.1
Idaho	2,081,944	23.4
Lemhi	2,665,715	29.9
Lewis	35,184	0.4
Nez Perce	63,175	0.7
Valley	1,537,451	17.3
Total	8,910,567	

Population

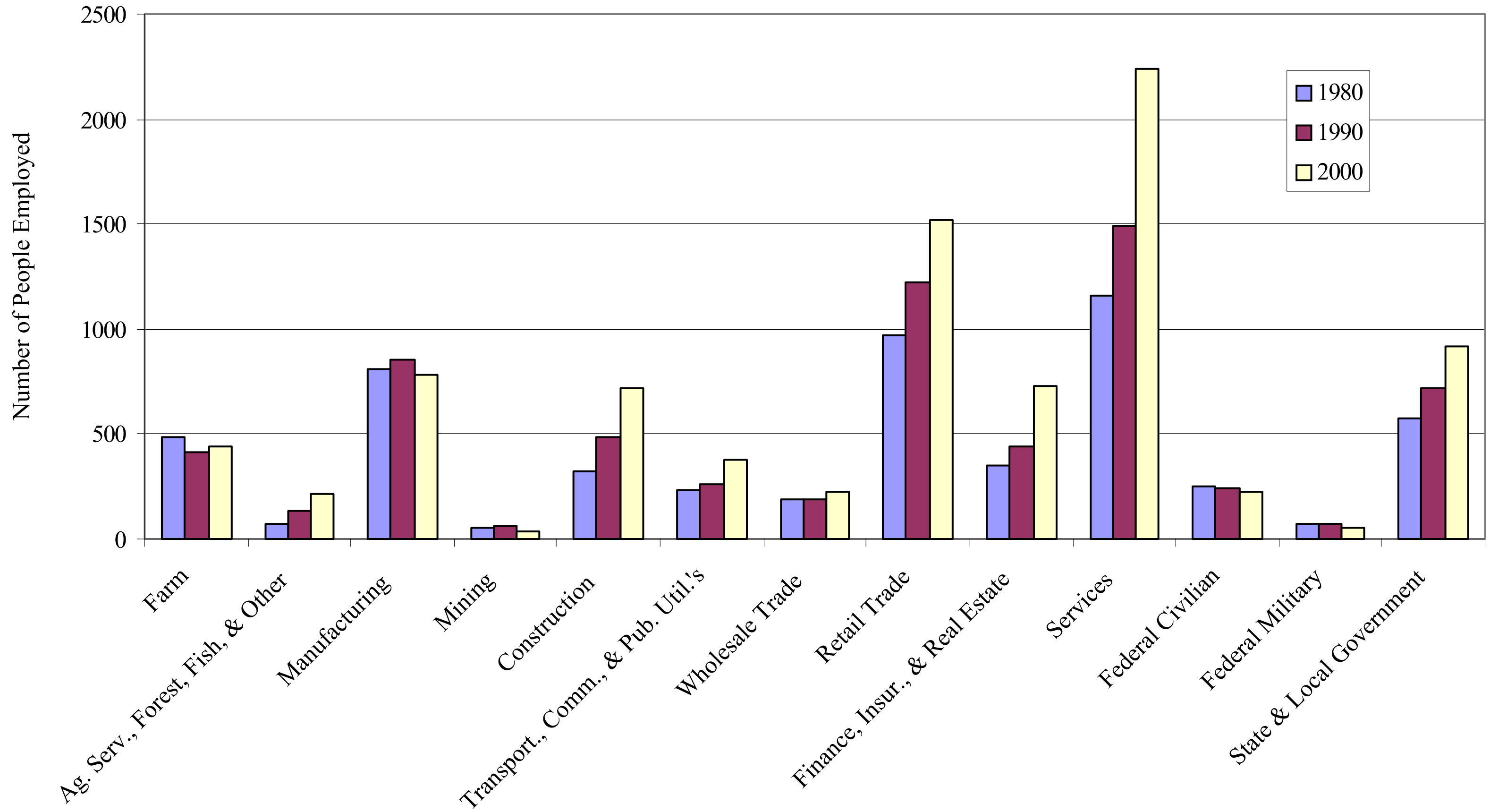
Based on the 2002 data collected by Idaho Department of Commerce, the most populous county within the Salmon subbasin is Nez Perce County with 37,106 people. The majority of the population (84%) in this county resides in urban areas that lie outside of the subbasin. As illustrated in Appendix Figure 3, the lowest populated counties are Adams, Custer, Lewis, and Valley.



Appendix Figure 3. Population of the counties in Salmon subbasin from 1980 to 2002 (IDOC 2002)

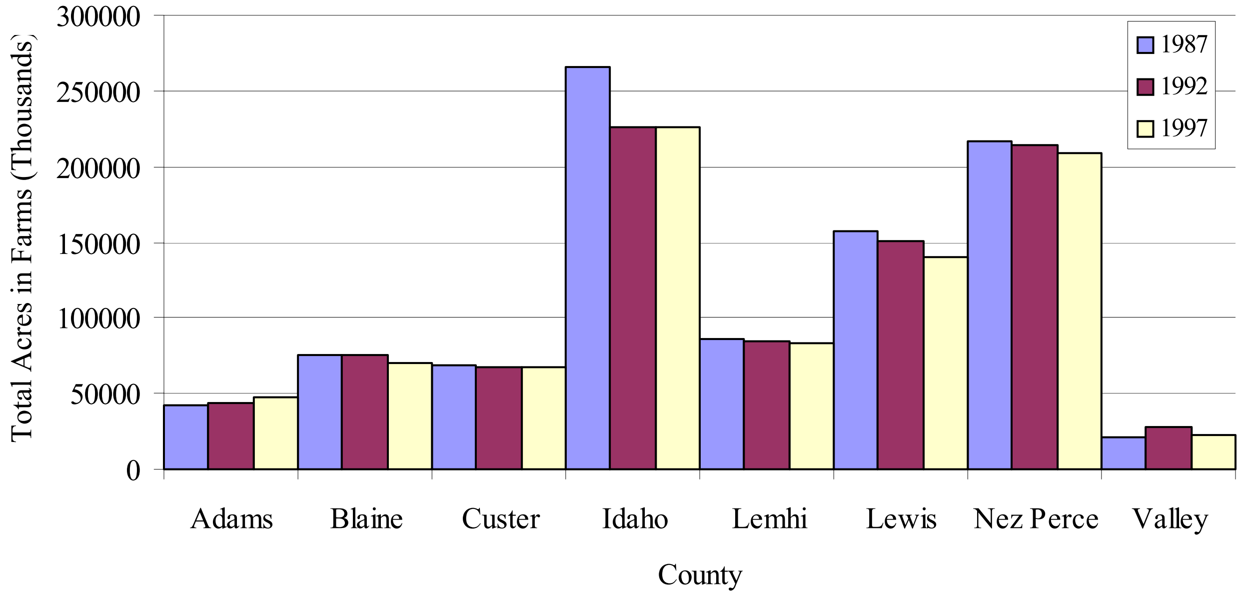
Economics

Employment by Industry—The economy of the Salmon subbasin is heavily dependent on retail trade and services (Appendix Figure 4). The prominence of these particular industries is heavily influenced by the presence of Lewiston (which lies within Nez Perce County but outside of the Salmon subbasin boundary) and Grangeville (which lies within Idaho County but outside of the Salmon subbasin boundary). The number of jobs in Nez Perce County is most likely skewed by the city of Lewiston, which lies outside the subbasin boundary. The lowest populated counties, Adams, Custer and Lewis, rely on farming and retail trade industries for employment. Contributions that come from industries classified within the category agriculture services, forestry, fishing, hunting and mining are important throughout the subbasin. The changes that occurred over time in each industry are described in the separate county summaries (Appendix Figure 14, Appendix Figure 15, Appendix Figure 16, Appendix Figure 17, Appendix Figure 18, Appendix Figure 19, Appendix Figure 20, and Appendix Figure 21).



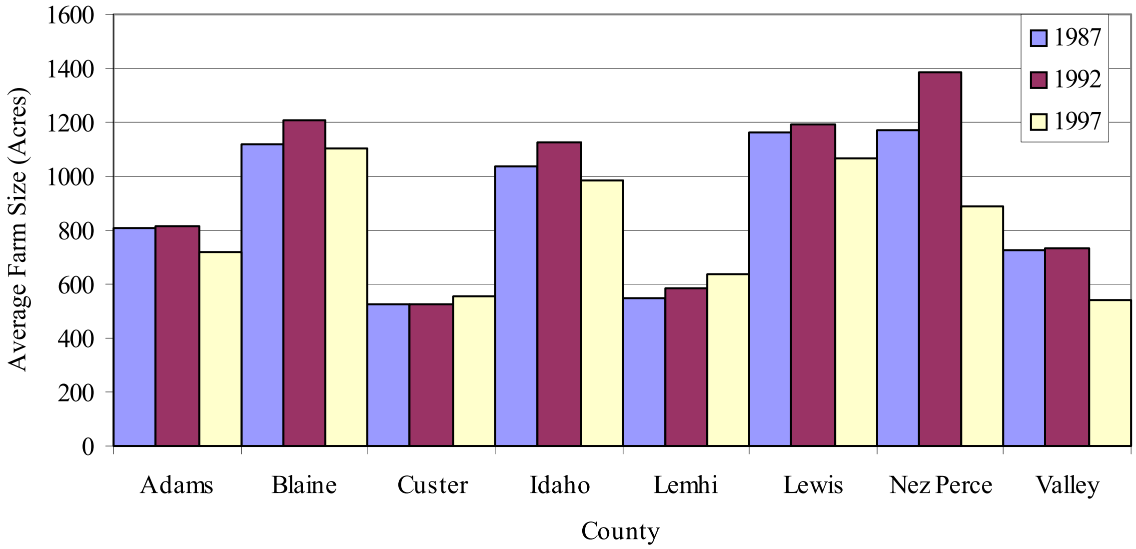
Appendix Figure 4. Average employment by industry in the Salmon Subbasin from 1980 to 2000 (IDOC 2002).

