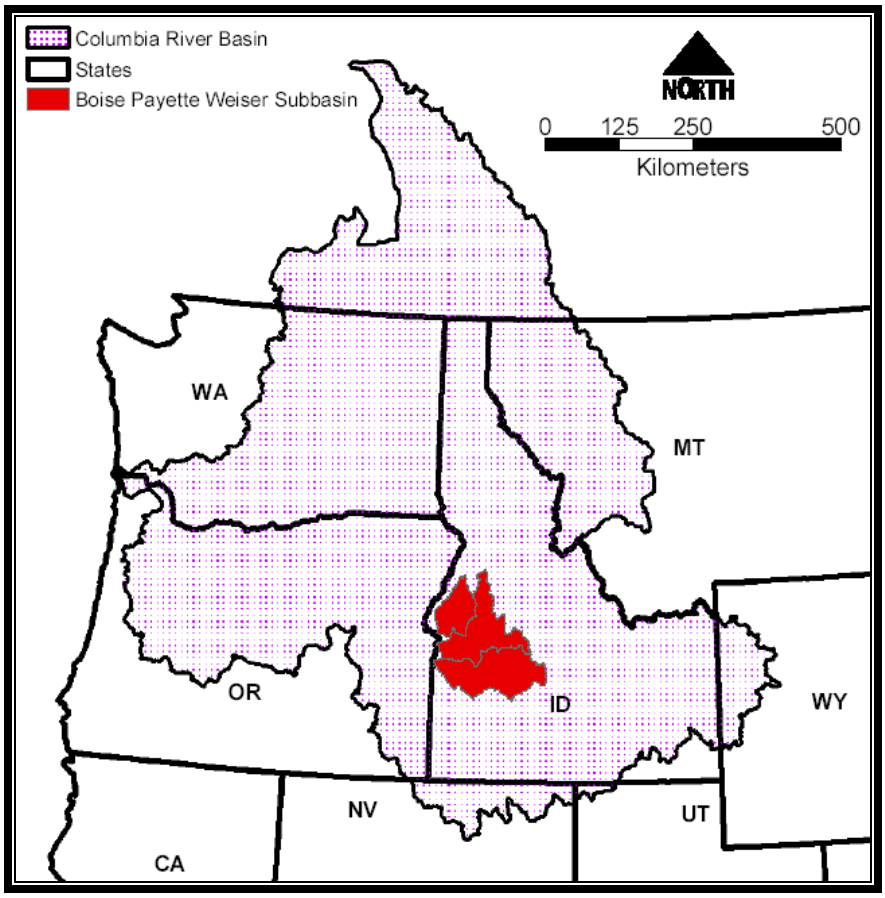
BOISE, PAYETTE, AND WEISER SUBBASINS MANAGEMENT PLAN

SUPPLEMENT



Prepared for:
Northwest Power and Conservation Planning Council
Portland, OR

Prepared by:
Watershed Professionals Network, llc
Boise, ID

November 2004

Table of Contents

List of Figures

List of Tables

1.0 INTRODUCTION

The review of the Boise, Payette and Weiser subbasin plan by the Northwest Power and Conservation Council (the council) determined the proposed subbasin plan did not adequately describe how the objectives and strategies in the management plan address the limiting factors described in the assessment. The council felt this key issue that must be addressed as these plans are considered for adoption as an amendment to the program.

The comments and the staff review of the proposed subbasin plans for the Boise, Payette and Weiser subbasins indicate that a lack of adequate "linkage" is a primary defect with the plan. Since the subbasin plan relied upon a collaborative, best professional judgment approach the council also identified a need to more systematically describe the methods used -- how data and information were identified and interpreted, and how the basic assumptions and hypotheses related to focal species' relationship to the environment were developed. Finally, council reviewers requested planners clarify which strategies in the management plan are priorities to implement first to address the most serious problems identified in the assessment.

This supplement was developed to remedy these issues. This supplement is designed to provide a summary of the following items (referencing and improving on the existing assessment):

(1) the key factors limiting biological potential of the subbasin focal species;
(2) which limiting factors are a priority;
(3) a description of the objectives and strategies, explaining how particular strategies address limiting factors; and
(4) a "prioritization framework," i.e., the criteria/considerations and procedures used to prioritize proposed actions for project selection consistent with the assessment and linked strategies.

This supplement summarizes key information, rather than trying to revise or edit or replace the original management plans it is designed to result in a more user-friendly subbasin plan.

2.0 METHODS

2.1 DATA IDENTIFICATION, ORGANIZATION & INTERPRETATION

Data incorporated into the Boise-Payette-Weiser (*BPW*) Subbasin Assessment and Plans was obtained from a wide variety of sources which are well documented in the subbasin plan. The actual analysis, identification of limiting factors and prioritization for the aquatic and terrestrial components of the *BPW Management Plan* was carried out collaboratively through a series of meetings by the Fisheries and Terrestrial Technical Teams. Table 1 lists the identified focal habitats, focal species associated with each focal habitat and key data sources utilized in the assessment portion of the subbasin plan.

The technical teams opted to base the assessment and management plan using an ecosystem-based approach with an emphasis upon focal habitats and a select number of focal species within these habitats. This habitat-based assessment places greater emphasis upon key habitats and their functional components, and less emphasis upon selected focal species. Practices of managing

wildlife and their habitat on a species-by-species basis sometimes fail to recognize the importance of biological diversity, or "biodiversity," to the health of the ecosystem (Wheeler 1996). The protection of a single threatened or endangered species often results in the protection of small parcels of habitats. This may lead to fragmented populations, and is reactive to problems facing a single species rather than proactively addressing the ecosystem integrity.

The terrestrial assessment team identified four focal habitats for the Boise, Payette and Weiser subbasins (Table 1). The technical team initial discussions were based primarily upon a list of 24 habitat classifications derived from the IBIS database. Focal habitat discussions evolved over the course of four meetings as both technical teams settled upon habitat classification questions that incorporated multiple species benefits as well as addressing high conservation priority areas.

Table 1: Focal Species Assessment Tools and data sources.

Focal Habitats	Focal Species	Data Sources, Evaluation Techniques
Aquatic	Bull Trout Redband Trout Kokanee	**Aquatic:** Professional Opinion Direct observation, local knowledge USFWS Bull Trout Draft Recovery Plan **Terrestrial:** Professional Opinion Direct observation, local knowledge ICBEMP (1997) GAP & GAP II project Kuchler's Potential Natural Veg. (1964) ISDA invasive weed data
Riparian/ Herbaceous wetlands	Columbia spotted frog Willow flycatcher Bald eagle American beaver	
Shrub-steppe	Greater sage grouse Sharp-tailed grouse Pygmy rabbit Mule deer S. Idaho ground squirrel	
Pine/fir forest	White-headed woodpecker Flammulated owl N Idaho ground squirrel	
Interior mixed conifer	Pileated woodpecker	

The aquatic assessment is also largely based on evaluating overall aquatic habitat conditions within the subbasin watersheds. Due to data and time limitations the aquatic sections of the Subbasin plan do not generally discuss how specific impacts to aquatic habitat are affecting specific focal species or life history stages. Portions of the assessment use the term 'aquatic' and discuss 5 focal habitats defined by the technical teams and other portions of the assessment consider the aquatic habitat and focal species separately. This supplement considers aquatic habitat a 'focal' habitat and the aquatic limiting factors and priorities have been combined with the terrestrial limiting factors and priorities. Given the habitat focus of these subbasin assessments and the limited scope of this supplement the aquatic and terrestrial limiting factor identification and prioritization could be effectively merged to give a more succinct overview of subbasin limiting factors and priority areas. Some exceptions have been made recognizing the differences in aquatic focal species life histories and distributions.

