STRATEGY FOR RECOVERY

A core area represents the closest approximation of a biologically functioning unit for bull trout. The combination of core habitat (*i.e.*, habitat that could supply all the necessary elements for the long-term security of bull trout, including for both spawning and rearing, as well as for foraging, migrating, and overwintering) and a core population (*i.e.*, bull trout inhabiting a core habitat) constitutes the basic core area upon which to gauge recovery within a recovery unit. Within a core area, many local populations may exist.

The Coeur d'Alene Recovery Unit contains one core area, the Coeur d'Alene Lake Basin Core Area, which encompasses the entire Coeur d'Alene Lake, the St. Joe and Coeur d'Alene River subbasins, and all tributaries within these systems.

The Coeur d'Alene Recovery Unit Team has identified priority streams within the core area (Appendix A) that either currently supply habitat elements necessary for long-term security or have a reasonable potential to be restored and supply elements for long-term security of bull trout. Using the criteria below and the best professional judgment of its members, the recovery unit team identified priority streams to focus the implementation of recovery activities to areas having the greatest potential for supporting bull trout. The priority streams include 1) known bull trout spawning streams; 2) other streams with evidence of bull trout recruitment and early life stage rearing; and 3) streams with habitat that may potentially support some level of recruitment, or local populations, since current habitat conditions have elements necessary for bull trout occupancy. Selected priority streams are considered the best of the best-remaining habitat for bull trout.

While many streams in the core area do not conform to the criteria established by the Coeur d'Alene Recovery Unit Team at this time, the recovery unit team recognizes that other streams in the core area may provide elements necessary for healthy local populations and will be included in recovery efforts if deemed appropriate in the future. The Coeur d'Alene Recovery Unit Team also

acknowledges that there are stream segments that have not been identified as priorities for the reestablishment of local populations but that provide necessary components to the long-term security of a local population; for example, Shoshone Creek is important as a migratory corridor and possibly for rearing during certain times of the year for a local population upstream in Falls Creek.

Factors for selecting priority streams that either currently or may potentially support local populations in the Coeur d'Alene Recovery Unit include the following:

1. Current or historic distribution
2. Sightings within the last 10 years
3. Water temperatures
4. Amount of public versus private land
5. Current habitat conditions
6. Restoration potential/"quick fix"
7. Poaching threats/accessibility
8. Exotic fish species presence/absence

Assessment of these factors was also used to prioritize streams and local populations (Appendices B and C) within the Coeur d'Alene Recovery Unit and may be used during recovery task implementation by management agencies to determine which streams will be the first for restoration and recovery activities.

In addition to delineating priority streams, the Coeur d'Alene Recovery Unit Team has identified the mainstem reaches of the Coeur d'Alene River, North Fork Coeur d'Alene River, St. Joe River, and Coeur d'Alene Lake as priority water bodies. Mainstem reaches serve as critical migratory corridors and probably as overwintering areas for juvenile, subadult, and adult bull trout, and the lake provides critical habitat for foraging, rearing, and overwintering for juvenile, subadult, and adult bull trout. Restoration and recovery activities in these areas should also receive a high priority during implementation of recovery tasks.

Recovery Goals and Objectives

The goal of the bull trout recovery plan is to **ensure the long-term persistence of self-sustaining, complex interacting groups of bull trout distributed throughout the species' native range, so that the species can be delisted**. To achieve this goal, the following objectives have been identified for the Coeur d'Alene Recovery Unit:

- Maintain current distribution of bull trout and restore distribution in previously occupied or depressed areas within the Coeur d'Alene Recovery Unit.

- Maintain stable or increasing trends in bull trout abundance.

- Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.

- Conserve genetic diversity and provide opportunity for genetic exchange.

Rieman and McIntyre (1993) and Rieman and Allendorf (2001) evaluated the bull trout population numbers and habitat thresholds necessary for long-term viability of the species. They identified four elements, and the characteristics of those elements, to consider when evaluating the viability of bull trout populations. These four elements are 1) number of local populations; 2) adult abundance (defined as the number of spawning fish present in a core area in a given year); 3) productivity, or the reproductive rate of the population (as measured by population trend and variability); and 4) connectivity (as represented by the migratory life history form and functional habitat). For each element, the Coeur d'Alene Recovery Unit Team classified bull trout into relative risk categories based on the best available data and the professional judgment of the team.

The Coeur d'Alene Recovery Unit Team also evaluated each element under a potential recovered condition to produce recovery criteria. Evaluation of

these elements under a recovered condition assumed that actions identified within this chapter had been implemented. Recovery criteria for the Coeur d'Alene Recovery Unit reflect 1) the stated objectives for the recovery unit, 2) evaluation of each population element in both current and recovered conditions, and 3) consideration of current and recovered habitat characteristics within the recovery unit. Recovery criteria will probably be revised in the future as more detailed information on bull trout population dynamics becomes available. Given the limited information on bull trout, both the level of adult abundance and the number of local populations needed to lessen the risk of extinction should be viewed as a best estimate.

This approach to developing recovery criteria acknowledges that the status of populations in some core areas may remain short of ideals described by conservation biology theory. Some core areas may be limited by natural attributes or by patch size and may always remain at a relatively high risk of extinction. Because of limited data within the Coeur d'Alene Recovery Unit, the recovery unit team relied heavily on the professional judgment of its members.