Farms, Cropland, and Livestock—Overall, the total number of acres in farms has remained constant from 1987 to 1997. There is a slight decrease in this number in Blaine, Idaho, Lewis, and Nez Perce counties (Appendix Figure 5). The largest number of total farms acres lay in Idaho and Nez Perce Counties. In contrast, the smallest number is in Valley County.



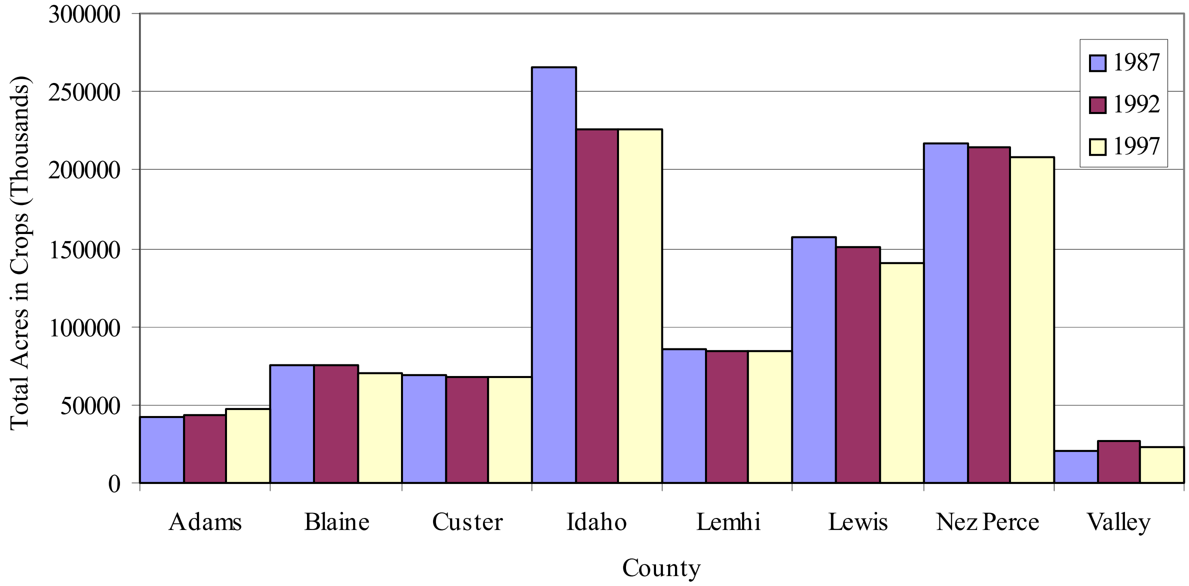
Appendix Figure 5. Total acres in farms in the Salmon subbasin by county (IDOC 2002).

The average farm size in the subbasin has fluctuated in the past ten years. The most consist pattern across the counties is one of decline in farm size (e.g., Valley, Nez Perce, and Lewis). The largest average farm size occurred in 1992 in Nez Perce County. The average farm size there reached almost 1500 acres in size (Appendix Figure 6). By 1997, that number had dropped to under 1000 acres.



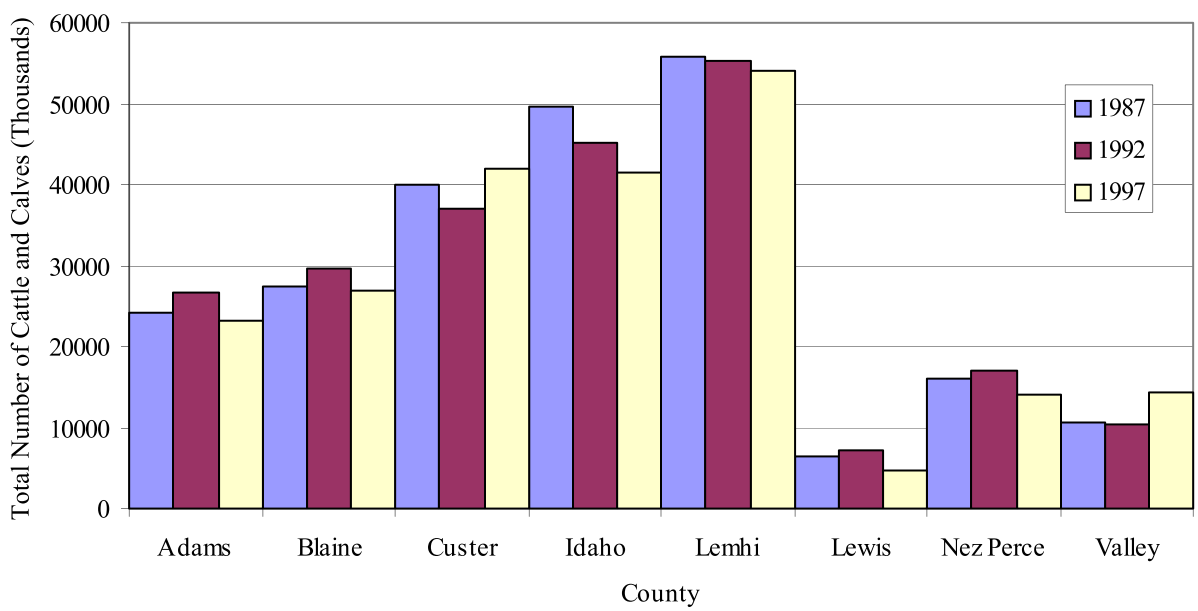
Appendix Figure 6. Average farm size in the Salmon subbasin by county (IDOC 2002).

The total acres in crops varied between the counties in the study area (Appendix Figure 7). The largest amount of acres in crops from 1987 to 1997 occurs in Idaho County. Here the number of acres decreased from just over 250,000 in 1987 to approximately 230,000 acres in 1997. The county with the lowest amount of acres in crops is Valley. In Valley County, the number of acres in crops has not risen over 50,000.



Appendix Figure 7. Total acres in crops in the Salmon subbasin by county (IDOC 2002).

The number of cattle and calves in the Salmon subbasin has decreased in almost every county except for Valley and Custer. Lemhi County has always had the highest number of cattle of all counties in the subbasin. Lewis County contains the smallest amount of cattle within the subbasin (Appendix Figure 8).

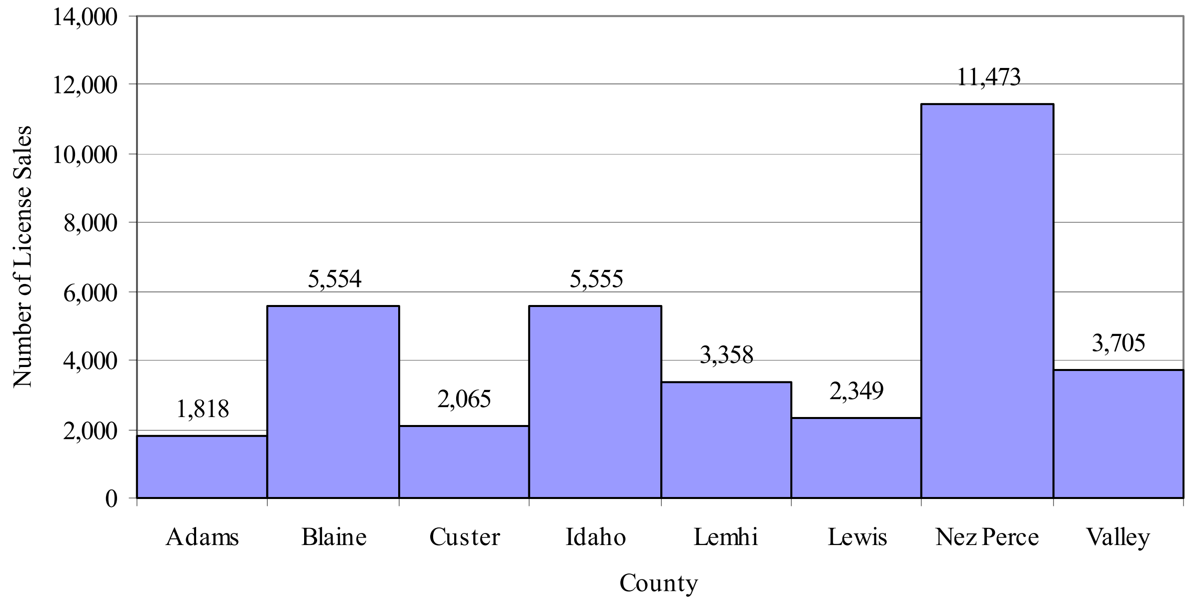


Appendix Figure 8. Cattle and calves inventory in the Salmon subbasin by county (IDOC 2002).