To identify management plan priorities both technical teams developed lists of rules for prioritization, based on reviews of other subbasin planning efforts and a brainstorming exercise. From this list, the Technical Team chose a structure most appropriate for prioritization of activities in the *BPW* subbasins. Little effort to develop a quantified prioritization method was

attempted due to lack of time. The rules and approach for identifying aquatic and terrestrial focal habitat priorities largely overlapped. Thus for this supplement the aquatic and terrestrial technical teams agreed to the joint prioritization framework outlined in this supplement.

3.0 FOCAL SPECIES & HABITATS

Focal species (Table 1) were selected according to guidelines provided by the Northwest Power and Conservation Council (NPPC 2001) and with an understanding of the council's obligation to mitigate for federal hydropower development. The following selection criteria were used for focal species selection:

- Federal/state classification
- Cultural/economic significance
- Critical ecological function
- Indicator of environmental health
- Locally significant or rare
- Guild representative
- Habitat obligate
- Managed species
- Relationship to salmon
- Data availability

Based on the above guidelines, the following focal species were chosen by the fisheries technical team: 1) bull trout (*Salvelinus confluentus*); 2) redband trout (*Oncorhynchus mykiss*); and 3) kokanee (*Oncorhynchus nerka*). Bull trout were selected because they are the only federally listed fish species in the subbasin. Redband trout were selected because they are widespread in the subbasin and of management importance. Kokanee were selected because they were native in Payette Lake and are restricted to lakes and the newly created reservoirs (Lucky Peak, Arrowrock, and Anderson Ranch) which is a habitat not used by the other aquatic focal species. Also, kokanee provide a food source for eagles, osprey, pine martin, and when they spawn they provide some nutrient transport out of the reservoirs and lakes where they occur. To provide a fishing resource in the absence of salmon. Fish and Game spends a fair amount of effort managing kokanee in Deadwood Reservoir, Lucky Peak and Arrowrock. Kokanee do not hybridize or out compete any other native fish. Generally there is very little known about other native fish species which limited their utility as focal species.

Sixteen terrestrial focal species were selected (Table 1) primarily because they were either species at risk and/or could be used as indicators for habitat health. While many animals were considered, final decisions were influenced by the amount of reliable technical data, the ability to monitor the species and technical team expertise.

3.1 FOCAL HABITATS

Both the aquatic and terrestrial resources sections describe the physical and biological features of a focal habitat. A focal habitat is described by a combination of unique vegetative characteristics, dominant plant species, or a successional stage with important ecological ties to fish and/or wildlife (e.g., old growth). A focal habitat may also be composed of specific environmental elements integral to the viability of fish and wildlife populations (e.g., snags and caves). One or more of the following criteria were used to identify focal habitats presented in this assessment:

- Comparatively high species density
- Comparatively high species diversity
- Characteristics of breeding habitat
- Extent of seasonal ranges

- Linkage movement corridors
- Rareness
- High vulnerability to habitat alteration
- Unique or dependent species

Four terrestrial focal habitats in the *BPW* subbasins were selected using land cover information and structure type (stand age). Because habitat description can be very specific and involve combinations of field survey data, remote sensing classifications, geography, botanical composition, and other factors, a simplified approach to collecting and analyzing all these data over large regional scales was used. Data sources defining habitat distribution in this assessment include the Interior Columbia Basin Ecosystem Management Project (ICBEMP) and the Geographic Approach to Planning (GAP) data sets. The stream network is defined as the Aquatic Focal habitat and which is represented by the hydrography/stream layer. The resolution and scales of these data layers is somewhat variable (see Subbasin Plan, Appendix 3-1 for a discussion of data limitations) the analysis and mapping should be considered a preliminary, broad scale analysis designed to help identify broad scale priorities.

3.2 Changes in Terrestrial Focal Habitat

Based on analysis of the IBIS data set and known species distribution in the *BPW* subbasins, the overall total functional diversity of the focal species and their associated habitats has declined over the last one hundred years (*see Section 2.1.1.5 in Assessment)*. The most significant decreases in total functional diversity are evident in the riparian/herbaceous wetlands and shrub-steppe habitats. It should be noted that these relationships are general descriptions at the subbasin level and may not reflect specific conditions within any one watershed.

3.3 Changes in Aquatic Focal Species

The *BPW* Subbasin current bull trout populations are upstream of reservoirs and in limiting areas of generally isolated habitat (*See Figure 2-13 – in BPW Assessment)*. Data on bull trout abundance through time are nonexistent (USFWS 2002). The subbasin plan provides estimates of current populations and productivity. It is generally considered bull trout populations have declined from historic levels.

Kokanee are not included on any federal or state protection or species of concern list. Kokanee are currently found in Payette and Little Payette lakes and in Cascade, Deadwood, Andersen Ranch, Lucky Peak, and Arrowrock reservoirs. Kokanee were native to Payette Lake, but the ***current population appears to be primarily the result of hatchery stocking***. Populations in Payette Lake and Deadwood Reservoir are naturally reproducing. Populations in Anderson Ranch Lucky Peak and Arrowrock are supplemented with hatchery kokanee. The kokanee population in Payette Lake is self-sustaining.

Widespread stocking of hatchery rainbow trout into waters where native redband trout potentially existed and in areas inaccessible to redband trout complicates the identification of historical distribution. The current distribution reflects a combined abundance of redband and rainbow trout. Due to the scarcity of information regarding native redband and hatchery rainbow trout introgression, any references to redband trout are made with the understanding that genetic status of the population is unknown. Redband trout are widely distributed throughout the *BPW* subbasins. High-density populations of redband trout are documented in all 4th field hydrologic

unit codes (HUCs) within the *BPW* subbasins, except for the Middle Fork and South Fork Payette watersheds. The Weiser subbasin contained most of the high density populations sampled.

3.4 DISTRIBUTION & OWNERSHIP OF FOCAL HABITATS

Understanding the distribution of focal habitats, ownership patterns and political boundaries will help with identifying the locations and types of enhancement and protection actions that may be most appropriate in specific subbasin areas. Because the aquatic habitat is described in terms of linear stream lengths and the terrestrial habitats are described as areas they are discussed separately. It is important to remember the aquatic stream habitat is closely linked to the riparian herbaceous wetland habitat, changes and impacts to one of these habitats will likely affect the other.

Figure 1 shows the relative percentages of focal habitats and other habitats within all subbasins combined. The riparian herbaceous wetland focal habitat is the smallest representing only 3% of land in the subbasins. Shrub-steepe habitat covers the largest area of the subbasins, approximately twice the area of other focal habitat types and about the same area of non-focal habitat areas.