Local Populations

Metapopulation theory is an important consideration in bull trout recovery. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994) (see Chapter 1). Multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events. In part, distribution of local populations in such a manner is an indicator of a functioning core area. Based in part on guidance from Rieman and McIntyre (1993), bull trout core areas with fewer than 5 local populations are at increased risk, core areas with between 5 and 10 local populations are at intermediate risk, and core areas with more than 10 interconnected local populations are at diminished risk.

There are currently three known local populations in the Coeur d'Alene Recovery Unit including Medicine Creek, Wisdom Creek, and the St. Joe River between Heller Creek and St Joe Lake. Using the above guidance, the Coeur

d'Alene Recovery Unit Team believes that bull trout in the Coeur d'Alene Recovery Unit are currently at increasing risk. An accurate description of current distribution is unknown, and the identification of resident local populations is considered a research need.

Adult Abundance

The recovered abundance levels in the Coeur d'Alene Recovery Unit were determined by considering theoretical estimates of effective population size, historical census information, and the professional judgment of recovery unit team members. In general, effective population size is a theoretical concept that allows us to predict potential future losses of genetic variation within a population due to small population sizes and genetic drift (see Chapter 1). For the purpose of recovery planning, effective population size is the number of adult bull trout that successfully spawn annually. Based on standardized theoretical equations (Crow and Kimura 1970), guidelines have been established for maintaining minimum effective population sizes for conservation purposes. Effective population sizes of greater than 50 adults are necessary to prevent inbreeding depression and a potential decrease in viability or reproductive fitness of a population (Franklin 1980). To minimize the loss of genetic variation due to genetic drift and maintain constant genetic variance within a population, an effective population size of at least 500 is recommended (Franklin 1980; Soule 1980; Lande 1988). Effective population sizes required to maintain long-term genetic variation that can serve as a reservoir for future adaptations in response to natural selection and changing environmental conditions are discussed in Chapter 1 of the recovery plan.

For bull trout, Rieman and Allendorf (2001) estimated that a minimum number of 50 to 100 spawners per year is needed to minimize potential inbreeding effects within local populations. In addition, a population size of between 500 and 1,000 adults in a core area is needed to minimize the deleterious effects of genetic variation from drift.

For the purposes of bull trout recovery planning, abundance levels were conservatively evaluated at the local population and core area levels. Local populations containing fewer than 100 spawning adults per year were classified as

at risk from inbreeding depression. Bull trout core areas containing fewer than 1,000 spawning adults per year were classified as at risk from genetic drift.

Overall, bull trout in the Coeur d'Alene Recovery Unit persist at low numbers in fragmented local populations. Adult abundance was estimated (based on 10 years of redd counts) at 119 to 166 adult spawners per year in the 3 known local populations. Abundance for all streams in the core area was estimated at 190 to 264 adult spawners per year. Using the guidance on abundance described above, the Coeur d'Alene Recovery Unit Team believes that bull trout in the recovery unit are at increasing risk of inbreeding depression.

Productivity

A stable or increasing population is a key criterion for recovery under the requirements of the Endangered Species Act. Measures of the trend of a population (the tendency to increase, decrease, or remain stable) include population growth rate or productivity. Estimates of population growth rate (*i.e.*, productivity over the entire life cycle) that indicate a population is consistently failing to replace itself indicate increased extinction risk. Therefore, the reproductive rate should indicate that the population is replacing itself, or growing.

Since estimates of the total population size are rarely available, the productivity or population growth rate is usually estimated from temporal trends in indices of abundance at a particular life stage. For example, redd counts are often used as an index of a spawning adult population. The direction and magnitude of a trend in the index can be used as a surrogate for the growth rate of the entire population. For instance, a downward trend in an abundance indicator may signal the need for increased protection, regardless of the actual size of the population. A population that is below recovered abundance levels but moving toward recovery would be expected to exhibit an increasing trend in the indicator.

The population growth rate is an indicator of extinction probability. The probability of going extinct cannot be measured directly; it can, however, be

estimated as the consequence of the population growth rate and the variability in that rate. For a population to be considered viable, its natural productivity should be sufficient for the population to replace itself from generation to generation. Evaluations of population status will also have to take into account uncertainty in estimates of population growth rate or productivity. The growth rate must indicate a stable or increasing population for a period of time for the population to contribute to recovery. Given the overall lack of long-term population census information in the Coeur d'Alene Recovery Unit, the recovery unit team believes that bull trout are currently at increased risk.

Connectivity

The presence or absence of the migratory life history form within the Coeur d'Alene Recovery Unit was used as an indicator of the functional connectivity of the core area. If the migratory life form was absent, or if the migratory form was present but local populations lacked connectivity, the core area was considered to be at increased risk. If the migratory life form persisted in at least some local populations, with partial ability to connect with other local populations, the core area was judged to be at intermediate risk. Or, if the migratory life form was present in all or nearly all local populations and had the ability to connect with other local populations, the core area was considered to be at diminished risk.

Migratory bull trout persist in all local populations in the Coeur d'Alene Recovery Unit. The Coeur d'Alene Recovery Unit Team considers bull trout in the core area to be at diminishing risk.

