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Supplement to the **Powder and Burnt Subbasin Plans**
November 22, 2004

The attached supplement has been prepared in fulfillment of Task 1 of the Statement of Work dated 10/12/2004. We have specifically addressed the issues in the subtasks (a-d) within the limitations of this supplemental document.

Task 2 requests "consideration and, as appropriate, incorporation of suggestions in the comments submitted by the United States Fish and Wildlife Service concerning bull trout and the Service's Draft Bull Trout Recovery Plan." Many of the comments and suggestions have been addressed via the limiting factors and objectives and strategies in the attached supplement. For example, the Service expressed concern over "diversions, ditches and reservoirs" and their effect as barriers to fish movement; this concern is addressed in Objective 4. However, other suggestions, such as: "Bull trout planning unit should be described in more detail" could not be incorporated within the scope of the requested supplement; these would require changes and/or additions in the body of the Subbasin Plan.

Thank you,
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November 22, 2004

This supplement to the draft Powder and Burnt Subbasin Plans (Plans) addresses issues required for adoption of the plans into the NWPCC Wildlife Program as described in the Statement of Work dated 10/12/04. As requested, this supplement combines the Powder and Burnt subbasins due to their similarities. The most important difference between the two subbasins is the known presence of bull trout in the Powder while there are no known populations in the Burnt subbasin. Throughout this supplemental document, any reference to limiting factors and/or protection/restoration strategies for existing bull trout populations applies only to the Powder River subbasin.

Key factors limiting the biological potential of focal species:
In the process of conducting the QHA analysis described in the Draft Plans, the subbasin technical team rated the relative importance of four life stages of focal fish species in the subbasin. It is important to remember that these life stage rankings are *relative*; all life stages are important to individual organisms, populations and species. In the following discussion, the life stages appear in order of that ranking beginning with the "most important."

Habitat attributes are largely interdependent so it is difficult and somewhat artificial to attempt to separate them into independent entities. For example, high temperature, and its impact on fish, is affected by low flow, habitat diversity, obstructions and riparian condition. Channel stability is interactive with riparian condition, habitat diversity and high flow. Fine sediment may be partly a result of channel stability, riparian condition and habitat diversity. Thus, the factors limiting fish populations in the subbasin should not be viewed as independent issues but as an interdependent and interactive continuum of habitat conditions.

Redband Trout

Spawning and Incubation. The effect of fine sediment on spawning substrate and subsequent survival of eggs through incubation is the factor most limiting to this life stage of redband trout in the subbasin. Fine sediment is closely related to channel stability, riparian condition and habitat diversity. Degradation of those habitat attributes may result in too much or not enough sediment in the system. Similarly, extremely high or low sediment loads in the system may have a detrimental effect on those habitat attributes, especially habitat diversity.

Summer Rearing. Water quantity and quality are the major factors limiting redband trout during this life stage. Low flows, whether due to the natural hydrograph or diversions/withdrawals or both, limit access to summer rearing areas by creating barriers to fish movement and exacerbate problems of water quality including high temperature, dissolved oxygen and pollutants. The combination of these factors results in conditions that are uninhabitable or marginally inhabitable for fish. Obstructions, as defined in the QHA process, include physical barriers and barriers presented by areas dewatered or with

impassably low flows, high temperatures, low oxygen levels and/or high levels of pollutants. Thus, due to these factors, summer rearing habitat is limited and access to that habitat and connectivity between habitats is restricted.

Winter Rearing. Low flow, which may occur naturally, from water withdrawals for stock water and, in some areas, by the collection and storage of water in reservoirs, is the major factor limiting redband trout in this life stage. However, the degree to which low flow affects winter rearing in a given reach is dependent on the attributes of channel stability and habitat diversity. Low volumes of water may result in increased occurrence of icing events. Channel stability and habitat diversity can minimize the deleterious effects of those icing events on fish in a given stream or reach.

Migration. The major factor limiting the biological potential of redband trout in this life stage is obstructions including physical barriers and water quality. Obstructions act not just as physical barriers limiting or blocking the movement of individual fish, they can also act to suppress population health by limiting access to productive habitats and genetic interchange between populations. Both bull trout and redband trout exhibit resident, fluvial and adfluvial life histories. The seasonal movements associated with fluvial and adfluvial life histories allow access to habitats (larger rivers or lakes) which provide better conditions for growth. This better growth results in larger fish with increased fecundity. Obstructions (both physical and water quality) can block fish from accessing this increased productivity and transferring it to the population.