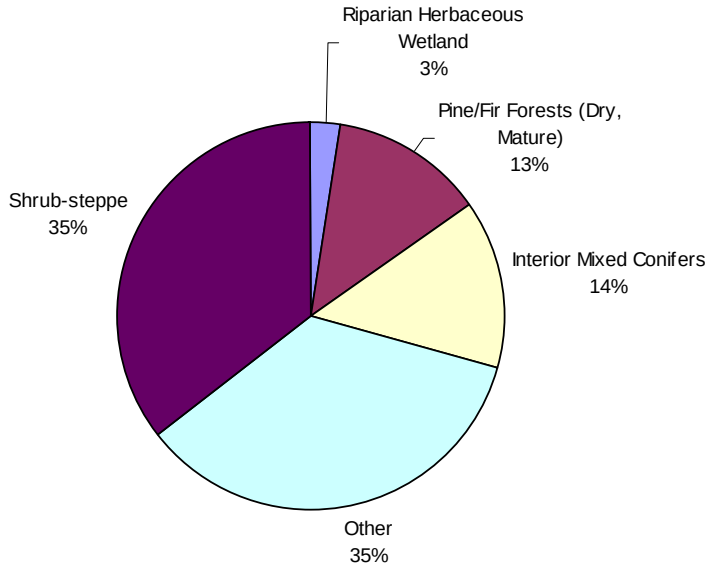


Figure 1. Percentage of terrestrial focal habitats relative to other habitat types within the *BPW* subbasins.

Figure 2 shows the ownership patterns in the entire subbasin and Figure 3 shows the ownership patterns for the 10 major watersheds within the subbasins. Over 60% of the land is in federal and state ownership and 36% is in private ownership. Only the lower Boise and main Payette watersheds have more the 50% private lands. The North Fork/ Middle Fork Boise and South Fork Payette watersheds are almost entirely in federal ownership (*also see:* Appendix A for more

detailed ownership patterns by watershed. Appendix B discussed ownership and Landuse by county)..

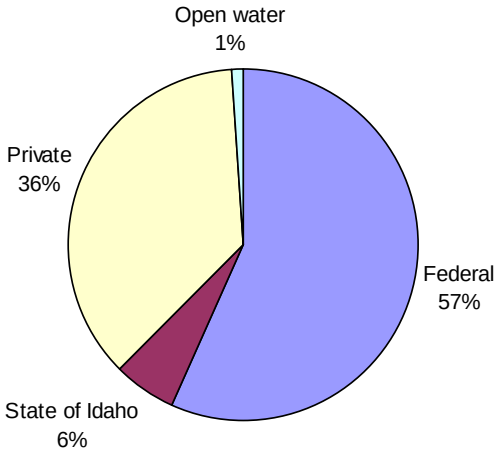


Figure 2. Ownership patterns in the Boise-Payette-Weiser subbasins combined.

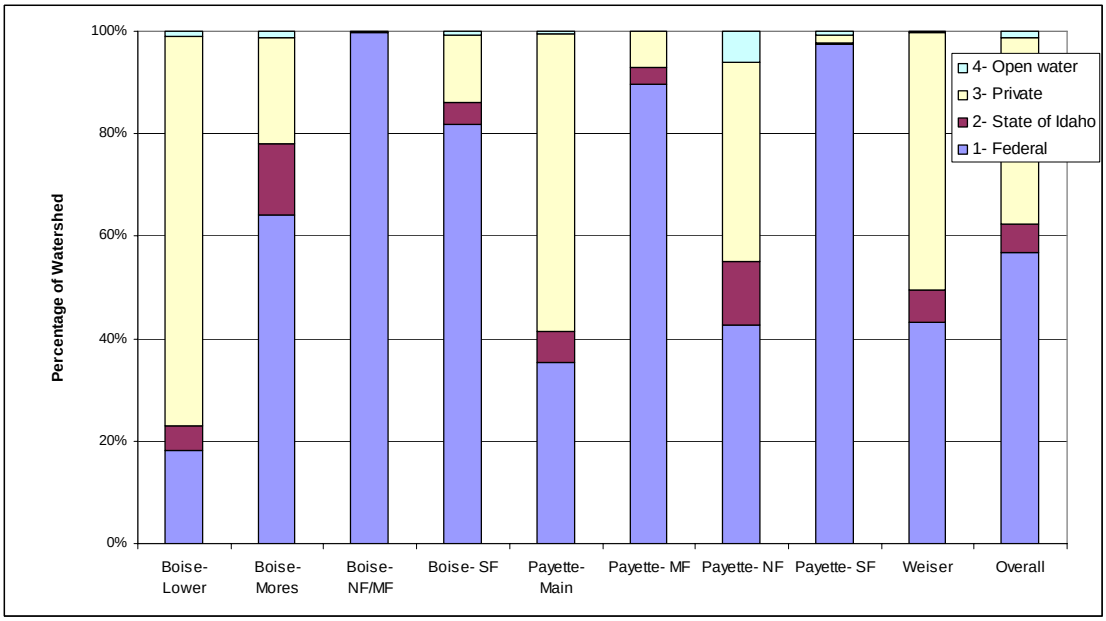


Figure 3. Ownership patterns in the 10 major watersheds of the Boise-Payette-Weiser subbasins and overall ownership for all subbasins combined.

Figure 4 illustrates the ownership patterns of the terrestrial focal habitats in the *BPW* subbasins. The majority (52%) of riparian herbaceous wetland focal habitat is in private ownership. A majority of this focal habitat is in private ownership, it is also the focal habitat covering the smallest area of the subbasins and should be a priority area.