<u>Recovery Criteria</u>

Recovery criteria for bull trout in the Coeur d'Alene Recovery Unit are the following:

1. **Distribution criteria will be met when the total number of stable local populations has been increased to 11 and these populations are broadly distributed throughout the core area.**

Within the core area, population levels of migratory bull trout representing a recovered status have been established for two subbasins: the St. Joe River and Coeur d'Alene River subbasins. Subbasins were developed to ensure that recovered local populations are well distributed within the Coeur d'Alene Recovery Unit and to improve management efficiency within each subbasin and throughout the Coeur d'Alene Recovery Unit. Annual adult spawner levels for each subunit and for each local population within the subunits will be based on trend data using contemporary monitoring standards and will be based on at least 10 years of monitoring data. The subunits are as follows:

- St. Joe River: Consisting of at least 8 local populations contributing to a total of an average of 800 annual adult spawners. However, within this subunit, 5 local populations with an average of 500 annual adult spawners will occur above and/or in Red Ives Creek, and 3 local populations with an average of 300 annual adult spawners will occur from Red Ives Creek downstream to Big Creek.

- Coeur d'Alene River (North Fork Coeur d'Alene River drainage): Consisting of at least 3 local populations contributing to an average of 300 annual adult spawners.

2. **Trend criteria will be met when the overall bull trout population in the Coeur d'Alene Recovery Unit is accepted, under contemporary standards of the time, as stable or increasing, based on at least 10 years of monitoring data.**

3. **Abundance criteria will be met when the core area hosts at least 11 stable local populations (a minimum of 8 in the St. Joe River subbasin and 3 in the North Fork Coeur d'Alene River watershed), contributing to an average of 1,100 adult spawners per year.**

4. **Connectivity criteria will be met when migratory forms are present in all local populations and when intact migratory corridors among all local populations in the core area provide opportunity for genetic exchange and diversity.**

Recovery criteria for the Coeur d'Alene Recovery Unit were established to assess whether recovery actions are resulting in the recovery of bull trout. The Coeur d'Alene Recovery Unit Team expects that the recovery process will be dynamic and will be refined as more information becomes available. While removal of bull trout as a listed species under the Endangered Species Act (*i.e.*, delisting) can only occur for the entity that was listed (Columbia River distinct population segment), the criteria listed above will be used to determine when the Coeur d'Alene Recovery Unit is fully contributing to recovery of the population segment.

Research Needs

Using the best scientific information available, the Coeur d'Alene Recovery Unit Team has described recovery criteria and actions necessary for recovery of bull trout within the Coeur d'Alene Recovery Unit. However, the recovery unit team recognizes that many uncertainties exist regarding bull trout population abundance, distribution, limiting factors and about actions needed to recover bull trout in the Coeur d'Alene Recovery Unit. Therefore, if effective management and recovery are to occur within the Coeur d'Alene Recovery Unit, this recovery chapter should be viewed as a "working" document, which will be updated as new information becomes available. As part of this adaptive management approach, the Coeur d'Alene Recovery Unit Team has identified the need to complete feasibility studies and research, which are essential within the Coeur d'Alene Recovery Unit.

A primary research need is a complete understanding of the current, and future, roles of the Coeur d'Alene River subbasin, Coeur d'Alene Lake (and lake tributaries), and the St. Maries River drainage in the continued recovery of bull trout within the Coeur d'Alene Recovery Unit. Many local populations of

migratory bull trout occurred throughout the Coeur d'Alene Lake basin, including those areas in which bull trout now are believed extirpated, occur only on an infrequent basis, or occur in very low densities. Therefore, it is essential to establish with certainty the current distribution of bull trout within the Coeur d'Alene Recovery Unit. To this end, the recovery unit team recommends applying a scientifically accepted protocol, such as the "Protocol for Determining Bull Trout Presence" being developed by the Western Division of the American Fisheries Society (AFS) or any other that is scientifically accepted. The protocol should be statistically rigorous and standardized for determining present distribution of bull trout. Applying such a protocol would improve the various resource agencies' ability to identify additional local populations in the Coeur d'Alene Recovery Unit and provide a basis for revising the current condition of bull trout within the basin.

Specifically, tributaries mentioned in isolated or anecdotal reports of bull trout capture or tributaries having good-quality habitat but limited fish surveys should be targeted to verify bull trout distribution within the Coeur d'Alene Recovery Unit. These areas include California, Yankee Bar, Heller/Sherlock, Bean, Bacon/Pass, Ruby, Timber, Red Ives, Copper, Beaver, Fly, Simmons, Gold, Mosquito, Eagle, Prichard, Falls, Trail, Teepee, Big Elk, and Independence Creeks and associated tributaries.

The Coeur d'Alene Recovery Unit Team has also identified an urgent need to implement a standardized monitoring and assessment program that would more accurately describe the current status of bull trout within the Coeur d'Alene Recovery Unit, as well as identify improvements in current sampling protocols that would allow for monitoring the effectiveness of recovery actions. Developing and applying models that assess population trend and extinction risk would be useful in refining recovery criteria as the recovery process proceeds. (See Chapter 1 for further discussion of monitoring and evaluation.)