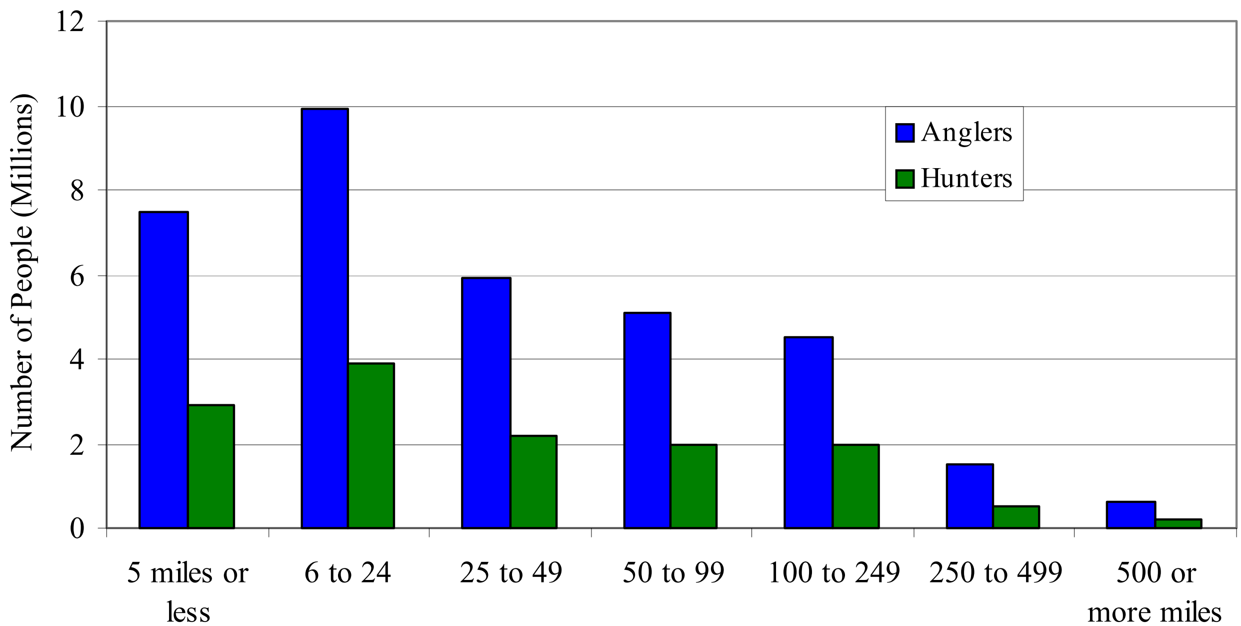
Employment by Recreation and Tourism—The recreation and tourism industry was hard to measure on a county basis. However, the *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (USFWS *et al*. 2003) found 868 thousand Idaho residents and nonresidents (16 and older) spent nearly 983 million dollars in Idaho for wildlife-related recreation during 2001. Of the 983 million dollars spent, 755 million dollars was due to fishing and hunting expenditures and 227 million dollars was due to wildlife-watching expeditions. The International Association of Fish and Wildlife Agencies and the American Sportfishing Association modeled the survey data (Southwick Associates 2001a) and estimated the number of jobs created in Idaho from all hunting activities as 6,197 and from all fishing activities as 7,773. The number of jobs created from all wildlife-watching activities was not modeled, but high expectations could be made based on the high percentage wildlife-watching expenditures in Idaho State. Rural community economies are generally considered to benefit from hunting and fishing activities, while some are highly dependent on it (Southwick Associates 2001b).

The Idaho Fish and Wildlife Foundation published a more detailed look at the specific economic impact of Salmon fishing in Idaho in their report: *The Economic Impact of the 2001 Salmon Season in Idaho.* The impact was found to be nearly 90 million dollars. The report revealed that within Idaho, salmon fishing had the most economic influence on Riggins (Idaho County, Salmon subbasin). In Riggins, activities related to salmon fishing contributed over 10 million dollars, approximately 23 percent of the town's sales. Other towns within the salmon subbasin that were substantially influenced by salmon fishing include White Bird (2.25 million dollars), Challis, Stanley, Salmon, and North Fork.

A summary of 2002 resident hunting and fishing license sales by county is used as a proxy measure to illustrate where most sportsmen live in the subbasin (assuming people buy licenses in the county of their residence) (Appendix Figure 9). The highest number of license sales was in Nez Perce county (n = 11,473) and followed by Blaine (n = 5,554) and Idaho (n = 5,555) counties (IDFG 2003). The 1991 *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* found 49 percent of all hunters and 52 percent of freshwater anglers traveled less than 25 miles to the sites they used most often (Appendix Figure 10, USFWS 1993).

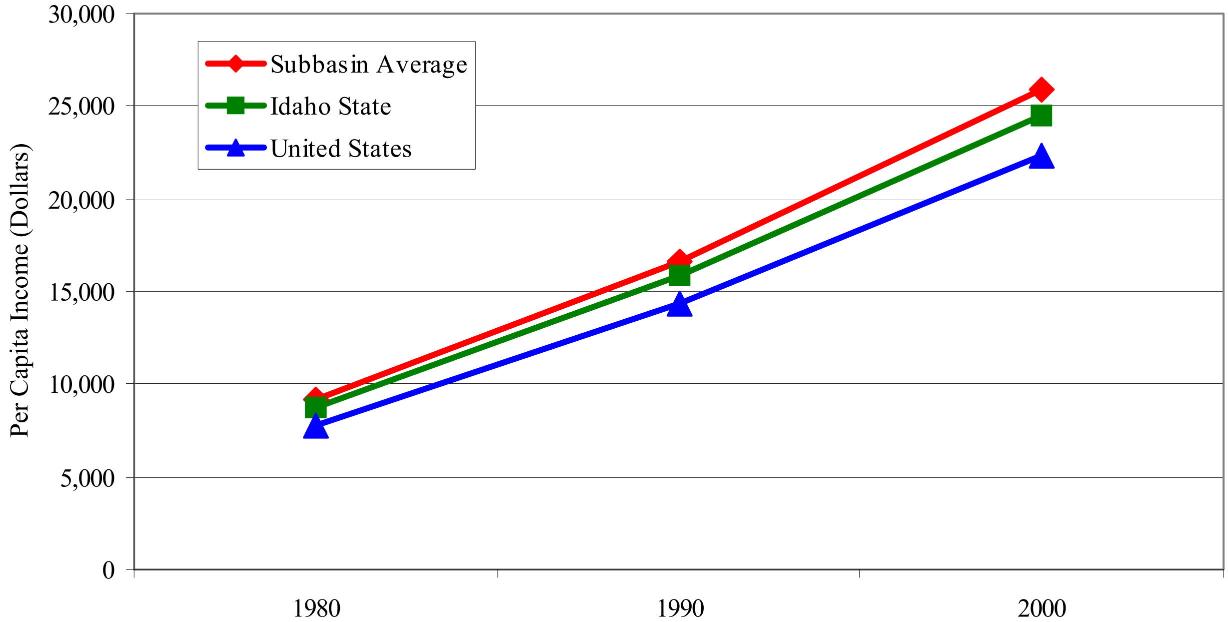


Appendix Figure 9. Resident hunting and fishing license sales in 2002 for counties in the Salmon subbasin (IDFG 2003).



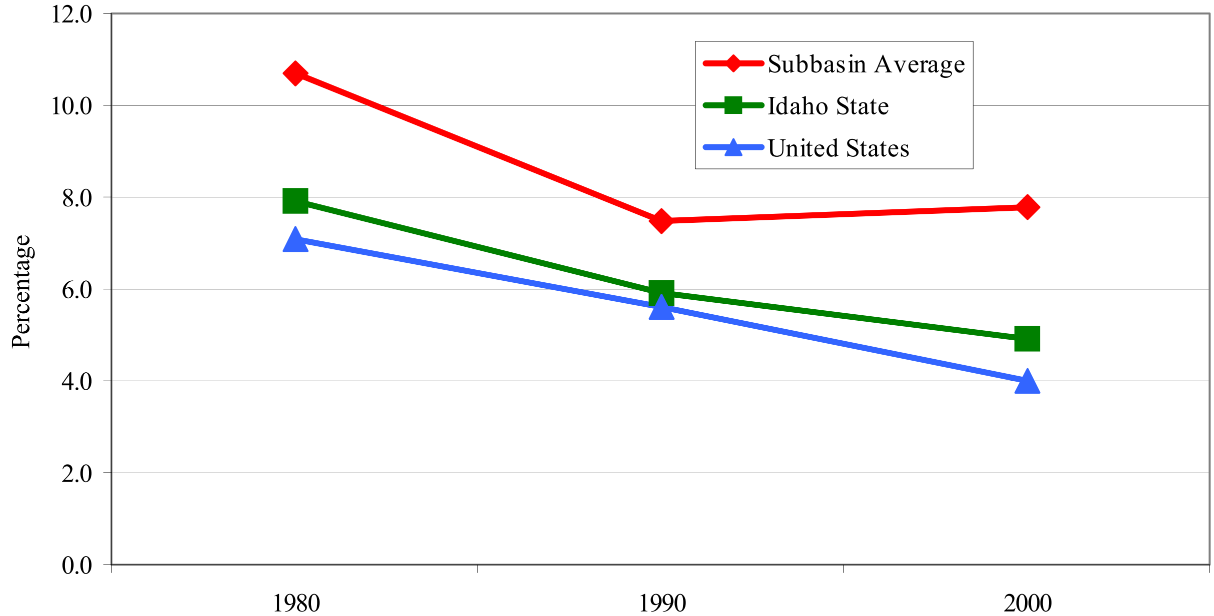
Appendix Figure 10. Distance traveled one-way to sites used most often by hunters and fisherman (USFWS 1993).

Income—The average per capita income trends during 2000 in the Salmon Subbasin are slightly higher than for Idaho and the national average (Appendix Figure 11). The per capital income for all eight counties has seen an upward trend from 1980 to 2001. Blaine County has experienced the biggest gain in per capita over the rest of the counties in the Salmon subbasin.