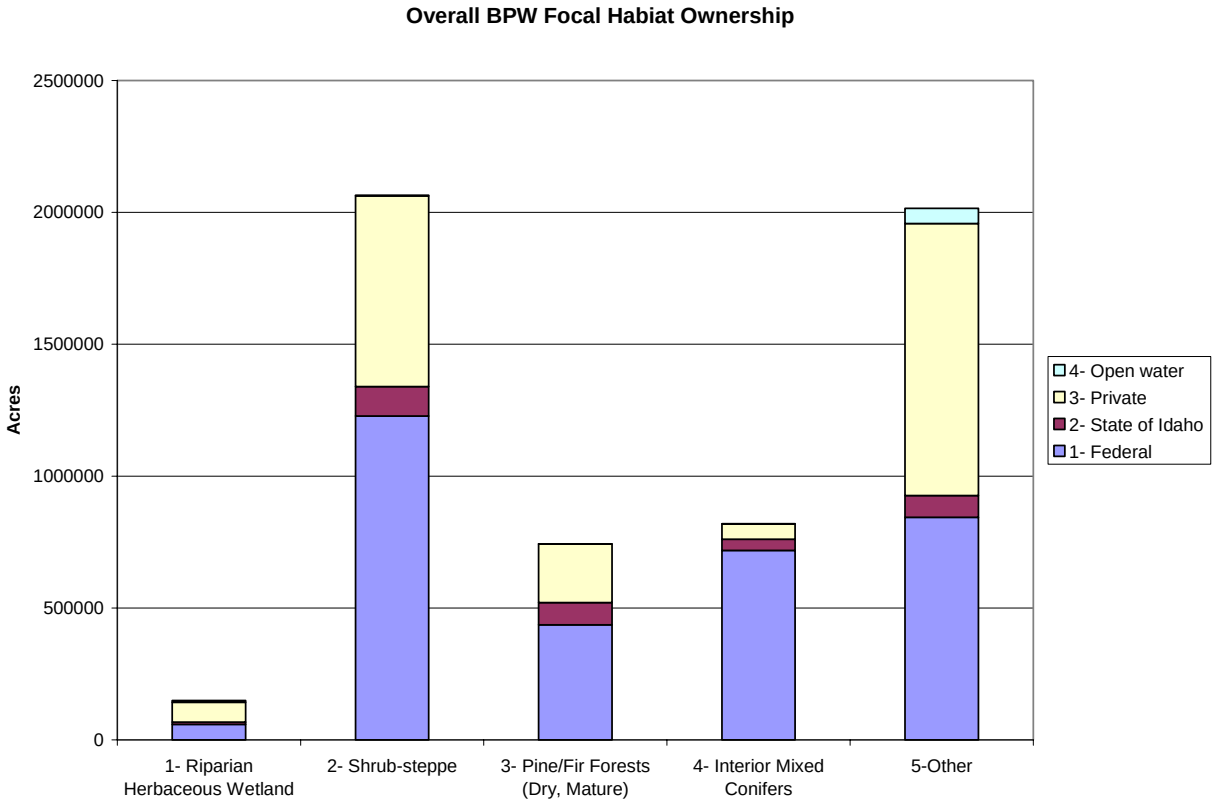


Figure 4. Ownership patterns of the Boise-Payette-Weiser terrestrial focal habitats.

Figure 5 illustrates the distribution of aquatic focal habitat (stream lengths) in the 10 major watersheds of the *BPW* subbasins.

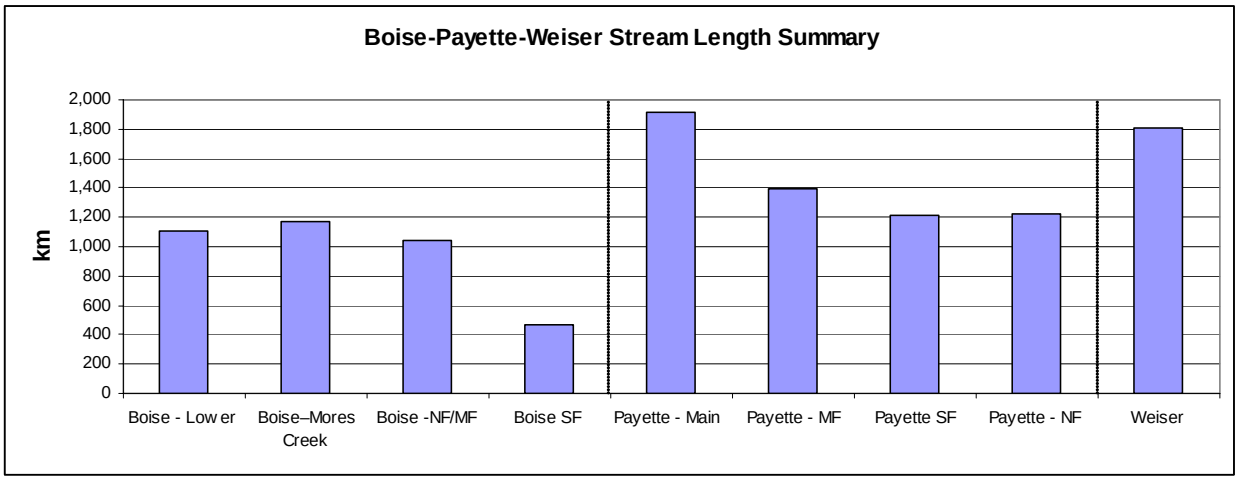


Figure 5. Summary of aquatic focal habitat distribution in the 10 major watersheds within the Boise-Payette-Weiser subbasins.

4.0 LIMITING FACTORS

The terrestrial environment of the *BPW* subbasins is assessed in terms of four focal habitats at the watershed scale relative to six primarily anthropogenic activities limiting habitat quantity and quality across the subbasins. For the purposes of this assessment, the definitions of the four focal habitats are simplifications of extremely complex interactions of natural processes, geomorphology, climate and land uses across the landscape. During the last 140 years, human activities have had an increasingly significant impact on structure and function of the environment in the *BPW* subbasins. Analyses of focal habitats in the assessment have attempted to determine what activities cause the most significant habitat alteration in the subbasin.

The following six activities were identified as primary causes of impacts limiting wildlife habitat in the *BPW* subbasins; 1) altered hydrologic regimes (impoundments, channel modifications, and diversions), 2) invasive and exotic species introductions, 3) land-use conversion (both urban and agricultural), 4) altered fire regimes (primarily fire suppression practices) and subsequent catastrophic fires, 5) grazing/browsing by livestock, and 6) timber harvest. These six activities have altered the composition and distribution of the focal habitats and the species with which they are associated.

It is important to note Appendix 3-1 of the assessment discusses a wide variety of activities which potentially impact the terrestrial and aquatic focal habitats. Many of these activities have a relatively small impact or impacts are confined to a small area. These six activities are considered the most pervasive and wide spread. Appendix 3-1 of the *BPW* assessment presents a detailed discussion of how these and other land use activities can potentially create the identified limiting factors. It is important to note that the impact of any given land use activity is dependent on the location of the activity, timing of the activity and intensity of the activity. This means that activities not identified may in some locations create conditions which seriously impact focal habitat. Or conversely activities identified that influence limiting factors may be modified in order to create the desired habitat conditions. Based on information from the *BPW* assessment Table 3 was developed to summarize in a very general way how the identified activities that cause limiting factors are related to specific changes in habitat conditions.

The aquatic assessment identified the following seven limiting factors; 1) habitat quality, 2) habitat quantity, 3) Predation, 4) Disease, 5) Harvest, 6) Competition and, 7) Fragmentation/ Connectivity. These seven limiting factors were not specific to the *BPW* Subbasin and the aquatic technical team did not identify any specific areas where disease, predation and illegal harvest were a known problem. Section 3.0 of the *BPW s*ubbasin plan presents a discussion of the activities that cause limiting factors which keys in on habitat quality, quantity, connectivity and competition as the main factors limiting aquatic populations. The discussion of aquatic limiting factors and influencing activities largely overlaps with the discussion of terrestrial limiting factor causes. In an effort to reduce duplication and more effectively evaluate watershed impacts in this supplement the terrestrial and aquatic limiting factor assessments were combined.

The identified aquatic and terrestrial limiting factors act both individually and in a cumulative, interactive manner. For clarity and consistency our discussion of limiting factors for both

aquatic and terrestrial species provides some definitions. At the broadest level, the following factors potentially limit any fish or wildlife population:

1. Food
2. Water
3. Cover/substrate (shelter)
4. Habitat space
5. Pathogens and Parasites
6. Competition, Predation, and Harvest
7. Harassment (intentional or not, from presence of people, vehicles, livestock)

The loss (or reduced accessibility or suitability) of the first four factors -- food, water, cover/substrate, or habitat space -- is termed "habitat loss" or "habitat degradation." There is not a clear distinction between habitat loss and habitat degradation; at some undefined point habitat degradation becomes habitat loss. For this report, **habitat loss** includes changes that are long term and that radically change habitat structure as perceived by fish or wildlife such as:

- conversion of any cover type to impervious surface, e.g., pavement, buildings, other infrastructure;
- permanent inundation of land, e.g., by large dams;
- permanent filling of seasonally or permanently inundated areas, e.g., by intentional or natural deposition of sediment, rock, or debris
- conversion of naturally vegetated land to agricultural production;
- creation of persistently unvegetated surfaces, e.g., from mining, gravel extraction;
- conversion of mature forests to very early successional land cover.