To ensure that restoration activities to recover bull trout focus on the critical limiting factors, conducting survival studies on the various life stages of bull trout will be necessary. Without information on where the critical limiting

factors occur, resources and funding could be expended in areas that may result in little or no improvements in bull trout abundance or distribution. Currently, it is unclear whether continuing declines in bull trout abundance are related to the lake environment, stream conditions, migratory corridors, or a combination of the three. Using initial resources on these kinds of studies will help ensure the greatest benefit on future restoration projects. At a minimum, these studies should focus on egg-to-fry survival, survival of rearing juveniles, and survival within the lake.

Throughout the Coeur d'Alene Recovery Unit, continuing efforts (feasibility study) should be conducted to determine which tributaries have the greatest potential to support bull trout in the future. This work could evaluate stream habitat characteristics such as water temperature, groundwater contributions, metals concentrations, substrate size and movement, bed and bank stability, pool frequency, and amount of large woody debris. This type of information can be used to prioritize restoration efforts and to identify streams where expediting recovery through artificial propagation or transplanting may be feasible.

The Role of Artificial Propagation and Transplantation

As described in Chapter 1, section 3(3) of the Endangered Species Act lists artificial propagation and transplantation as methods that may be used for the conservation of listed species. While artificial propagation has played an important role in the recovery of other listed fish species, the overall recovery strategy for bull trout in the Coeur d'Alene Recovery Unit will emphasize identifying and correcting threats affecting bull trout and bull trout habitats, where possible. If artificial propagation is determined to be necessary for bull trout recovery within the Coeur d'Alene Recovery Unit and if a feasibility study identifies a host of streams capable of supporting bull trout, the joint policy of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service regarding controlled propagation of listed species will be followed (65 FR 56916).

Also, an appropriate plan would need to be approved to consider the effects of transplantation on other species as well as on the donor bull trout populations. Transplanting listed species must be authorized by the U.S. Fish and Wildlife Service through a 10(a)(1)(A) recovery permit and must meet applicable State fish-handling and disease policies.

Though every effort should be made to recover a species in the wild before implementing a controlled propagation program, in the Coeur d'Alene Recovery Unit, local populations of bull trout within the North Fork Coeur d'Alene River drainage and portions of the St. Joe River subbasin are thought to be extirpated. And because there are limited numbers of bull trout in the upper portion of the St. Joe River subbasin to act as a source for recolonization, natural refounding would be expected to occur slowly in these areas. Also, difficulty of recolonizing in such circumstances is supported by recent behavioral and genetic studies that suggest that bull trout exhibit a high degree of fidelity to natal streams (James *et al*., *in litt*., 1998; Spruell *et al.* 2000; Hvenegaard and Thera 2001). In addition, the recovery unit team is unaware of any instances of natural refounding occurring for a local population of bull trout after a complete life cycle has been extirpated.

The findings of the Montana Bull Trout Scientific Group support the possible use of artificial propagation and transplantation. The group concluded that hatcheries are one of many potential tools that could be used in bull trout recovery and that hatcheries are appropriate for establishing genetic reserves for declining populations and some research strategies (MBTSG 1996). The Montana Bull Trout Scientific Group identified seven strategies for using artificially propagated fish, evaluated the strategies relative to recovery criteria and objectives, and provided recommendations. The group also concluded that transplantation into areas where bull trout have been extirpated should be considered only after the causes of extirpation have been identified and corrected.

To achieve the time frame for recovery as specified in Chapter 1 and in this Coeur d'Alene Recovery Unit chapter, some form of artificial propagation or transplantation may be anticipated in the Coeur d'Alene Recovery Unit. Such

strategies may also be necessary to establish a genetic refugia since the population within this recovery unit is seriously imperiled. Currently, only one known local population in the St. Joe River might meet the level of 100 annual adult spawners that is suggested by Rieman and Allendorf (2001) to minimize the risk of inbreeding depression. Before the implementation of any artificial propagation or transplant program, a feasibility study would be completed to identify streams (either the priority streams or any new streams) having the greatest potential to support local populations of bull trout.

The Coeur d'Alene Recovery Unit Team recommends the following: 1) identify and correct threats in the St. Joe River subbasin to increase bull trout densities and allow for natural recolonization to occur within streams that have evidence of recruitment and consider an artificial propagation program only if a feasibility study indicates that such a program is the best option for recovery or to establish a genetic reserve and 2) recognize that, even if threats are identified and corrected in the North Fork Coeur d'Alene River watershed, recolonization in the near future is unlikely and that supplementation or transplanting may be the best option. For this option, a feasibility study would need to be completed to identify streams with the greatest potential to support local populations. Supplementation or transplanting would then occur concurrently with other restoration and recovery activities.

Estimated Date of Recovery

For the St. Joe River subbasin, population indices within each local population are expected to expand concurrently with recovery activities, and recovery criteria are expected to be achieved within three to five generations (15 to 25 years).