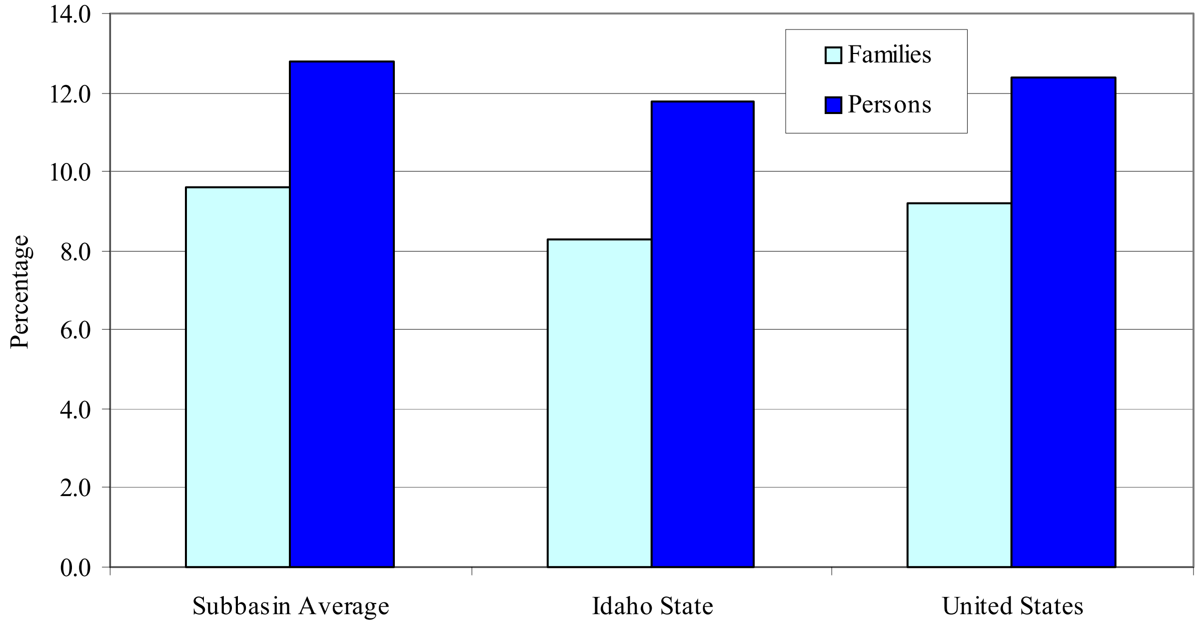
Appendix Figure 11. Per capita income trends from 1980–2000 in the Salmon subbasin, State of Idaho, and United States (IDOC 2002, NIIP 2001, U.S. Census Bureau 2000).

Unemployment—The average unemployment rate in the Salmon Subbasin decreased, between 1980 and 2000, along with that of the state of Idaho and the nation (Appendix Figure 12). The average unemployment rate in the subbasin tends to be higher that that in the State of Idaho and the nation and around the year 2000 was 7.8 percent, compared to 4.9 percent in Idaho State. The average subbasin unemployment rate decreased 2.9 percent since 1980. From 1980 to 2000, unemployment rate has dropped in all eight counties with the exception of Custer County. In this county, unemployment has risen from 5 percent in 1980 to almost 9 percent in 2002.



Appendix Figure 12. Percent civilian labor force unemployment trends from 1980 to 2002 in the Salmon Subbasin, State of Idaho, and United States (IDOC 2002, U.S. Census Bureau 2000).

Poverty—The percentage of families or persons living below the poverty level in the subbasin was only slightly higher than in Idaho and the United States. The percentage of families below poverty is generally 3.5 percent lower than the percentage of persons below poverty (Appendix Figure 13). Idaho County had the highest percentage of persons below poverty in 1999 (16.3), while Blaine County had the lowest (7.8).



Appendix Figure 13. Percentage of families and persons living below poverty in the Salmon Subbasin, the State of Idaho, and the United States (IDOC 2002, U.S. Census Bureau 2000).

County Summaries

Adams County

Adams County ranks 41st among Idaho counties in population and 22nd in area (IDOC 2002). The federal government manages about 65 percent of the county. Forest products manufacturing and government jobs support the local economy in Adams County. Major employers include Adams County government, Council Community Hospital, the U.S. Forest Service, S & S Drywall, Inc., JI Morgans, Meadowcreek Properties, and Evergreen Forest Products (Appendix Figure 14). Brundage Ski Area, located on the Adams and Valley County border, is a large seasonal employer (IDOC 2002).

Blaine County

Blaine County ranks 15th among Idaho counties in population and 7th in area (IDOC 2002). The federal government manages about 78 percent of the county. Recreation and tourism provide jobs in trade, services, and construction (Appendix Figure 15). Major employers include St. Luke's Wood River Medical Center, Blaine County government, Power Engineers, Inc., Sun Valley Company, the U. S. Forest Service, and Albertson's, Inc. (IDOC 2002).

Custer County

Custer County ranks 37th among Idaho counties in population and 3rd in area. (IDOC2002) The federal government manages over 93 percent of the county. Mining and agriculture are the major basic industries, with trade, services and government providing the largest employment opportunities (Appendix Figure 16). Annual average total civilian employment in the county increased 10.2 percent from 1991 to 2001. Major employers include Challis Joint School District, Custer County government, L & W Stone Corporation, Redfish Lake Lodge, The Industrial Company, the U.S. Forest Service, Thompson Creek Mining, and Challis Lodge (IDOC 2002).

Idaho County

Idaho County ranks 20th among Idaho counties in population and 1st in area (IDOC 2002). The federal government manages about 16 percent of the county. Agriculture, forest products, and manufacturing are the basic industries, but the government is the largest sector (Appendix Figure 17). Trade and services also provide substantial employment. Major employers include Bennett Lumber Products; Clearwater Forest Industries, Inc.; Department of Corrections; Seubert Excavators, Inc.; St. Mary's Hospital; Three Rivers Timbers, Inc.; and the U.S. Forest Service (IDOC 2002).

Lemhi County

Lemhi County ranks 31st among Idaho counties in population and 4th in area (IDOC 2002). The federal government manages about 91 percent of the county. Government employment supports the majority of the local economy through federal land agencies (Appendix Figure 18). The most significant industries are cattle ranching and tourism. Also, mining and forest products manufacturing provide a small sector of employment. Major employers include Steele Memorial Hospital, Safeway Market, Discovery Care Center, Q-B Corporation, Idaho Department of Game and Fish, Salmon Public Schools, and Lemhi County government (IDOC 2002).

Lewis County

Lewis County ranks 40th among Idaho counties in population and 41st in area (IDOC 2002). Only 2.6 percent of its land is federally managed, the least of any Idaho county. Agriculture and forest and wood products manufacturing are important to the local economy, and government provides nearly half of the non-farm wage and salary employment (Appendix Figure 19). Major employers include the Idaho Department of Lands, Highland and Nez Perce Joint School Districts, Hillco, Inc., Lewiston Grain Growers, U.S. Timber Corporation, Kamiah Mills, Three Rivers Timber Company, Clonnigers Thrift, and the U.S. Forest Service (IDOC 2002).

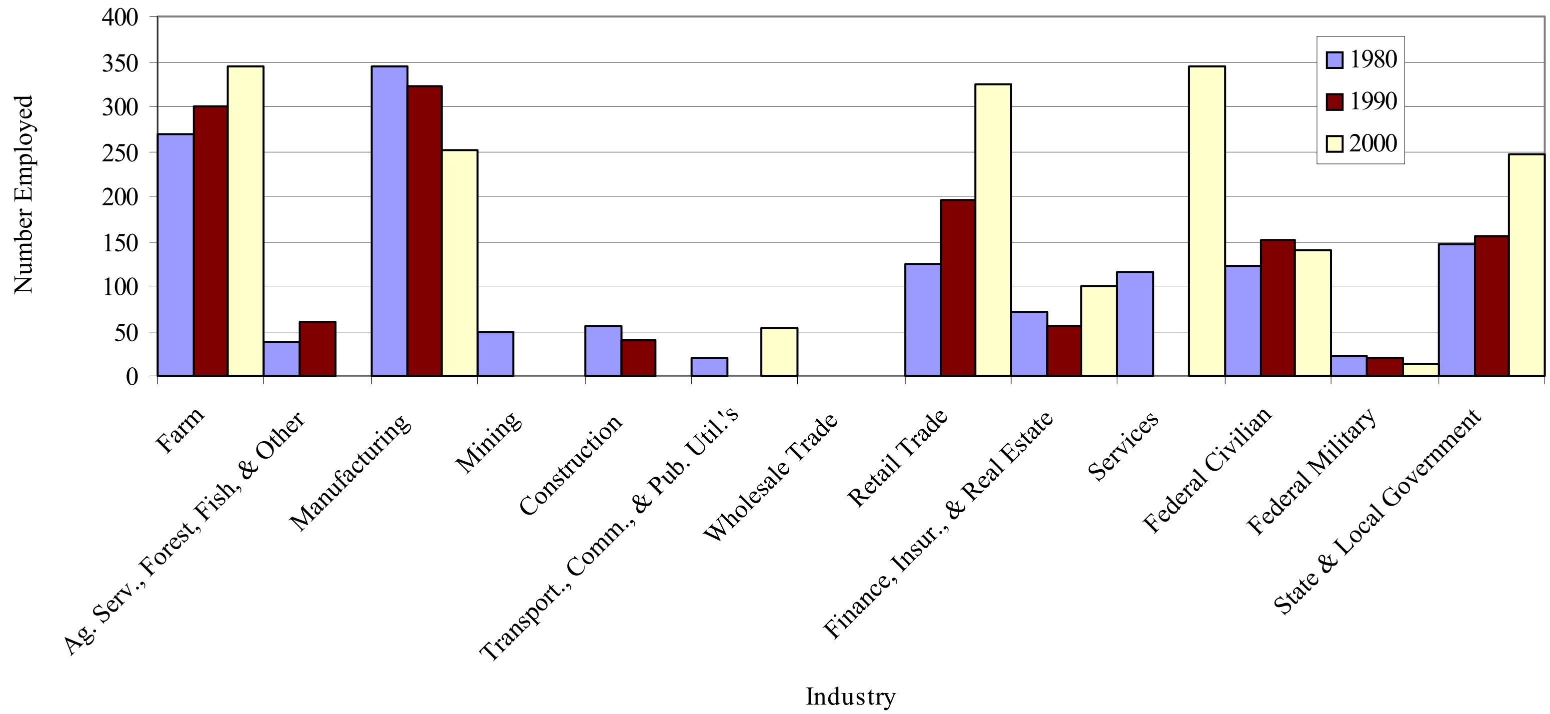
Nez Perce County

Nez Perce County ranks 9th among Idaho in populations and 33rd in area (IDOC 2002). Only 6.2 percent of the county is managed as federal land, the second lowest of all Idaho counties. Paper and wood products manufacturing form the foundation of the local economy (Appendix Figure 20). Trade and transportation are also important due to the influence of the Port of Lewiston, Idaho's only seaport. Major employers include Potlatch Corporation, Albertson's, Inc., Lewis-Clark State College, Alliant Techsystems, Swift Transportation Company, Tribune Publishing Company, Twin City Foods, Inc., Wal-Mart, and Northwest Children's Home, Inc., (IDOC 2002).

