Friends of the Wild Swan
P.O. Box 103
Bigfork, MT 59911

July 20, 2015

U.S. Fish and Wildlife Service
Idaho Fish and Wildlife Office
1387 S. Vinnell Way, Room 368
Boise, ID 83709
Attn: Michael Carrier, State Supervisor
Via e-mail to: fw1bulltroutrecoveryplan@fws.gov

Dear Mr. Carrier,

Please accept these additional comments on the draft Recovery Unit Implementation Plans that were prepared for us by Christopher A. Frissell, Ph.D.

/s/Arlene Montgomery
Program Director

FINAL

20 July 2015
Christopher A. Frissell, Ph.D.
[redacted]

Comments on the

Revised Draft Recovery Plan
for the Coterminous United States Population
of Bull Trout (*Salvelinus confluentus*) (Changes in Bull trout Recovery Criteria)
and Associated
Draft Recovery Unit Implementation Plans, June 2015

U. S. Fish and Wildlife Service
Portland, Oregon

This comment document pertains to the following US Fish and Wildlife Service documents from June 2015 that I reviewed in some detail for the purpose of the present comments. Because of limitations of time and resources I did not produce a detailed, point-by-point analysis of the draft documents, but the comments are of direct general and strategic importance in structuring recovery criteria and effective implementation plans:

1) The USFWS Document "**Changes in Bull Trout Recovery Criteria**," dated June 2015 (http://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/Proposed_Bull_Trout_Recovery_Criteria_June_2015b.pdf).

2) The **Draft Coastal Recovery Unit Implementation Plan** (June 2015) (http://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/Draft_Coastal_RUIP_052715.pdf)

3) The **Draft Columbia Headwaters Recovery Unit Implementation Plan** (June 2015) (http://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/Draft_Columbia_Headwaters_RUIP_060215.pdf).

4) Cursory examinations of the remaining Draft Recovery Unit Implementation Plans.

In December of 2014 I submitted an extensive set of comments (Frissell 2014) on the Revised Draft Recovery Plan for Bull Trout (released September 2014, http://ecos.fws.gov/docs/recovery_plan/20140904%20Revised%20Draft%20Bull%20Trout%20Recovery%20Plan.pdf). In those comments I emphasized several key scientific oversights and erroneous science and management assumptions that undermine the veracity and potential effectiveness of the draft plan as a construct to guide and support the recovery of bull trout. Here I summarize the major points I made in that document, and later in this comment I will address the degree to which those comments are pertinent to the content of above-cited documents from June 2015.

1) The Draft Recovery Plan's core logic rests on a frustratingly non-explicit but prevailing assumption that there is some clear ecological basis that confers to to the Service discretion to permit harm to and risk potential loss of bull trout populations and habitat in existing "core areas" or known biological strongholds, under the premise that management actions will allow new strongholds, or entirely new populations, to be established on a relatively short time frame of years to decades. However, the proposition that robust populations of bull trout can be created from extant depleted or remnant populations or in currently unoccupied habitat remains extremely speculative and has never been demonstrated. Hence, contrary to the Service's unexamined core assumption, there is no rational substitute for implementing all measures necessary to protect the remaining relatively productive, robust, and persistent populations and their habitats, including the ecosystem elements, processes and conditions that sustain them.

2) The plan rejects biological and habitat data as the basis for recovery goals and delisting criteria, despite that the state of the art convention for making such determinations, the Viable Salmonids Framework, relies principally on such data and can be robustly informed with extant data sources for many, if not most populations of bull trout. Hence the treatment of threats as the prime basis for recovery in the Draft Plan becomes a construct unmoored not only from most relevant conservation science, but from the actual biology and ecology of bull trout in the field.

3) The third, perhaps most important, and certainly most novel conceptual fallacy of the Draft Plan is its complete reliance on the unexamined and undefended presumption that threats can be unambiguously identified, and with ease determined to be "managed" to the degree that biological recovery presumably results. However, informed scientific analysis of threats almost always reveals a great deal of complexity,. Including interactions and cumulative effects of multiple systematic factors ofioten compounded by infrequent natural events. This tells us that the environmental factors and human actions that affect them can only be "managed" to the benefit of the species if assumptions about the relation of management actions to biophysical cause and effects, and thence the response of bull trout

populations to habitat changes, are 1) thoroughly evaluated with best available information *a priori* and, 2) *verified* post hoc *with direct data on populations and habitat*. But in this Draft Recoery Plan and supporting documents, the key threshold criterion—that is the simple phrase "threats are managed" —is never informed with a clear definition, criteria, or even illustrative examples that would allow objective and independent evaluation.

4) Some categories of threat are ignored or ill-described in the Draft Plan; any threat that is common in the real world but missed in this plan will likely not be recognized or will be given low priority in treatment, thereby seriously undermining actual biological recovery.

5) Adaptive management is invoked in the plan, but not described or bounded in a way that would make it useful or meaningful for evaluating recovery actions and outcomes.

My overall evaluation is that the while the Draft Recovery Unit Implementation Plans (DRUIPs) provide a great deal more specific information about status and local area threats to bull trout, they address only a fraction of my comments on the 2014 Draft Recovery Plan. Here are my summary comments pursuant to the criticisms noted above:

1) The ecological basis of discretionary harm to extant core areas and biological strongholds remains undisclosed and not addressed. There is no demographic or ecosystem analysis of cause and effect and likely outcomes, nor are assumptions about the rate of population response to proposed habitat restoration actions and reintroductions and how that rate affects overall conservation and recovery of the species disclosed, either within Recovery Units or across the range of the species.