For the North Fork Coeur d'Alene River drainage of the Coeur d'Alene River subbasin, two scenarios are considered for the estimated date of recovery:

1. Allow for natural recolonization to occur within the North Fork Coeur d'Alene River drainage and implement a controlled propagation program

only if all other measures have been ineffective in improving bull trout status in the wild. With this scenario, an extended recovery duration would be expected, even if threats to bull trout and bull trout habitats were significantly reduced through implementing recovery tasks (20 to 25 years), because there are no known local populations to expand within the North Fork Coeur d'Alene River watershed and no source of bull trout within the Coeur d'Alene Recovery Unit large enough to support natural recolonization. As local populations within the St. Joe River subbasin expand 4 to 5 generations out, the opportunities for natural recolonization to occur within the North Fork Coeur d'Alene River drainage may increase. However, natural recolonization is expected to occur very slowly, if at all, in the North Fork Coeur d'Alene River drainage as recent behavioral and genetic studies of bull trout in other portions of their range suggest that the fish exhibit a high degree of fidelity to natal streams. Therefore, recovery may take an additional 4 to 5 generations (20 to 25 years), totaling 8 to 10 generations (40 to 50 years), for this subunit.

2. Accelerate recovery time by initiating a controlled propagation program. This program would only be initiated 1) upon completion of a feasibility study to identify a host of streams having the greatest potential to support local populations and 2) concurrent with reduction of threats to bull trout and bull trout habitats. With this scenario, recovery of bull trout within the North Fork Coeur d'Alene drainage may be prolonged by only one or two generations (5 to 10 years) because the feasibility study and development of a controlled propagation program would take approximately five years. Under this scenario, recovery of bull trout for the Coeur d'Alene Recovery Unit is expected to occur within five to seven bull trout generations (25 to 35 years). Because the population of bull trout within the Coeur d'Alene Recovery Unit is seriously imperiled, initiating this program as quickly as possible may also be necessary to establish a genetic refugia. Currently, only one known local population in the St. Joe River may meet the level of 100 annual adult spawners that has been suggested by Rieman and Allendorf (2001) to minimize the risk of inbreeding depression. In addition, because of the risks related to

stochastic and deterministic processes, the population of bull trout within the Coeur d'Alene Recovery Unit is a prime candidate for a propagation program.

In both scenarios, the Comprehensive Environmental Response, Compensation, and Liability Act and other clean-up activities in the South Fork Coeur d'Alene River drainage and the mainstem Coeur d'Alene River are expected to improve water quality and habitat conditions within the lower Coeur d'Alene River migratory corridor. Continued implementation of the Lake Management Plan for Coeur d'Alene Lake will improve ambient water quality conditions and will also assist in recovery efforts.

ACTIONS NEEDED

Recovery Measures Narrative

In this chapter and all other chapters of the bull trout recovery plan, the recovery measures narrative consists of a hierarchical listing of actions that follow a standard template. The first-tier entries are identical in all chapters and represent general recovery tasks under which specific (*e.g.*, third-tier) tasks appear when appropriate. Second-tier entries also represent general recovery tasks under which specific tasks appear. Second-tier tasks that do not include specific third-tier actions are usually programmatic activities that are applicable across the species' range; they appear in *italic type*. These tasks may or may not have third-tier tasks associated with them; see Chapter 1 for more explanation. Some second-tier tasks may not be sufficiently developed to apply to the recovery unit at this time; they appear in *a shaded italic type (as seen here)*. These tasks are included to preserve consistency in numbering tasks among recovery unit chapters and intended to assist in generating information during the comment period for the draft recovery plan, a period when additional tasks may be developed. Third-tier entries are tasks specific to the Coeur d'Alene Recovery Unit. They appear in the Implementation Schedule that follows this section and are identified by three numerals separated by periods.

The Coeur d'Alene Recovery Unit chapter should be updated or revised as recovery tasks are accomplished, as environmental conditions change, and as monitoring results or significant new information becomes available. Revisions would probably focus on priority streams or on areas within the core area that the Coeur d'Alene Recovery Unit Team has determined offer the greatest opportunity for recovery and would not focus on the entire core area. The Coeur d'Alene Recovery Unit Team should meet annually to review annual monitoring reports and summaries and to make recommendations to the U.S. Fish and Wildlife Service.

During the development of recovery tasks for the Coeur d'Alene Recovery Unit, site-specific information was not readily available for many of the tasks identified within the third-tier of the recovery measures narrative. Therefore, the Coeur d'Alene Recovery Unit Team prioritized streams (see Appendices B and C), using the previously discussed criteria to assist in the implementation of recovery activities. Where a task or activity does not apply to the highest priority streams or local populations within these streams, subsequently lower-rated streams should be considered. This system is only meant to be a tool to assist or guide resource managers in implementing recovery tasks in the highest priority bull trout habitat or potential habitat. If using the priority stream guidance is inappropriate, the best available information and expertise of local biologists should be used to implement recovery tasks, where and when appropriate. In some instances, recovery tasks are not focused within priority streams but in priority water bodies such as migratory corridors or overwintering habitat. Once again, the best available information and expertise of local biologists should be used when determining in which priority water bodies to implement tasks.

1 Protect, restore, and maintain suitable habitat conditions for bull trout.

1.1 Maintain or improve water quality in bull trout core areas or potential core habitat.

1.1.1 Identify problem roads that cause sediment delivery. Develop strategies that identify roads that are problems or high risk for sediment delivery at stream crossings, culverts, slopes, and unstable road sections in priority streams and priority water bodies.