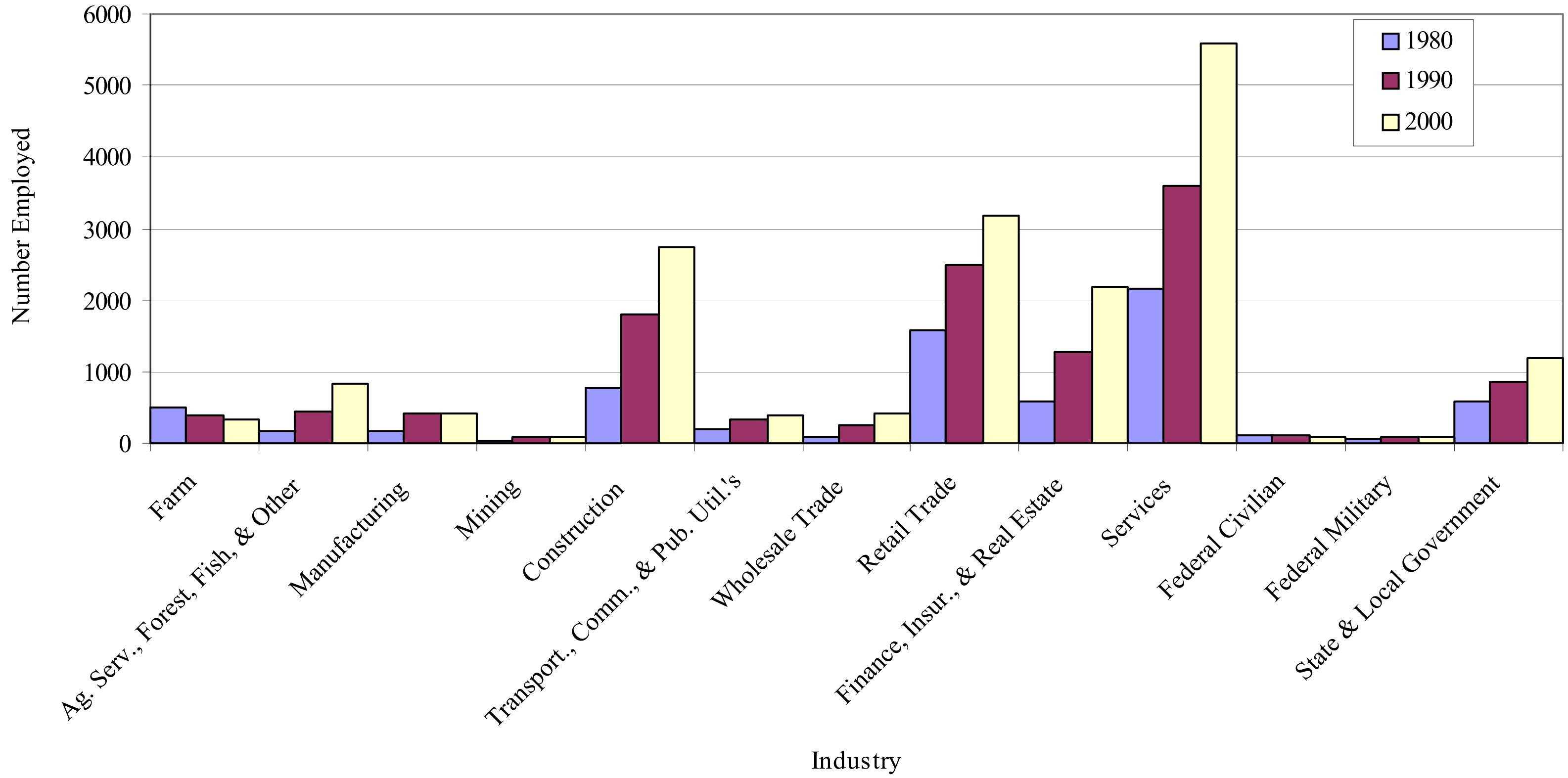
Valley County

Valley County ranks 30th among Idaho counties in population and 5th in area (IDOC 2002). The federal government manages about 88 percent of the county. Construction and forest products manufacturing are the basic industries, but the government is the largest sector

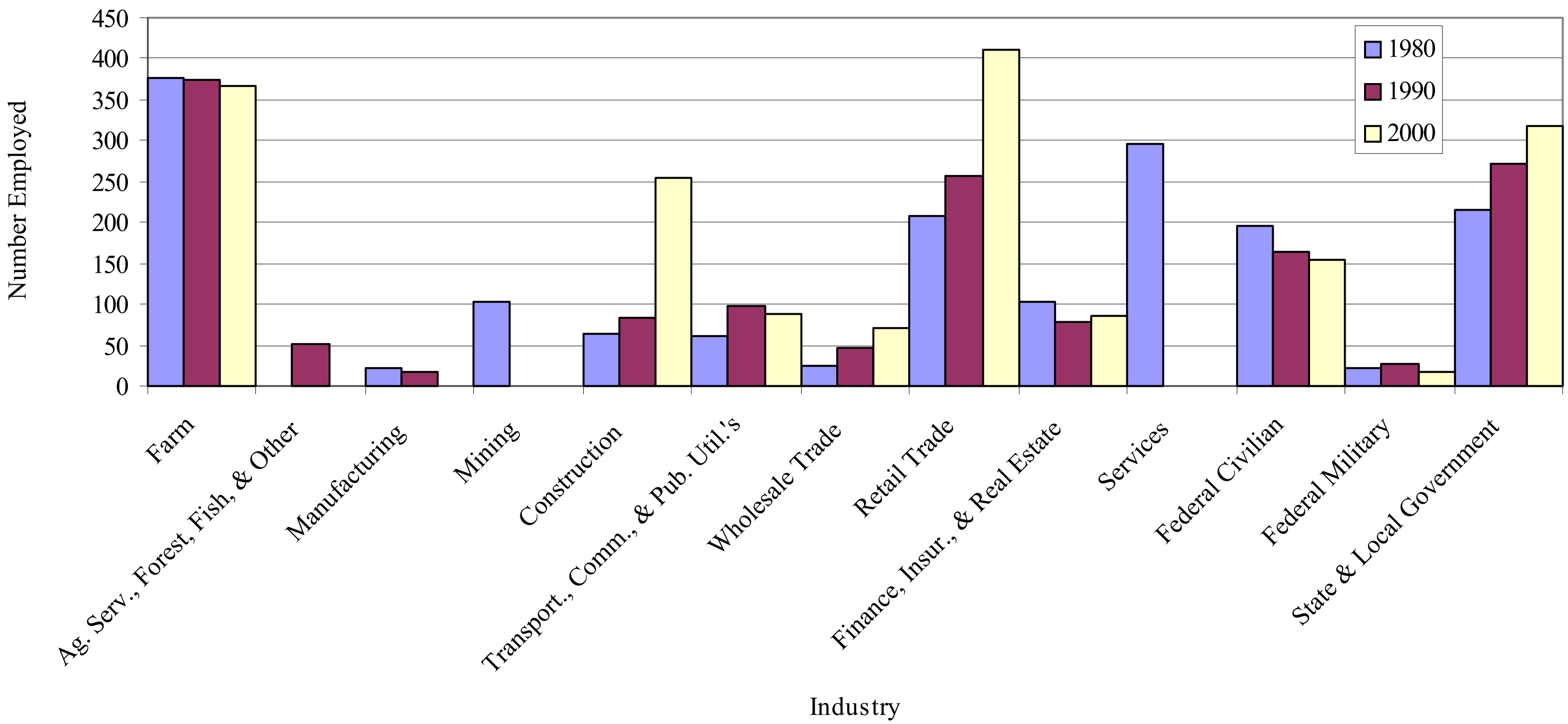
(Appendix Figure 21). Trade and services also provide substantial employment. Major employers include McCall Memorial Hospital, Paul's Market, Ridley's, the school districts, Valley County government, Brundage Mountain Ski Resort, and the U.S. Forest Service (IDOC 2002).