Habitat degradation involves physical and biological changes that are technically easier to reverse or mitigate, or which can be reversed over shorter time periods, although there may be substantial socioeconomic barriers to doing so. Their effect on focal species is to decrease the accessibility or suitability of food, water, and cover/substrate -- and coincidentally increase crowding, competition, predation, pathogen or parasite transmission, and/or mortality rates. Often, a single change can contribute to both habitat degradation and to habitat enhancement. This depends upon the species potentially affected and the distribution of the change in time and space. Changes which, at extreme levels, most often lead to degradation of habitat are:

- increased air or water pollution, e.g., excessive toxins, nutrients, sediments
- increased air or water temperature, e.g., from vegetation removal, urbanization
- increased soil compaction and trampling, e.g. road construction, grazing
- increased or decreased tree canopy cover, shrub cover or herbaceous plant cover
- changes in species diversity within a habitat, e.g. perennial bunchgrass/shrub to annual grasses
- increased or decreased dead wood (standing or downed) and soil organic matter
- increased or decreased soil saturation and/or water levels and persistence, e.g., from irrigation, agricultural drainage, groundwater withdrawals
- increased or decreased barriers to movement, e.g., roads, fences, unsuitable habitat
- increased density of invasive species

The last two changes are frequently a consequence of the preceding ones, and complex feedbacks may occur among any of these changes. All of these changes have the potential to cause two fundamental changes at a landscape (watershed, subbasin) scale:

- increased simplification of habitat, i.e., fewer habitat types and structures
- increased distance between patches of suitable habitat

Together, all of the above have the potential to affect the presence or expression of Pathogens and Parasites, Predation, Competition and Harassment which are other major factors that limit wildlife. As shown in Table 2, the changes listed above can be attributed to specific **activities** (human disturbance elements). This facilitates managing the activities that cause the changes. In some cases the agents can be managed as a tool to move habitat conditions to the desired state if the desired conditions are clearly identified.

Table 3 shows how the specific activities causing limiting factor are distributed through the watersheds with in the subbasins and finally Table 4 shows the degree (which was qualitatively determined by the technical teams) specific limiting factors are affecting the terrestrial focal habitat types and aquatic focal species.

4.1 Out of Basin Limiting Factors

Historic runs of anadromous fish provided an annual influx of marine nutrients to portions of the subbasin. Watersheds identified as having supported historical runs of anadromous fish have lost the nutrient influx associated with spawning adults of steelhead, Chinook salmon, and sockeye salmon. Resident fish, listed bull trout, and terrestrial habitats and species would benefit from the return of this marine nutrient input.

4.2 Mitigation for Federal Hydropower Development

Federal hydropower developments—Black Canyon, Deadwood, and Anderson Ranch—impacted terrestrial and aquatic species within the Boise and Payette subbasins. Though loss assessments analysis programs have been developed to implement wildlife mitigation through land acquisition for these hydropower projects. This mitigation programs need to be completed to increase habitat for focal terrestrial wildlife in these subbasins. In addition, further assessment for losses to resident fish and wildlife from indirect losses, such as powerline construction, and direct losses from operation and maintenance of these projects is also necessary.

Locations of land acquisition opportunities need to be carefully considered. Most of the land base in some subbasin counties are in federal and state ownership (see Appendix B for summary). Where land acquisitions will reduce an already small portion of a county tax base counties will need to be compensated for land being taking off tax roles.

Table 2. Land use activities and their associated landscape/ habitat changes which potentially degrade aquatic and terrestrial habitat conditions.

3= stronger likelihood of association with change resulting in loss or degradation of habitat conditions, 2= secondary likelihood of association with change, 1 = indirect likelihood of association with change based on published opinions of other biologists, the author, or field data.

		Changes Having a Potential to Degrade Aquatic & Terrestrial Habitats									
Primary Activity	**Activity Components**	Air-Water Pollution	Tree Canopy Cover (+ / -)	Shrub Cover (+ / -)	Herb Cover (+ / -)	Dead Wood & Soil Organic Matter (+ / -)	Soil Compac-tion/ Erosion	Water Levels & Water Persistence (+ / -)	Barriers (+ / -)	Fragmen-tation	Population Integrity
Altered Fire Regime		0	3	3	3	3	3	2	0	2	0
Grazing/ Browsing	Upland	1	1	3	3	2	3	0	0	0	0
	Riparian/ Wetland	1	0	3	3	2	3	1	0	0	0
Altered Hydrologic Regime	Dams	1	2*	h	h	h	1	3	3	2	0
	Irrigation	3	0	0	0	0	2	3	3	3	0
Forestry/ Timber Harvest	Tree Removal	1	3	1	1	1	1	1	0	2	0
	Road dev., maintenance	2	1	1	1	1	3	1	3	3	0
Land Use Conversion	Urbanization	3	3	3	3	3	3	3	3	3	0
	Agriculture	3	3	3	3	3	3	3	3	3	0
Invasive/ Exotics	Plants/ weeds	2	1	2	3	3	0	2	0	3	0
	Animal Species	0	0	0	0	0	0	0	0	0	3

*affects cottonwood regeneration

h- historical

Table 3. Rankings of the activities and impacts to limiting factors for aquatic and terrestrial resources in each watershed in the Boise, Payette, and Weiser subbasins (rankings by the technical team: 0 = none to insignificant, 1 = low, 2 = moderate, and 3 = high).

Watershed	Altered Fire Regime		Grazing/ Browsing	Altered Hydrologic Regime		Timber Harvest		Land-Use Conversion		Invasive/ Exotics	
	Pine fir & Mixed /conifer	Shrub Steep	Upland & Riparian	Reservoir Operations	Irrigation	Tree Removal	Roads Sediment/ fish passage	Urbanization	Agriculture (Farming)	Invasive Plants	Non-natives (ie. Bull frogs, brook trout, warm water fish)
NMB	3	3	1	2	0	1	3	1	0	2b	3
BMO	3	3	2	2	2	2	2	3	0	3	3
SFB	3	3	3	3	1	2	3	1	1	3	0
LBO	3	3	3	3	3	1	2	3	3	3	3
NFP	3	3	1	2	3	1	3	3	2	3	3
SFP	3	3	1	1	1	1	3	0	0	3	3
MFP	3	3	1	0	2	2	2	1	1	2	1
PAY	3	3	3	3	3	2	3	3	3	3	3
WEI	3	3	3	1	3	2	3	3	3	3	3

Table 4. Hypothesized or documented importance and prevalence of the limiting factors to focal species in focal habitats.

3 = primary factor; 2= secondary factor, 1= tertiary factor based on published opinions of biologists, the author, or (least often, due to unavailability) field data.