1.1.2 Reduce general sediment sources. Implement actions to limit or prevent sediment delivery from problem or high risk roads in priority streams and priority water bodies.

1.1.3 Gauge sediment from roads. Estimate the extent of sediment input from road networks or other sources

throughout priority streams and priority water bodies by gathering and reviewing baseline data.

1.1.4 Upgrade problem roads. Insure compliance on and implementation of road maintenance for roads throughout watersheds that contain priority streams and priority water bodies to minimize erosion and sediment delivery.

1.1.5 Assess impacts from trail systems. Assess the extent of impacts to bull trout from motorized and nonmotorized use of the access trails to the St. Joe River subbasin and the North Fork Coeur d'Alene River drainage of the Coeur d'Alene River subbasin during certain times of the year.

1.1.6 Develop sediment monitoring plan. Coordinate with land owners and land managers on sediment monitoring plans in the mainstem of the St. Joe River and North Fork Coeur d'Alene River drainages.

1.1.7 Identify water quality problems. Investigate the extent of water quality problems associated with private residences along the St. Joe River and North Fork Coeur d'Alene River drainages.

1.1.8 Identify sources of water temperature increases. Identify significant sources of thermal increases in priority streams and priority water bodies, for example, effluent inflows or loss of riparian canopy.

1.1.9 Assess grazing impacts. Identify and reduce impacts of grazing with current proven technology within the core area, for example, fencing, changes in timing and use of riparian pastures, off-site watering, and salting.

1.1.10 Identify trespass grazing. Determine whether trespass grazing on National Forest lands is contributing to water quality problems and, if necessary, increase enforcement efforts to address this issue.

1.1.11 Identify the need for gauging stations. Determine whether permanent stream gauging stations are needed to provide information necessary for assisting in the recovery of bull trout and request funding for installing and monitoring such stations.

1.1.12 Identify cold groundwater sources. Identify and protect groundwater sources in support of local populations or priority streams.

1.1.13 Provide literature on proper road management. Coordinate with and provide County road crews (and others) with information on proper road maintenance to reduce sediment inputs to streams.

1.1.14 Complete an assessment of "leave tree" requisites. Review requirements for leaving trees within priority streams, identify where the requirements are inadequate, and provide recommendations where necessary.

1.1.15 Enforce and evaluate existing mining regulations. Continue enforcing mining regulations, increase inspections of operations, and alter seasons of operations; but also determine effectiveness of current regulations on bull trout habitat and revise regulations, if needed, to reduce threat of habitat degradation to bull trout.

1.1.16 Contribute to development of total maximum daily loads. Review total maximum daily loads for adequacy in protecting bull trout and bull trout habitat and provide recommendations as appropriate.

1.1.17 Identify sources of mining contamination. Identify tailings piles, waste rock, and other sources of mining impacts or contaminants for Comprehensive Environmental Response, Compensation, and Liability Act restoration activities.

1.1.18 Implement Comprehensive Environmental Response, Compensation, and Liability Act activities. Implement Comprehensive Environmental Response, Compensation, and Liability Act activities in an effort to remediate or restore areas impacted by mining. Clean up mine waste at active, inactive, and orphan sites. Control mining runoff from roads, dumps, processing facilities, and ponds by removing and stabilizing mine tailings and waste rock deposited in the stream channel and floodplains and by restoring stream channel function. Activities should focus on actions that will have the greatest benefit to downstream mainstem reaches that act as migratory corridors for bull trout.

1.2 Identify barriers or sites of entrainment for bull trout and implement tasks to provide passage and eliminate entrainment.

1.2.1 Identify barriers to fish passage. Identify complete or seasonal barriers at stream crossings that inhibit or prevent bull trout from using habitat upstream, for example, at culverts.

1.2.2 Remedy fish passage barriers. Remove or modify constructed fish passage barriers to improve bull trout access to habitat upstream of barriers.

1.2.3 Monitor success of barrier removal activities. Monitor all road crossings or barriers that have been modified for upstream passage and further modify them, if necessary, throughout the core area.

1.2.4 Eliminate entrainment risks. Identify fish screen needs and priorities for actions throughout the core area and implement screen projects at sites determined to potentially take bull trout.

1.3 Identify impaired stream channels and riparian areas and implement tasks to restore their appropriate functions.

1.3.1 Conduct watershed analyses. Identify specific tasks for recovery actions appropriate for individual watersheds. Watershed analysis is intended to generate a holistic understanding of land use and stream conditions within a watershed. It should identify historic conditions that can be used to develop restoration actions and to prioritize problems within a watershed. At a minimum, a complete watershed analysis should contain assessments for roads, riparian areas, streams (including fish resources), and landslides.

1.3.2 Identify stream channel degradation. Identify streambanks that are susceptible to excessive mass wasting and bank failures, that negatively impact riparian areas, or that inhibit natural stream functions.

1.3.3 Repair streambanks. Repair areas that have been identified as being susceptible to excessive mass wasting and bank failures, negatively impacting riparian areas, or inhibiting natural stream functions.

1.3.4 Reduce campsite impacts. Identify and manage dispersed (undeveloped) and developed recreation sites and relocate, when necessary, to avoid impacts to bull trout habitat.