Bull Trout

Spawning and Incubation. Because bull trout spawn in the fall, the factors limiting the potential of bull trout in this life stage are different than those for spring spawners such as redband trout. The major factor limiting bull trout at this stage in the subbasin is high water temperature. High water temperatures are related to low flows, riparian condition and water quality attributes such as dissolved oxygen. Habitat diversity may offer areas of refuge from high temperatures. Habitat diversity is further related to channel stability. Obstructions, both physical and those created by poor water quality/quantity, limit the distribution of bull trout to quality spawning areas and, therefore, limit spawning. Exotic species such as brook trout also have a limiting effect on bull trout spawning and incubation both through competition for resources and through interbreeding.

Summer Rearing. High water temperature is the key factor limiting bull trout in the subbasin during summer rearing. Low flows and poor riparian condition contribute to increased water temperature while increased habitat diversity and healthy riparian areas can moderate the impact of seasonal temperature increases through shading, release of stored water and providing areas of refuge for fish. Low flows and high temperatures exacerbate other water quality issues such as dissolved oxygen and pollutants. Exotic species such as brook trout compete with bull trout for limited resources including habitats with temperatures lower than the lethal threshold for bull trout.

Winter Rearing Low flow, which may occur naturally, from water withdrawals for stock water and, in some areas, by the collection and storage of water in reservoirs, is the major factor limiting bull trout in this life stage. However, the degree to which low flow affects winter rearing in a given reach is dependent on the attributes of channel stability and habitat diversity. Low volumes of water may result in increased occurrence of icing events but channel stability and habitat diversity can minimize the deleterious effects of those icing events on fish in a given stream or reach.

Migration. The major factor limiting the biological potential of bull trout in this life stage is obstructions including physical barriers and water quality. Obstructions act not just as physical barriers limiting or blocking the movement of individual fish, they can also act to suppress population health by limiting access to productive habitats and genetic interchange between populations. Both bull trout and redband trout exhibit resident, fluvial and adfluvial life histories. The seasonal movements associated with fluvial and adfluvial life histories allow access to habitats (larger rivers or lakes) which provide better conditions for growth. This better growth results in larger fish with increased fecundity. Obstructions (both physical and water quality) can block these fish accessing this increased productivity and transferring it to the population.

Prioritizing Limiting Factors

In the above discussion of key factors limiting the biological potential of redband and bull trout in the subbasin, the highest priority factor for each life stage of each species is noted. However as noted above, habitat attributes are interdependent and the factors limiting fish populations should not be viewed as independent issues but as an interdependent and interactive continuum of habitat conditions. To achieve proper function in any given reach, all factors should be addressed concurrently. However, the issue of highest priority in the subbasin is low flow because of its direct indirect effects. Low flow, and its interaction with habitat and water quality, contributes to or exacerbates the negative effects of temperature, dissolved oxygen, pollutants, riparian condition and habitat diversity. In lower elevation reaches, low flows in the summer result from water diversion and in the winter from water storage. In higher elevation and headwater reaches (above irrigation withdrawals), natural hydrology may contribute to seasonal low flows.

Objectives and Strategies

Objective 1. Improve riparian, floodplain and wetland habitats

Strategies:

A. Maintain/protect existing riparian, floodplain and wetland habitats. Addresses the limiting factors of riparian condition, channel stability, habitat diversity, low flow, fine sediment and high temperature by preventing further degradation.

B. Implement proper grazing management.

Addresses the limiting factors of riparian condition, channel stability, habitat diversity and fine sediment by managing livestock for minimum stream access to reduce loss of riparian vegetation and degradation of stream banks with its attendant loss of channel stability and increased introduction of fine sediment. Improvements in riparian condition aid in improvements to habitat diversity.

C. Establish buffers to improve riparian areas through conservation easements, riparian fencing and implementation of setbacks.

Addresses the limiting factors of riparian condition, habitat diversity, channel stability and fine sediment. A healthy, functioning riparian zone contributes to habitat diversity through the addition of large wood and root structures, aids in stabilizing channels and captures and holds fine sediment from surface runoff.

D. Reestablish wetlands through easements, restoration and enhancement.

Addresses the limiting factor of low flow. Properly functioning wetlands hold water that becomes available during precipitation and high flow events and release it into the system gradually to maintain flow longer into the summer season. As flows improve, other habitat attributes will follow.

E. Plant native vegetation (seed, rootstock or cuttings).

Addresses the limiting factors of riparian condition, habitat diversity, channel stability, fine sediment and low flow. Native vegetation will contribute to a properly functioning riparian zone which will stabilize stream banks, moderate sediment inputs, increase habitat diversity and store water for gradual release to maintain flow into the summer season.

F. Restore and maintain connection of stream channels to their floodplains to restore floodplain function.

Addresses the limiting factors of channel stability and fine sediment. As with wetlands and riparian areas, a properly connected and functioning floodplain dampens the effects of high flow events by capturing and holding some of the water which reduces erosion and sediment input.

Objective 2. Improve stream channel processes.