Focal Habitat	Focal Species	**Habitat Loss** Land conv.	**Habitat Alteration** Vegetation change		Water regime change	Pollution Air, WQ	Soil compaction/ erosion	Barriers migration corridor loss	Competition non-native sps.	Invasive Plants	Loss Marine Nutrients
Riparian/ Herbaceous wetlands	Columbia spotted frog, Willow flycatcher, Bald eagle, American beaver*	3	3		3	3	3	3	2	3	3
Shrub-steppe	Greater sage grouse, Sharp-tailed grouse, Pygmy rabbit, Mule deer, S. Idaho ground squirrel	3	3		1	1	3	3	3	3	2
Pine/fir forest	White-headed woodpecker, Flammulated owl, N Idaho ground squirrel	1	2		1	1	1	2	1	2	1
Interior mixed conifer	Pileated woodpecker	1	2		1	1	1	2	1	2	1
	Aquatic Focal Sps.	(Impound, Channelize)	Channel Mod.	Riparian Cond.	Water Quant./ flow mod.	Pollution WQ	Soil erosion, channel sed	Road/ barriers Habitat Frag.	Competition non-native sps.	Invasive Plants	Loss Marine Nutrients
Aquatic	Bull Trout	3	2	3	1	1	2	3	3	1	3
	Redband Trout	3	2	2	2	1	2	3	2	1	3
	Kokanee	3	2	1	2	1	2	3	2	1	2

4.3 PRIORITY LIMITING FACTORS

The assessment of conditions in the subbasin showed, at a basic level, the main factors limiting the life stages of focal species are the **loss of connectivity** and **decrease in habitat quantity, quality, and diversity**. Addressing these factors should be the priority in the subbasins. In addition to the habitat based factors which were the focus of the assessment, one issue that became apparent is that numerous state, federal, tribal, and nongovernmental entities conduct active management activities across the *BPW* subbasins, often with minimal coordination. It was difficult to get current status information on projects and their expected impacts to limiting factors. Future implementation of management plan goals and objectives will be most effective if completed under the auspices of single regional entity. This will minimize duplicated effort, enhance logistical efficiency, ensure that biological objectives are being achieved, and ultimately increase cost effectiveness.

Finally data on the locations, distribution and condition of riparian and herbaceous wetland focal habitats was not available at a scale allowing reasonable quantification. Because the riparian/ herbaceous wetland focal habitat was identified as the highest priority terrestrial focal habitat and as a critical link between the terrestrial and aquatic environments, it is imperative data be collected on which to base justifiable management decisions.

4.3.1 Terrestrial Priorities

The highest priority habitat type is shrub-steppe in the lower elevation areas of the subbasins (Weiser, MF Payette, Main Payette, Lower Boise and SF Boise watersheds). Within the shrub-steppe habitat, the highest priority areas for protection and restoration are riparian/herbaceous wetland habitats and the largest remaining high quality shrub-steep habitat areas.

Completion of loss assessments for the Federal hydropower projects and mitigation programs to increase habitat for focal terrestrial wildlife should be a priority action. One limiting factor that is a priority is altered fire regime, however, addressing this limiting factor is taking place in other political forums and, implementation of other strategies, such as addressing noxious weeds, will incidentally address some of the problems associated with altered fire regimes. Hence addressing altered fire regimes is not recommended as part of this process.

4.3.2 Aquatic Prioritizations

Prioritization for the aquatic components was carried out collaboratively by the Fisheries Technical Team. The team developed a list of rules for prioritization, based on reviews of other subbasin planning efforts and a brainstorming exercise. From this list, the team chose a structure for prioritization of activities in the *BPW* subbasins. Table 5 lists the identified priority limiting factors by watershed and focal species. Connectivity is a limiting factor in almost all areas. Habitat quality primarily related to sediment impacts and temperature increases due to riparian impacts are the next most widespread limiting factors. Finally, competition with non-native brook trout and unknown genetic impacts from hatchery rainbow stocking are additional priority concerns.

Table 5. Priority aquatic limiting factors by watershed and focal species.

	Bull Trout	Redband Trout	Kokanee	Comments
Lower Boise				The Lower Boise has highly degraded habitat, not a high protection or restoration priority
Boise-Mores Creek	*Protect -Mores Creek headwaters* Connectivity			• Protect the resident headwaters population • Convert Hay Fork Campground Culvert to open habitat • Monitor the Upper Mores bull trout population • Not a high priority for restoration it is highly degraded
Arrowrock Core Area	Connectivity, sediment, illegal harvest, reservoir operations	Connectivity, Sediment, Hatchery rainbow impacts		• Remove culvert barrier on Roaring River
Anderson Ranch Core Area	Culverts, sediment, illegal harvest (potential)	Culverts, sediment		• Address culverts in Bear, Dog, Steel, Big Water Gulch and Shake Creek • Restoration potential on Little Smokey Creek
Main Payette	Connectivity, irrigation diversions	Irrigation diversions		• Start protection and restoration efforts in the headwaters of Squaw Ck first (from the confluence of Second Fork upstream). • Not high restoration priority as habitat is highly degraded
Middle Fork Payette	*Focus in headwaters: Bull Creek)* Connectivity, sediment (in Lower MF Payette)	*(Lower MF Payette)* Riparian degradation, Sediment		• Restoring internal connectivity in the headwaters (Bull Creek) of the Upper Middle Fork Payette is a priority. • Riparian and sediment issues on the Lower Middle Fork Payette.
North Fork Payette	***Restoration priority*** Connectivity, habitat quantity and quality, Sediment, brook trout	***Restoration priority*** Connectivity	*Protect – Monitor spawning , predators*	• Gold Fork – bull trout transport/ fish ladder should be considered. • Gold Fork Diversion passage, irrigation entrainment. • Fish screens in Lake Fork Creek to prevent entrainment. • Sediment issues in the lower tribs – see Cascade Reservoir TMDL for priorities.
South Fork Payette	Connectivity, brook trout, sediment (Clear Creek)	Connectivity, Sediment, Hatchery rainbow impacts	Introduced in altered habitat (Deadwood)	• Adfluvial bull trout upstream of Deadwood Reservoir. • Efforts to eradicate brook trout should receive lower priority than efforts to prevent their establishment in bull trout areas.
WEISER SUBBASIN *(Start in headwaters)*	Connectivity, Screening diversions, brook trout, habitat quality (complexity and bank stability), sediment	*Restoration priority* Connectivity, Screening diversions, Riparian, Sediment		• Fix known culvert barriers first focusing high in watershed • Stabilize populations by preventing hybridizing with brook trout, while providing connectivity. • Restore riparian cover to reduce temperatures, making habitat more suitable for bull trout than for brook trout.

5.0 OBJECTIVES AND STRATEGIES

Biological objectives describing the physical and biological changes needed to achieve the subbasin vision, and strategies providing specific steps necessary to accomplish the biological objectives were developed from the factors limiting focal species and habitats in the subbasins. The biological objectives and strategies in the plan were developed in response to a list of 20 problem statements (Table 6). The problem statements that most directly relate to priority limiting factors are highlighted.

For organizational purposes, problem statements were grouped by three categories: biological, environmental, and socioeconomic components, although these three components are intrinsically linked. The biological objectives were developed by the Project and Technical Teams, with support from the Planning Team. Objectives and strategies addressing the human components of protecting and enhancing fish and wildlife populations and their habitats are considered socioeconomic components. Objectives for socioeconomic components, as appropriate, were developed by the Planning Team.

The Planning Team considers these three components critical to successfully implementing the *Boise, Payette, and Weiser Subbasins Management Plan*.

5.1 AQUATIC

The highest priority strategies to implement are those outlined in under problem statements 1, 5, 6 and 7 that address the specific limiting factors of habitat connectivity and habitat quality. The loss of marine nutrients and anadromus fish due to anadromous blockage has not been fully quantified. Many of the *BPW* watersheds are naturally low in nutrients so it is likely this loss of nutrients was significant on a local basis.