1.3.5 Improve grazing practices. Develop, implement, and revise, when necessary, adaptive livestock grazing management plans that include mid-season performance standards to maintain stream channel conditions to maintain quality bull trout spawning and rearing habitat.

1.3.6 Revegetate denuded riparian areas. Identify denuded sites and revegetate them to restore shade and canopy, riparian cover, and native vegetation to improve or maintain bull trout habitat.

1.3.7 Evaluate current and legacy effects. Determine how timber management, roads, mining, and increases in peak flow have affected bull trout habitats and identify actions to eliminate negative effects or improve conditions.

1.3.8 Reduce current and legacy effects. Where feasible, improve conditions of bull trout habitat or implement actions to eliminate negative effects that result from the current and legacy effects of timber management, roads, mining, and increases in peak flows.

1.3.9 Implement appropriate riparian management guidelines. Meet Federal, State, Tribal, County, and local guidelines

concerning riparian management guidelines on all ownership in the Coeur d'Alene Recovery Unit, as appropriate.

1.3.10 Protect roadless condition. Maintain roadless conditions in designated roadless areas that occur in portions of watersheds that contain priority streams and minimize activities in areas that are not designated as roadless but that are otherwise in a roadless condition.

1.3.11 Provide information on stream and riparian function. Provide information to urban and semi-rural landowners on river dynamics and biological populations, to remove dikes where possible, and, where removal is not feasible, to plant riparian cover as appropriate.

1.3.12 Provide for incentives to restore proper stream function. Identify and promote incentives and programs to restore floodplain and channel function.

1.3.13 Conduct stream surveys. Identify, or better define, problems and possible solutions for restoring channel stability, function, and complexity and for reducing coarse bedload movement.

1.3.14 Implement buy-out programs. Identify and, where appropriate, implement buy-out programs to protect bull trout areas from redevelopment and initiate activities to restore riparian and channel function, when appropriate, to protect bull trout habitat.

1.3.15 Manage beaver dams. Monitor beaver dams on an annual basis within bull trout migratory corridors and modify

dams determined to be blocking passage to or from spawning areas, for example, by placing passage tubes through the dam or by structurally modifying the dam.

1.3.16 Evaluate overwintering habitat. Within the mainstem rivers, identify overwintering habitat and then determine whether overwintering habitat is being adversely affected by sediment accumulation or through bedload movement.

1.3.17 Improve overwintering habitat. Implement restoration activities to improve overwintering habitat in any mainstem river reaches determined to be limited as a result of sediment accumulation or bedload movement.

1.3.18 Improve instream habitat. Increase or improve instream habitat by adding large woody debris and by encouraging pool development in the near term. In the long term, revegetate to restore large woody debris and pool development.

1.4 Operate dams to minimize negative effects on bull trout in the lake and in tributary streams.

1.4.1 Reduce impacts from Post Falls Dam. Review Post Falls Dam operation concerning water level manipulation, entrainment, and other factors. Evaluate effects of the project and methods to optimize lake operations.

1.4.2 Conduct limiting factors analyses for dam operations. Analyze existing biological information and determine whether, for example, there are limiting factors to bull trout that can be addressed through dam operation.

1.4.3 Identify research needs related to Post Falls Dam. Determine research needs associated with the operation of Post Falls Dam and any related adverse effects to or limiting factors on bull trout, their habitat, or their prey species.

1.5 Identify upland conditions negatively affecting bull trout habitats and implement tasks to restore appropriate functions.

1.5.1 Identify sediment sources in upland areas. Identify problem areas, such as erosional areas or landslides, from all roads within the bull trout watersheds for which actions will be developed and applied to reduce sediment delivery to streams. Examples of actions are road obliteration, road reconstruction, and adequate drainage.

1.5.2 Investigate impacts from development. Investigate impacts associated with urbanization and industrialization and, based on findings, make recommendations to agencies, organizations, and municipalities to address issues.

1.5.3 Conduct watershed assessments. Complete assessments within known occupied watersheds and watersheds containing priority streams to identify extent of use by bull trout.

1.5.4 Determine changes to the hydrograph. Assess current and historic effects of upland management on changes to the hydrograph, for example, timing and magnitude of peak flows.

1.5.5 Determine need for prescribed fires. Investigate use of prescribed fire to mimic natural disturbance to reinvigorate

forests and emphasize continued fire suppression efforts to reduce risk of catastrophic fire, while not putting bull trout watersheds at risk.

2 Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.

2.1 Develop, implement, and enforce public and private fish stocking policies to reduce stocking of nonnative fishes that affect bull trout.

2.2 Evaluate enforcement of policies for preventing illegal transport and introduction of nonnative fishes.

2.3 Educate the public about ecosystem concerns of illegal introductions of nonnative fishes.

2.4 Evaluate biological, economic, and social effects of control of nonnative fishes.

2.4.1 Develop protocols for suppressing nonnative fishes. Evaluate and provide recommendations for experimental removal of brook trout or other competing nonnative species from priority streams.

2.5 Implement control of nonnative fishes where found to be feasible and appropriate.

2.5.1 Control nonnative fishes in migratory corridors. Implement removal of or reduction efforts for nonnative species (northern pike, largemouth bass, smallmouth bass, chinook salmon) wherever feasible and biologically,

economically, and socially supportable in Coeur d'Alene Lake and migratory corridors.