Strategies:

A. Allow stream flow processes to maintain channels through restoration of natural flow regimes and floodplain connection.

Addresses the limiting factors of low flow, habitat diversity, channel stability, high temperature, fine sediment, dissolved oxygen and pollutants by restoring more natural function. This may require reductions in irrigation and storage and maintenance of minimal flows to recreate natural flow regimes.

B. Improve in-stream channel habitat through placement of large woody debris and boulders, bank stabilization efforts and flow augmentation/improvement.

Addresses the limiting factors of channel stability, habitat diversity, low flow, high temperature, dissolved oxygen and pollutants. In additions to physically creating habitats and stabilizing channels, these measures will contribute to the potential for aquatic organisms to survive periods of high temperature or low flow by creating habitat features that serve as refugia.

C. Develop off-channel habitat.

Addresses the limiting factors of low flow, high flow and habitat diversity by re-introducing historic habitats.

D. Remove or modify levies, berms, roads or dikes where appropriate.

Addresses the limiting factors of obstructions, habitat diversity, channel stability, fine sediment, low flow and water quality. Removal or improvement of such structures will eliminate some passage barriers, reduce erosion of sediment into the stream and improve flows by cutting down on water seepage out of the system. Whenever flows are improved, other water quality attributes generally improve as well.

E. Re-configure modified channels through active restoration.

Addresses all the limiting factors by restoring a stream to its natural function.

Objective 3. Improve Water Quality (temperature, dissolved oxygen, chemical pollutants, biological pollutants, pH, turbidity).

Strategies:

A. Improve irrigation and water management to increase flow (may include purchase or lease of water where necessary and available).

Addresses the limiting factor of low flow and all associated water quality attributes.

B. Maintain or create adequate vegetation in buffers to intercept overland and subsurface sources of pollution.

Addresses the limiting factors of fine sediment, and pollutants (chemical and biological) by intercepting them and preventing or slowing their introduction to the stream.

C. Appropriate application of herbicides and insecticides to protect water quality and aquatic resources.

Addresses the limiting factor of pollutants (chemical) by minimizing their movement into aquatic systems.

D. Implement nutrient management.

Addresses the limiting factor of pollutants (biological) by minimizing their presence in aquatic systems.

E. Implement sewage and stormwater management.

Addresses the limiting factor of pollutants (chemical and biological) by minimizing their movement into aquatic systems.

Objective 4. Improve habitat connectivity and fish passage.

Strategies:

A. Create fish passage at dams and irrigation water diversion structures. Remove unnecessary dams and diversion structures.

Addresses the limiting factor of obstructions by allowing passage past them.

B. Remove barriers at roads; repair/improve culverts to allow fish passage.

Addresses the limiting factor of obstructions by eliminating culverts at roads as barriers.

C. Eliminate barriers created by dewatered reaches and poor water quality.

Addresses the limiting factor of obstructions by removing the barriers caused by lack of water and/or poor water quality.

D. Install approved fish screens at irrigation diversions.

Addresses the limiting factors of water quantity and quality by keeping fish in areas where these factors are less degraded and out of areas such as irrigation ditches and cultivated fields.

Objective 5. Reduce upland erosion and sedimentation.

Strategies:

A. Encourage improvements in road management to reduce erosion.

Addresses the limiting factor of fine sediment by reducing the effect of roads as a source.

B. Encourage improvements in grazing management.

Addresses the limiting factor of fine sediment by reducing livestock disturbance to areas vulnerable to erosion.

C. Encourage improvements in timber management.

Addresses the limiting factor of fine sediment by reducing disturbance caused by timber management activities in areas vulnerable to erosion.

D. Encourage improvements in agricultural practices including methods such as no till farming or cover crops.

Addresses the limiting factor of fine sediment by minimizing agricultural sources of sediment.

Objective 6. Minimize the detrimental effects of exotic species.

Strategies:

A. Implement public education and enforcement to prevent illegal introductions.

Addresses the limiting factor of exotic species competition by reducing new introductions.

B. Increase and/or improve available habitat for native species.

Addresses the limiting factor of exotic species competition by improving habitat conditions for native species which most often reduces habitat quality for exotics and removes their competitive advantage.

Prioritizing Objectives and Strategies

The aquatic objectives listed above are presented in priority order although objectives one and two essentially share top priority. Prioritization of the strategies utilized to achieve a given objective will be dependent upon a number of factors. First, managers in the subbasin, using the QHA outputs in the Plans, need to identify the reaches to which the limiting factors and objectives apply and develop a list of priority reaches. In addition, stream reaches not rated in the QHA process need to be assessed for their contribution to aquatic habitat factors such as high temperature and sediment. As reaches are identified for protection and/or restoration, the application of noted strategies will depend on opportunities presented by available funding, landowner willingness and the priorities set by various land management agencies involved in the subbasin.