5.2 TERRESTRIAL

The highest priority strategies to implement are those outlined in the objectives and strategies under problem statements 14 and 15 that address limiting factors in shrub-steppe and in riparian areas in shrub-steppe areas.

5.3 SOCIOECONOMIC

The highest priority strategies to implement are those outlined in the objectives and strategies under problem statement 17. Developing a mechanism for regional coordination of efforts related to the subbasin planning objectives and goals will facilitate effective implementation, reduce duplication, facilitate communication and reduce overall costs.

Table 6. Problems statements and biological objectives for the *BPW* subbasins. These must be taken in context with associated strategies and discussion comments in this section about biological components.

PROBLEM STATEMENTS	
AQUATIC SPECIES	
1	Anadromous fish have been extirpated from the subbasins, with widespread impacts on aquatic ecosystems and user groups.
2	Bull trout within the *BPW* subbasins are not as widely distributed or abundant as they used to be.
3	Redband trout populations are reduced throughout much of the subbasin due to high temperatures, habitat alteration, flow limitations, drought, limited connectivity, and competitive or interactions with hatchery or other introduced species.
4	Long-term persistence and abundance of native resident fish species within the *BPW* subbasins are of concern.
5	Limited understanding of the composition, population trends, and habitat requirements of the focal communities limits the ability to effectively manage or conserve these areas.
AQUATIC ECOSYSTEMS	
6	Water quantity, quality, and connectivity are key environmental factors that limit the production of resident fish and aquatic wildlife populations.
7	Degraded habitat complexity and channel alterations limit the availability of quality habitat for aquatic focal species.
8	Roads and trails have altered the size, quality, and distribution of habitats for native species. Roads are also conduits for the spread of exotic plants and changing predator behavior. Roads and trails allow the spread of human activities and increase intensity of human impacts year around.
9	Some reservoir operations negatively affect aquatic focal species in the *BPW* subbasins.
TERRESTRIAL ECOSYSTEMS	
10	The introductions of noxious weeds and undesirable nonnative species have negatively impacted terrestrial focal habitats and species.
11	The expansion of urban and rural human development has impacted native species and habitats.
12	Historic and current livestock grazing has impacted fish and wildlife habitats and populations in some areas of the subbasins.
13	Alteration of the natural fire regime in the *BPW* subbasins has negatively impacted native terrestrial focal habitats and species.
14	The loss or degradation of wetland and riparian habitats has negatively impacted the numerous wildlife species that utilize these habitats.
14a	The loss or degradation of wetland and riparian habitats as part of development of Federal Hydropower projects
15	The loss and degradation of shrub-steppe habitat has negatively impacted numerous native plant and animal species dependent on these habitats.
16	Alterations of forest structure (including timber harvest and fire suppression) are limiting pine/fir forest habitats in some areas.
Socioeconomics	
17	As reflected in the inventory, numerous agencies and entities are implementing programs and projects in the subbasins. Insufficient coordination and integration limit the economic, social, cultural, and biological benefits of aquatic and terrestrial protection and restoration in the subbasins.
18	The management of both public and private lands in the *BPW* subbasins impacts local economies.
19	In the past, projects have not been successful in conditions where the local groups are not supportive. Lack of stakeholder and management understanding of issues, problems, and solutions continues to limit the effectiveness of implementation efforts in these subbasins.
20	Many important cultural uses of the *BPW* subbasins are impacted by fish and wildlife activities. Indian tribes are continually losing opportunities to practice long-standing traditions related to and contingent on responsible natural resource management. Non-Indian users also face difficulty in maintaining cultural uses. Traditional uses, hunting and fishing, river floating, backpacking, and other activities are uses important to all users of the subbasins. Local industries that support these users suffer or benefit from impacts on these uses.

6.0 PRIORITIZATION OF STRATEGIES "PRIORITIZATION FRAMEWORK"

There is no single cause for many of the limiting factors identified in the plan; rather, multiple causes and a long history of activities have acted in concert to disrupt the ecosystem processes. Therefore, the Subbasin Plan does not attempt to isolate, elevate, or pre-select a single, most important limiting factor, strategy or sequence of ranked strategies. There are no simple priorities.

However, there are straightforward objectives. The overall objective of this plan is to increase fish and wildlife population trajectories. To accomplish this effectively many things need to happen simultaneously over a long time period. The plan identifies 46 biological, 98 ecosystem and 20 socioeconomic strategies which could be implemented to meet the biological objectives. This means that all concerned parties in the subbasin need to be on the same page in terms of conservation outcomes, commitment of resources to efficiently produce those outcomes, and tracking whether these efforts are working. For the subbasin planning goals to be effectively implemented it will require vastly improved coordination, program integration, targeted budgeting, and public communication. The current institutional setup does not facilitate these coordinated activities between local, state and federal entities.

Although there are no simple priorities, there are clear conservation themes that will deliver important benefits to the subbasin fish and wildlife habitat and populations in the next 10 to 15 years;

- *Remove culvert barriers to allow fish passage into additional habitat.*
- *Focus restoration on Shrub-steppe & Riparian herbaceous wetland habitats.*
    - *Especially where these areas overlap with aquatic habitats*
- *Reduce competition with non-native brook trout, bull frogs*
- *Reduce upland erosion and fine sediment inputs to aquatic habitats*
- *Address invasive plants*
- *Find opportunities to restore the altered hydrologic regime*
- *Ensure that all priority themes above are taken up and supported in an organized way at the local level.*

The recommendation to ensure that all priority themes are taken up and supported in an organized way at the local level cannot be overemphasized. This plan cannot succeed unless local interests take ownership, agree with the identification of system-level needs, and identify how local contributions can help meet those needs.

6.1 CRITERIA TO PRIORITIZE PROPOSED ACTIONS

A list of all aquatic and terrestrial strategies is presented in Table 7. The guidelines presented below were developed by the technical teams to present criteria that are intended to effectively screen and prioritize projects designed to address the causes of these deficiencies.

Table 7: Framework for screening and identifying the priority of proposed projects in the Boise-Payette-Weiser subbasins.