2.5.2 Experimentally remove nonnative fishes in spawning and rearing streams. Implement experimental removal of brook trout or other competing nonnative species from priority streams.

2.6 Develop tasks to reduce negative effects of nonnative taxa on bull trout.

3 Establish fisheries management goals and objectives compatible with bull trout recovery and implement practices to achieve goals.

3.1 Develop and implement State and Tribal native fish management plans integrating adaptive research.

3.2 Evaluate and prevent overharvest and incidental angling mortality of bull trout.

3.2.1 Provide educational opportunities. Reduce unintentional harvest of bull trout and catch-and-release mortality by making public education materials available and establishing interpretive signs at fishing access points in bull trout and potential bull trout waters. Information concerning fish identification, fishing regulations, agency contacts, and appropriate handling of fish should be included. Continue cooperation on education projects with the Coeur d'Alene Tribe, U.S. Forest Service, Bureau of Land Management, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, anglers, other recreational organizations, and local newspapers.

3.3 Evaluate potential effects of nonnative fishes and associated sport fisheries on bull trout recovery and implement tasks to minimize negative effects on bull trout.

3.4 Evaluate effects of existing and proposed sport fishing regulations on bull trout.

4 Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout.

4.1 Incorporate conservation of genetic and phenotypic attributes of bull trout into recovery and management plans.

4.1.1 Conduct genetic inventory. Collect samples for genetic analyses to contribute to establishing a program to understand genetic baseline and monitor genetic changes throughout the range of bull trout (see Chapter 1). Include assessment of the extent of bull trout and brook trout hybridization within the core area.

4.2 Maintain existing opportunities for gene flow among bull trout populations.

4.2.1 Determine where barriers to migration exist. Research connectivity between and among bull trout populations in the Coeur d'Alene Recovery Unit. Consider both water quality and physical barriers.

4.3 Develop genetic management plans and guidelines for appropriate use of transplantation and artificial propagation (see discussion of transplantation and propagation in Chapter 1).

5 Conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks.

5.1 Design and implement a standardized monitoring program to assess the effectiveness of recovery efforts affecting bull trout and their habitats.

5.2 Conduct research evaluating relationships among bull trout distribution and abundance, bull trout habitat, and recovery tasks.

5.2.1 Conduct limiting factors analyses. Determine what and where critical limiting factors are preventing the recovery of bull trout within the Coeur d'Alene River subbasin and restricting recovery within the St. Joe River subbasin by assessing the survival of different life history stages of bull trout.

5.2.2 Conduct feasibility studies. Within the Coeur d'Alene and St. Joe River subbasins, conduct studies to verify which tributaries have the greatest potential to support bull trout local populations. Use results to focus recovery tasks or direct implementation of a controlled propagation program

5.3 Conduct evaluations of the adequacy and effectiveness of current and past best management practices in maintaining or achieving habitat conditions conducive to bull trout recovery.

5.4 Evaluate effects of diseases and parasites on bull trout and develop and implement strategies to minimize negative effects.

5.5 Develop and conduct research and monitoring studies to improve information concerning the distribution and status of bull trout.

5.6 Identify evaluations needed to improve understanding of relationships among genetic characteristics, phenotypic traits, and local populations of bull trout.

6 Use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats.

6.1 Use partnerships and collaborative processes to protect, maintain, and restore functioning core areas for bull trout.

6.1.1 Use the Lake Management Plan. Coordinate with the State of Idaho, Coeur d'Alene Tribe, and local agencies in developing and implementing the Lake Management Plan.

6.1.2 Use the proposed Coeur d'Alene Basin Plan. Coordinate with the U.S. Environmental Protection Agency in implementing activities of the proposed Coeur d'Alene Basin Plan in an effort to improve bull trout habitats.

6.1.3 Conduct long-term monitoring of clean-up activities. Develop and implement long-term monitoring to assess the clean up and restoration of areas within the Coeur d'Alene River subbasin that are impacted by mining, as well as bull trout response to these clean-up measures.

6.2 Use existing Federal authorities to conserve and restore bull trout.

6.3 Enforce existing Federal and State habitat protection standards and regulations and evaluate their effectiveness for bull trout conservation.

6.3.1 Fully implement State habitat protection laws. Fully implement State habitat protection laws. Continue

enforcing the Idaho Forest Practices Act and increase inspection and pre-inspection of forest operations specifically in priority watersheds.

7 Assess the implementation of bull trout recovery by recovery units and revise recovery unit plans based on evaluations.

7.1 Convene annual meetings of each recovery unit team to generate progress reports on implementation of the recovery plan for the U.S. Fish and Wildlife Service.

7.1.1 Develop an Implementation Plan. Develop a Participation Plan for all involved State, Federal, Tribal, industry, and private entities to support implementation in the Coeur d'Alene Recovery Unit.

7.2 Develop and implement a standardized monitoring program to evaluate the effectiveness of recovery efforts.

7.3 Revise scope of recovery as suggested by new information.

7.3.1 Conduct annual meetings. Periodically assess (at a minimum, annual meetings) progress and determine needs for changes in the Coeur d'Alene Recovery Plan, as well as assess the priority of actions in the context of how to emphasize actions in the Coeur d'Alene Recovery Unit.