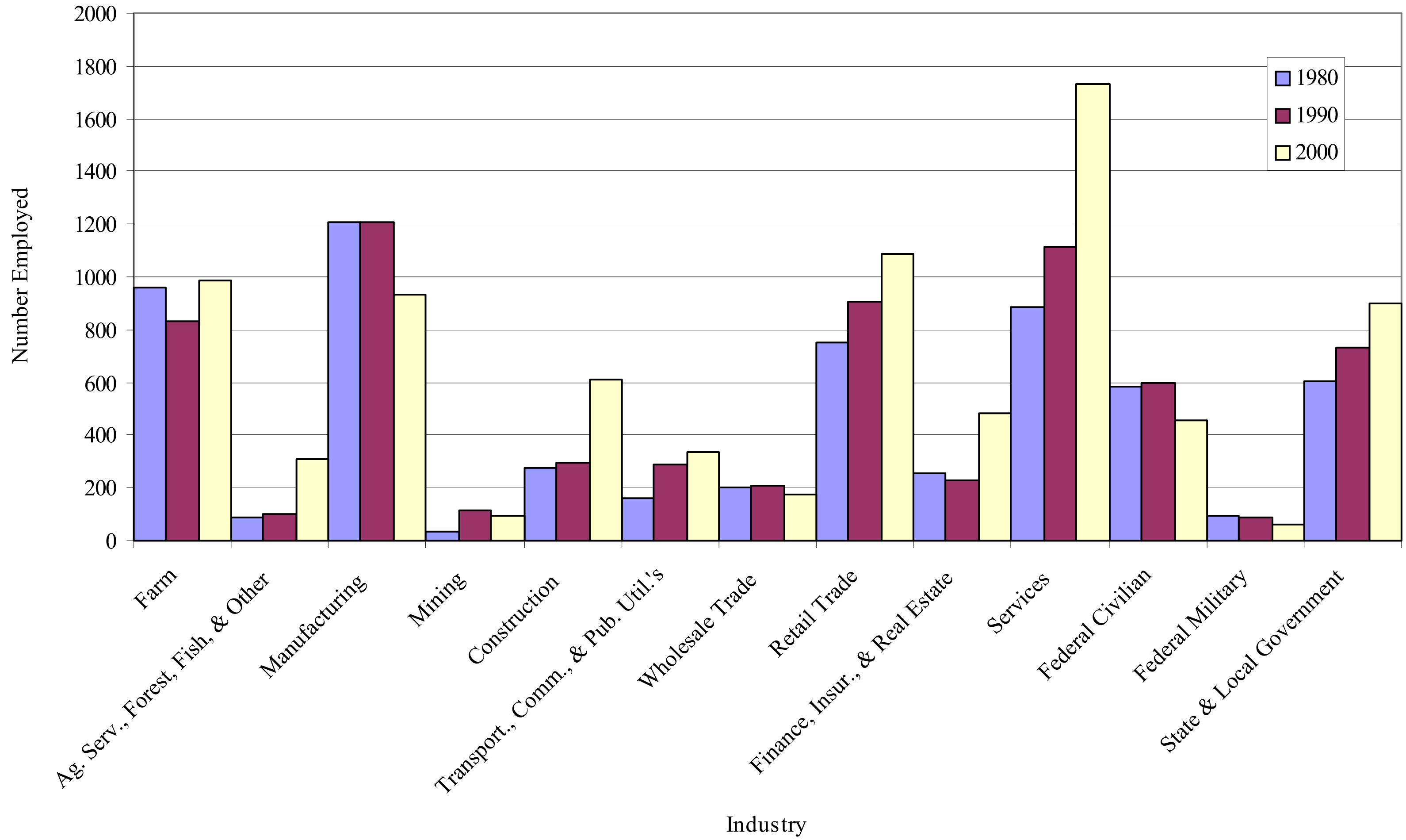
Appendix Figure 14. Number of workers by industry in Adams County (IDOC 2002).



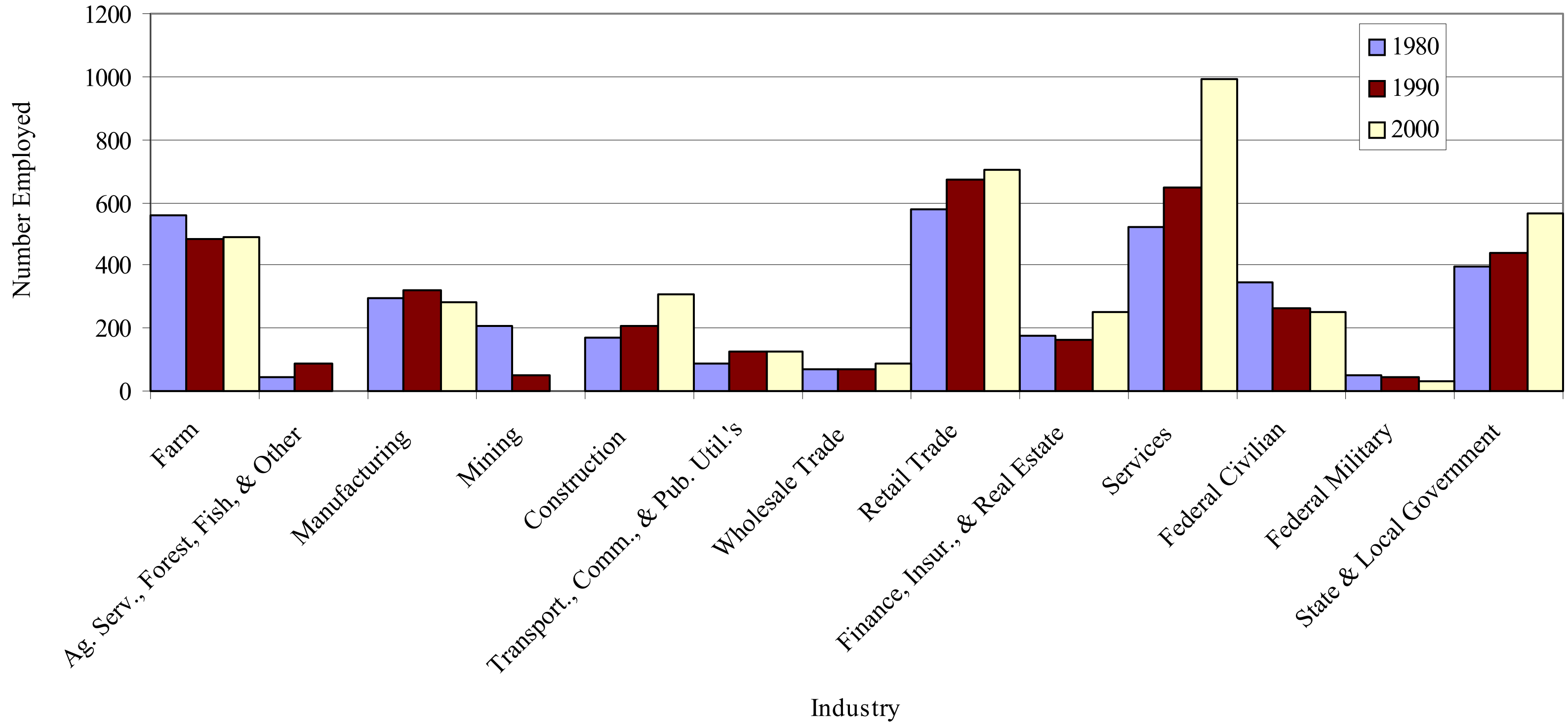
Appendix Figure 15. Number of workers by industry in Blaine County (IDOC 2002).



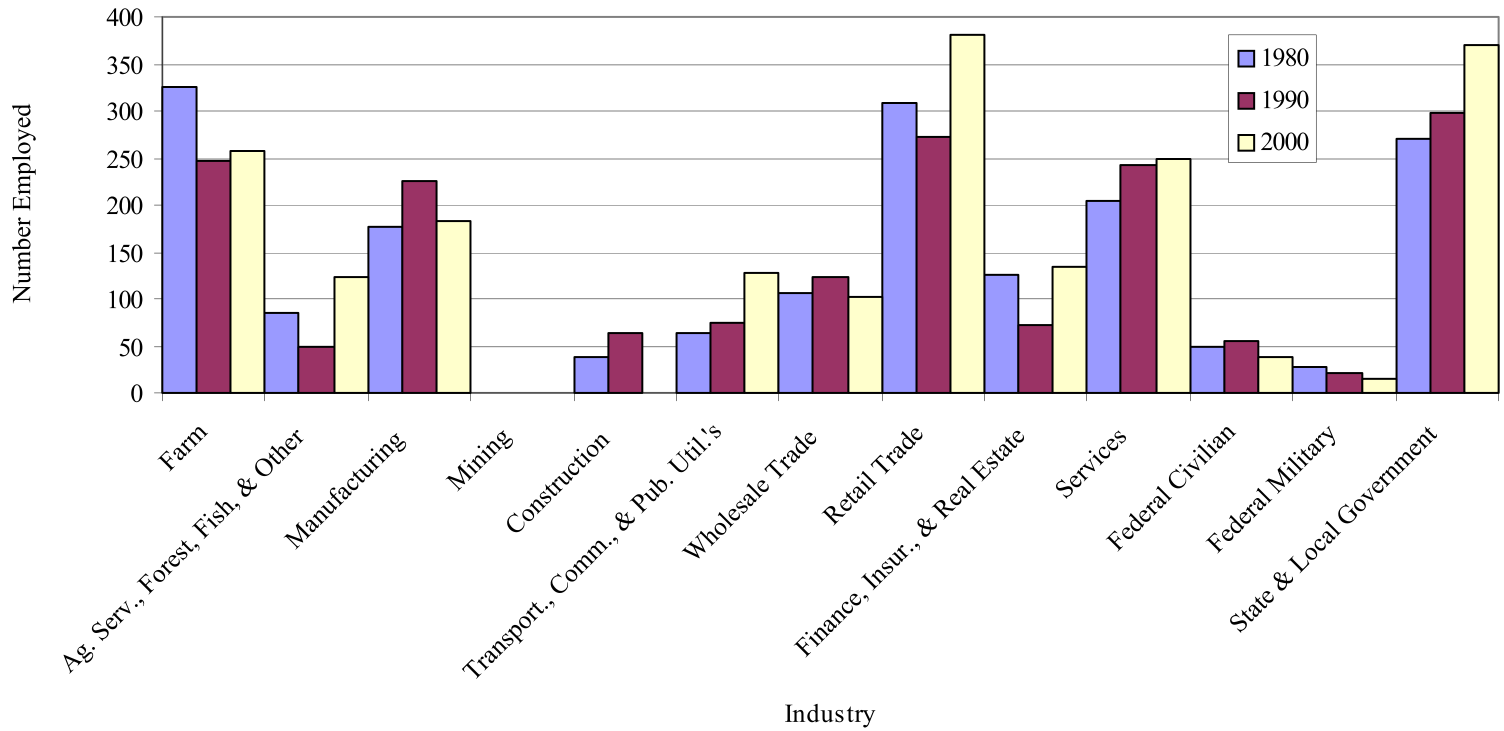
Appendix Figure 16. Number of workers by industry in Custer County (IDOC 2002).