Restore watershed connectivity limiting key fish and wildlife populations	
Rationale	Restoring access to portions of the watershed with quality habitat is the appropriate initial strategy for the long-term improvement of watershed health. This approach provides access to suitable habitats for native aquatic species because it restores such connectivity. These types of projects are a priority because they have a high probability of success in a short time frame with relatively low cost and risk of failure
Key Areas	• Restoring fish passage to good habitats by restoring passage at road-crossing barriers ♦ Restoring natural stream flows in dewatered streams through improved irrigation efficiency projects and instream flow protection ♦ Reducing mortality of migrating wildlife by providing crossings at the intersection of roads and migrations corridors ♦ Reduce loss in irrigation diversions with fish screens
Prioritize areas for restoration by focal habitat type	
Rationale	It is too expensive and impractical to address a particular limiting factor across the entire subbasin so potential limiting factors will be addressed for Key Focal habitats.
Key Areas	♦ Riparian/herbaceous wetland ♦ Shrub-steppe ♦ Aquatic
Build from strength	
Rationale	Work from the areas in the best condition outward. Protect habitat that supports existing populations that are relatively healthy and productive. Next, expand to adjacent habitats that have been historically productive or have a likelihood of sustaining healthy populations by reconnecting or improving habitat.
Key Areas	♦ Work outward from high quality areas ♦ Larger contiguous habitat areas are higher priority than smaller fragments. ♦ Riparian Habitat: SF Payette and Middle Fork Payette ♦ Shrub Steppe: Weiser, MF Payette, Main Payette, Lower Boise, and SF Boise ♦ Address stream and population connectivity in all subbasins
Prioritize for multiple species & benefits	
Rationale	Projects in riparian habitats have the potential for multiple benefits for both terrestrial and aquatic species and were considered a priority by both Technical Teams.
Key Areas	♦ Shrub-steppe riparian areas contains the highest percentage of potentially listed species of all habitat types in the subbasin
Importance of limiting factors to be addressed	
Rationale	The priority limiting factors are habitat loss, habitat alteration, and invasive plants. High priority projects should address one or more of these limiting factors.
Key Areas	TERRESTRIAL ♦ Invasive plants — Vegetation change ♦ Erosion, soil compaction — Migration corridors AQUATIC ♦ Instream flows — Dam operations ♦ Hydro system Imapcts — Sediment sources

Expected biological benefits	
Rationale	Choose projects that get the most "bang for the buck." Riparian habitats in shrub-steppe communities are the most impacted by the limiting factors and most in need of restoration, and these habitats are very responsive to restoration activities.
Key Areas	♦ Riparian habitats within shrub steppe
Maximize overlap between terrestrial and aquatic benefits	
Rationale	Efforts should address areas and limiting factors that provide the greatest benefit to both terrestrial and aquatic species and habitats.
Key Areas	♦ Focusing restoration efforts on riparian/wetlands
Prioritize projects that benefit fish and wildlife and local communities	
Rationale	By successfully implementing projects in riparian/wetland habitats, local communities will benefit. These benefits include improved water quality, improved recreational and tourism opportunities, scenic value, and restored fire regime (including reduced fire impacts on communities and increased protection from fire).
Key Areas	♦ When selecting among projects that offer similar biological benefit, choose projects that provide the most benefit to local communities. ♦ Choose projects benefiting sensitive species as a proactive approach to prevent need for ESA listing.
Prioritize strategies and activities that are practical and possible	
Rationale	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.
Key Areas	♦ Restore riparian/herbaceous wetland habitats
Address ESA recovery goals and species conservation agreements	
Rationale	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.
Key Areas	♦ Restore bull trout habitat ♦ Restore N. Idaho Ground Squirrel habitat
Mitigation for Federal Hydro Development	
Rationale	Projects that restore or mitigate for habitat lost when Federal Hydropower Projects (Anderson Ranch, Black Canyon and Deadwood) in the subbasins were developed.
Key Areas	♦ Projects that fit in with Southern Idaho Wildlife Mitigation Programs

7.0 APPROACHES TO IDENTIFING PROJECTS AND IMPLEMENTING RECOVERY OBJECTIVES

Identifying and developing projects designed to target the priority limiting factors and move conditions in the subbasins toward the biological objectives across ownerships, municipal,

county and other governmental boundaries. Will be the biggest challenge and require an unprecedented degree of cooperation and collaboration.

7.1 COORDINATION

One issue that became apparent as a result of the assessment process is that numerous state, federal, tribal, and nongovernmental entities conduct active management activities across the Boise, Payette, and Weiser subbasins, often with minimal coordination. We believe that an approach similar to the Upper Salmon Basin Model Watershed Project should be initiated in the Boise, Payette, and Weiser subbasins. The structure of such an organization could be based on the three subbasins together or composed of three separate subbasin working groups with an overarching coordinator. The charter of the group(s) would incorporate aquatic and terrestrial components and build on identified goals, objectives, and strategies. Such an approach would maximize the benefits derived from Bonneville Power Administration Fish and Wildlife Program funding allocations.

7.2 IMPLEMENTATION ON PRIVATE OWNERSHIPS

Protection and enhancement of focal habitat on private ownership requires a different approach than on other ownerships. In many cases through education about what the biological objective are and what habitat conditions are desirable land owners can modify their existing management to meet the defined habitat goals.

The Resource Conservation &Development councils, both Southwest Idaho and the West Central Highlands, are interested in assisting groups, organizations or individuals with specific recovery project. Typically the RC&D could apply for project funds on behalf of the group or organization. The RC&D would coordinate the necessary technical assistance to define the project and administer the funds to implement the project. The process is that projects would come to the RC&D Council, most likely through the Soil Conservation Districts or County Commissions, who are RC&D members. These sponsors are responsible to see that projects meet local priorities or need before the RC&D Council adopts the project.

Alternatively, agencies could bring projects to the Council and request the Council's assistance. The big caveat though is that there must be a local work group or committee that works the project as decisions need to be made before the Council can take actions.

With the large proportion of riparian herbaceous wetland focal habitat in private ownership it will be critical to ensure private landowners are informed, educated and engaged in assisting with the implementation of the plan goals.

7.3 RIPARIAN HABITAT INVENTORY

Watershed-scale assessments of riparian wetland habitat quantity and quality are necessary first steps for current and future iterations of management planning in the Boise, Payette, and Weiser subbasins. These habitat assessments would incorporate concerted research effort into replicable assessment methodology and be implemented basinwide.

7.4 MITIGATION FOR FEDERAL HYDROPOWER DEVELOPMENT

Finally, federal hydropower development impacted identified terrestrial species within the Boise and Payette subbasins. The Black Canyon, Deadwood, and Anderson Ranch projects have existing wildlife loss assessments and a program to implement wildlife mitigation through permanent habitat protection and land acquisition. This mitigation program should be completed to fulfill mitigation requirements of the Northwest Power Act for the purpose of increasing quality focal habitats.

Loss assessments for resident fish due to the three federal hydropower projects need to be developed. Further assessment for losses to resident fish and wildlife from indirect losses, such as powerline construction, and direct losses from operation and maintenance of these projects is also necessary. This work is ongoing through existing projects, there is no estimated completion date.

REFERENCES

GAP II, 2003, Idaho Land Cover Geographic Data, Landscape Dynamics Lab, Moscow, ID, USA, (Accessed October, 2003). http://www.gap.uidaho.edu

Interior Columbia Basin Ecosystem Management Project (ICBEMP). 1997. An assessment of ecosystem components in the Interior Columbia Basin and portions of the Klamath and Great basins. Volumes 1–4. In: T.M. Quigley and S.J. Arbelbide, editors. Scientific reports and associated spatially explicit datasets. U.S. Department of Agriculture, Forest Service, and U.S. Department of the Interior, Bureau of Land Management.

Northwest Power Planning Council (NPPC). 2001. Technical Guide for Subbasin Planners. Council Document 2001-20.

Scott, J.M., C.R. Peterson, J.W. Karl, E. Strand, L.K. Svancara, and N.M. Wright. 2002. A gap analysis of Idaho. Final report. Idaho Cooperative Fish and Wildlife Research Unit, Moscow, ID.

U.S. Fish and Wildlife Service (USFWS). 2002. Southwest Idaho Recovery Unit, Idaho. 110 pp. Chapter 18 *in* U.S. Fish and Wildlife Service. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. USFWS, Portland, OR.

Wheeler 1996