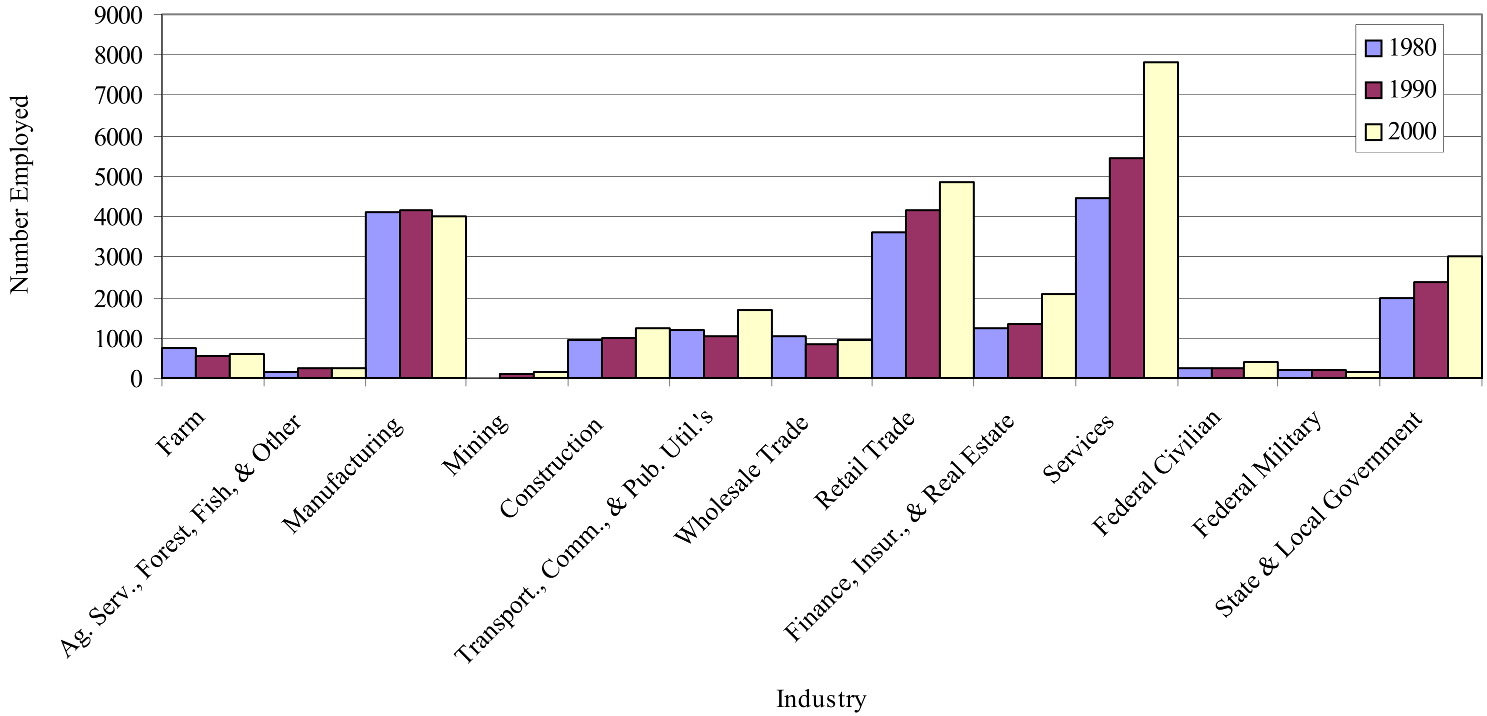
Appendix Figure 17. Number of workers by industry in Idaho County (IDOC 2002).



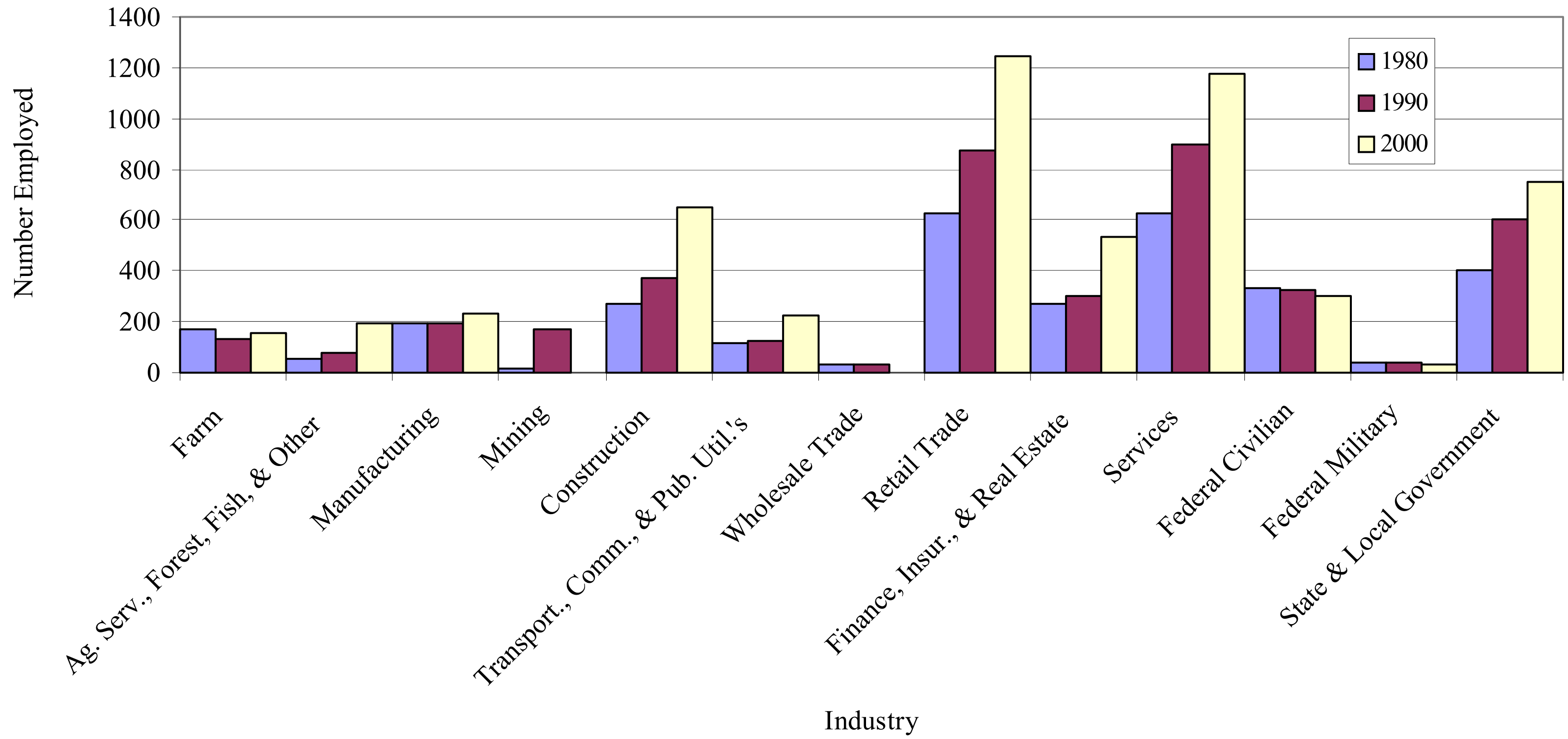
Appendix Figure 18. Number of workers by industry in Lemhi County (IDOC 2002).



Appendix Figure 19. Number of workers by industry in Lewis County (IDOC 2002).



Appendix Figure 20. Number of workers by industry in Nez Perce County (IDOC 2002).



Appendix Figure 21. Number of workers by industry in Valley County (IDOC 2002).

APPENDIX H REFERENCES

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Appendix I—Examples of ongoing, regional and subbasin-specific aquatic monitoring and evaluation efforts

Appendix Table 9. Salmon Subbasin Hatchery Genetic Management Plans (2002) and other programs relevant to the proposed Salmon M&E, as presented in the Assessment appendices

Assessment Appendix #	Program	Document Title (Year Submitted)	Species or Hatchery Stock	Agency/ Operator
2-4	**Salmon River Basin, Spring Chinook Salmon** • Sawtooth Fish Hatchery • East Fork Salmon River Satellite	SALMON RIVER SAWTOOTH SPRING CHINOOK HATCHERY AND GENETIC MANAGEMENT PLAN (2002)	Spring Chinook Salmon *(Oncorhynchus tshawytscha)*	IDFG
2-5	Lemhi River	DRAFT LEMHI RIVER SPRING/SUMMER CHINOOK IN THE SALMON SUBBASIN HATCHERY AND GENETIC MANAGEMENT PLAN (2003)	Spring/summer Chinook Salmon *(Oncorhynchus tshawytscha)*	IDFG
2-6	East Fork Salmon River	DRAFT SPRING/SUMMER CHINOOK (EAST FORK SALMON RIVER)–INTEGRATED IN THE SALMON SUBBASIN HATCHERY AND GENETIC MANAGEMENT PLAN	Spring Chinook Salmon *(Oncorhynchus tshawytscha)*	IDFG
2-7	West Fork Salmon River	DRAFT SPRING/SUMMER CHINOOK (W. FORK YANKEE FORK SALMON RIVER)–INTEGRATED IN THE SALMON SUBBASIN HATCHERY AND GENETIC MANAGEMENT PLAN	Spring Chinook Salmon *(Oncorhynchus tshawytscha)*	IDFG
2-9	Salmon River Basin Summer Chinook Salmon. McCall Fish Hatchery	SALMON RIVER SUMMER CHINOOK HATCHERY AND GENETIC MANAGEMENT PLAN (2002)	Spring Chinook Salmon *(Oncorhynchus tshawytscha)*	IDFG
2-10	Johnson Creek Artificial Propagation Enhancement (JCAPE) Project	SALMON RIVER JOHNSON CREEK SUMMER CHINOOK HATCHERY AND GENETIC MANAGEMENT PLAN (2000 – resubmitted 2003)	Spring Chinook Salmon *(Oncorhynchus tshawytscha)*	NPT
2-11	Pahsimeroi	DRAFT SPRING CHINOOK (PAHSIMEROI) IN THE SALMON SUBBASIN HATCHERY AND GENETIC MANAGEMENT PLAN (2003)	Spring Chinook Salmon *(Oncorhynchus tshawytscha)*	NPT
2-12	Pahsimeroi	DRAFT STEELHEAD A-RUN (PAHSIMEROI)–	A-run Steelhead *(Oncorhynchus*	IDFG

Assessment Appendix #	Program	Document Title (Year Submitted)	Species or Hatchery Stock	Agency/ Operator
		HATCHERY IN THE SALMON SUBBASIN HATCHERY AND GENETIC MANAGEMENT PLAN (2003)	*mykiss)*	
2-13	**Salmon River Basin, A-Run Steelhead** • Sawtooth Fish Hatchery • Magic Valley Fish Hatchery • Hagerman NFH	SALMON RIVER A-RUN STEELHEAD HATCHERY AND GENETIC MANAGEMENT PLAN (2002)	A-run Summer Steelhead *(Oncorhynchus mykiss)*	IDFG
2-14	**Salmon River Basin, B-Run Steelhead** • Magic Valley Fish Hatchery • Clearwater Fish Hatchery • Dworshak National Fish Hatchery • Hagerman National Fish Hatchery • Sawtooth Fish Hatchery, • East Fork Salmon River Satellite facility • Squaw Creek Pond	SALMON RIVER B-RUN STEELHEAD HATCHERY AND GENETIC MANAGEMENT PLAN (2002)	Summer Steelhead B-run *(Oncorhynchus mykiss)*	IDFG
2-15	**East Fork Salmon Natural Steelhead** • Sawtooth Fish Hatchery • East Fork Salmon River Satellite facility • Magic Valley Fish Hatchery	EAST FORK SALMON RIVER NATURAL STEELHEAD HATCHERY AND GENETIC MANAGEMENT PLAN (2002)	Summer Steelhead *(Oncorhynchus mykiss)*	IDFG
2-16	Redfish Lake Captive Broodstock Program	DRAFT REDFISH LAKE SOCKEYE IN THE SALMON SUBBASIN HATCHERY AND GENETIC MANAGEMENT PLAN	Sockeye salmon *(Oncorhynchus nerka)*	IDFG; NOAA Fisheries
2-17	Redfish Lake sockeye salmon and Snake River spring/summer	FINAL ISSUE 12 RESPONSE: REVIEW OF BLUE MOUNTAIN AND MOUNTAIN SNAKE	Sockeye salmon *(Oncorhynchus nerka)*	(The following entities co-authored Kline (et al. 2003) and do not necessarily represent hatchery operators as indicated in the column header)

Assessment Appendix #	Program	Document Title (Year Submitted)	Species or Hatchery Stock	Agency/ Operator
	chinook captive broodstock programs	PROVINCE CAPTIVE PROPAGATION PROGRAMS: RESPONSE TO THE NORTHWEST POWER AND CONSERVATION COUNCIL (Kline et al. 2003)	Spring Chinook Salmon *(Oncorhynchus tshawytscha)*	IDFG, ODFW, NOAA Fisheries, SBT, U. of ID, NPT, CTUIR
2-18	Rainbow Trout Stocking	RAINBOW TROUT HATCHERY AND GENETIC MANAGEMENT PLAN	Rainbow Trout *Oncorhynchus mykiss.*	IDFG

Appendix J—Final Recommendations of the Upper Salmon Basin Planning Team

The following recommendations were submitted by the Upper Salmon Basin Planning Team after the final Planning Team meetings and were not reviewed by the Lower Salmon Planning Team. For that reason they are included as an appendix rather than as part of the recommendations chapter. Until reviewed and accepted by the Lower Salmon Planning Team, they only apply to the upper Salmon portion of the subbasin.

The Planning Team recognizes that all habitats are critical for fish and wildlife for at least some portion of their life history. Prioritizing specific projects or subbasins for restoration activities sometimes leads to the exclusion of projects or subbasins that may be equally as important. The efforts in the Upper Salmon River Basin have been directed toward restoration projects in areas and subbasins that benefit the most life stages simultaneously. Unless an obvious limiting factor is identified, we assume that all recovery actions have equal benefits to fish and wildlife so long as the proposed project is in a location that benefits multiple life stages. Individual projects may not alone lead to quantifiable or measurably direct benefits to species of interest. However, like negative impacts, positive impacts are also cumulative and can lead toward the fulfillment of the Vision for the Salmon Subbasin.

The Planning Team believes recovery of anadromous focal species may not be accomplished exclusively through headwater habitat improvements but will require improvements in all freshwater habitats occupied by anadromous fish during their life cycle. Many of the proposed actions in the plan will benefit both anadromous and resident focal species, resulting in substantial improvements in headwater habitats that all focal species depend on. The measure of success should not be solely population responses of anadromous fishes but include the habitat and resident fish response to those habitat improvements. Appropriate credit should be given to private landowners who make those improvements. At the same time, landowners should not be blamed if anadromous fish populations do not respond due to out-of-basin factors acting to limit populations.

Proper monitoring and evaluation will be employed in fish and wildlife habitats to ensure that restoration activities result in the maximum productivity of those habitats that allow for sustainable returns of adult anadromous fishes and the most suitable rearing environments for their progeny. The burden of focal species recovery should not be carried by headwater habitat restoration alone. We in the Upper Salmon will continue to address the limiting factors in this subbasin that can be influenced, focusing on those projects that have the greatest biological benefit with the least social impact.

Restoration activities in the Upper Salmon basin are coordinated through the Upper Salmon Basin Watershed Project (USBWP), which ensures that projects are directed toward important habitats through their ranking process and prioritization procedures. Planning and implementation of projects are directed through the USBWP with assistance from NRCS, BLM, USBR, USFS, IDFG, USFWS, NOAA, the Shoshone-Bannock Tribes, and private consultants. It has always been the goal of the USBWP to work in a collaborative fashion. Projects implemented as part of "mandates" often lead to resistance and compliance reluctance by affected landowners. It is this team’s contention that this collaborative approach is the most effective means of accomplishing the plan’s vision while maintaining community support on a wide level. This collaborative method should continue under the guidance of the USBWP Technical Team and Advisory Committee.

The USBWP has developed, with the assistance of its partner agencies, a prioritization document. This document, Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin (SHIPUSS), weighs habitat by its current importance to fish. It is updated annually and prioritizes projects on two levels; biological importance and social constraints.

The opportunity exists to work in areas that meet both biological and social goals with the biological value of certain watersheds acting as a constant. Social needs and constraints will change over time. It is the assessment of the Planning Team that even in watersheds where social issues may make implementation difficult, social concerns will likely change over time. In particular, if restoration efforts are enacted in adjacent watersheds, resulting in favorable biological and social benefits, reluctant participants may wish to participate after the program's success is demonstrated. The team has observed such a "social turnaround" when successful projects are implemented nearby.

Implementation of projects is currently driven by opportunity. While this may not seem to be the best approach, it can be likened to putting together a puzzle. While the puzzle border is being constructed, pieces of the center can be placed in their correct position. Capitalization of these opportunities as they arise, even if they are out of the seemingly logical order, is vital toward completion of the whole. Project implementation funding needs to come from a stable source to ensure proper planning and good faith commitments to landowners. Stringing along cooperative landowners for years as funding is awaited causes a loss of credibility for plan implementers. Historically, private landowners have relied on USBWP for timely and effective project implementation. Due to recent funding uncertainty, this rate of timely implementation has been compromised.

As with the unstable funding issue, the level of project scrutiny and federal compliance process has increased substantially in recent years. This has led the USBWP to expend considerable personnel resources in "process." This time could be better spent in restoration work. Either streamlining the "process" or providing additional manpower to accomplish compliance requirements is needed to make the actual implementation process more successful. The team prefers the former solution, as it is apparent significant federal compliance scrutiny already exists from any number of sources.