2) The DRUIPs reclaim some ground in that they do identify some population biological metrics and prioritize some survey actions for bull trout distribution and abundance, and in some cases they identify resources required to develop and gather needed demographic data to plan and evaluate the effectiveness of restoration projects. However, this is highly fragmentary and there is no evidence of systematic data gathering and analysis to support USFWS evaluation of status and recovery within Recovery Units, or across the range of the species. In general it appears most of the identified efforts in biological data collection appear to originate from some other agency, tribe, or organization having identified a commitment to proceed with biological monitoring, independent of USFWS recovery planning. Hence there is still no systematic USFWS plan identified for bull trout biological evaluation and demographic validation of recovery assumptions, nor any population biological basis for delisting criteria.

3) The criterion "threats are managed" remains undefined and so vague as to be virtually immune to objective or scientific scrutiny. Most important, no criteria are to be found in the DRUIPs that establish clear criteria for determining when "threats are managed," even where existing threats and actions are more comprehensively identified.

4) While the DRUIPs do a marginally comprehensive job of identifying threats in some bull trout waters, there are numerous puzzling omissions of threats recognized as important by scientists and managers but which do not appear in the DRUIPs. Some of these are passive omissions that in my opinion result in a distorted view of threats and restoration priorities in some watersheds and river segments, whereas others are documented as uncertainties, without any best-judgment assessment. In my opinion the outcome is neither an unbiased and objective, nor a comprehensive assessment of threats; rather it is strongly biased by existing programs or projects and "popular" threats that receive the most attention by managers and fishing enthusiasts. The threats assessment consistently overlooks many of the more crucial underlying ecosystem processes and the more socially controversial but essential management and regulatory actions. A few examples of management and regulatory actions that are pervasively critical for bull trout conservation but overlooked except for fragmentary mentions in the DRUIPs are: protection of floodplains and channel migration zones from residential and commercial development, inadequate streamside forest buffers to protect and improve water temperatures in headwater streams that support bull trout or contribute water directly to bull trout habitat, re-regulating water rights, water allocations, and water withdrawal infrastructure to protect instream flows from overexploitation and restore migratory connectivity between spawning and early rearing habitats, re-engineering or regulating traffic on highways and railways to reduce the risk of toxic chemical spills in critical habitat, and limiting nonnative fish or other biological introductions or stocking by state agencies where bull trout are at risk from those species. While there might be a few examples of each of these "unpopular" recovery actions in the DRUIPs, they are grossly underrepresented relative to their need on the ground. This is strong evidence that the Service has intentionally attempted to simplify recovery and propagate the illusions of near-term management discretion and longer-term recovery success by both winnowing the field of recognized "threats" and by failing to adopt any objectively defined measure of how to know when threats are "managed."

5) In the DRUIPs and the changes in recovery criteria, the Service still fails to identify any rigorous or implementable framework or criteria for monitoring and adaptive management that should, according to the 2014 Draft Recovery Plan, provide some improved assurance of bull trout recovery in response to management actions. The promise of adaptive management in the absence of formal objectives, criteria and implementation guidance and without the

formal allocation of resources and authorities needed to sustain an adaptive management program, is an empty promise indeed.

In the following text I provide a few more specific comments pursuant to the conclusions above.

Existing Core Areas are Highly Likely to Remain the Keystones for Bull Trout Persistence and Recovery

The Revised Draft Recovery Plan appears to purposefully diminish the long-term importance of extant bull trout core areas and population strongholds by suggesting that climate change will introduce uncertainty, and speculating that the loss of some core areas is inevitable because of climate change. Further, this assertion that extant core areas will be lost because of ongoing large-scale anthropogenic change in climate is then seemingly interpreted by the Service to imply that permitted specific local human actions such as the proposed and permitted Montanore Mine and Rock Creek Mine in NW Montana, which threaten two of the known stronghold migratory populations in the Middle Clark Fork area where stronghold populations are exceedingly few, will not significantly reduce the likelihood of recovery of the species. In my view this assumption is not only objectively false, it is insidious and completely undermines any prospect of species recovery. It must be disclosed and held to examination by the Service, and explicitly exposed to public review, if this recovery plan is to be considered legitimate.

The Service continues to provides no evidence that existing populations that are small can be substantially increased, or have been increased through specific recovery actions to the degree new robust core area habitats and stronghold populations can be established through actions such as habitat manipulation or population reintroductions. There is a considerable body of management experience now for many, if not most of the proposed recovery actions, but the Service has neither offered nor cited any objective evaluation or scientific review of their effectiveness.

Climate Change Effects are Likely Misconstrued

Both DRUIPs I reviewed in detail contained reference to published studies that projected climate change impact to salmonid fishes. The basis of these research projects is largely linked to simulation models that attempt to predict stream temperature changes relative to air temperature changes predicted from stepped-down climate change models. In general they concentrate on summer thermal maxima, but some also deal less specifically with fall and winter flows that may affect spawning migration and incubation success of bull trout. However, a careful reading of those published papers will reveal they are preliminary assessments

"black box" key aspects of hydrology—most importantly, they ignore or gloss over groundwater and hyporheic flow effects that greatly mediate both stream flow and stream temperature responses in most, if not all streams that are important to bull trout spawning and early rearing. The direct reliance of bull trout on groundwater-influenced waters where temperature changes are not accurately predicted by presently available coupled climate-hydrology change models means that inferences derived from those model predictions may have little bearing on actual conditions for bull trout survival and recovery.

In my opinion, for example, climate change effects as reported in the Coastal DRUIP overemphasize changes at higher elevations because the models cited do not adequately describe the hydrologic mechanisms that account for groundwater and hyporheic flow and its effects of temperature of specific surface waters. Yet these conditions of strong of groundwater and hyporheic flow influence are endemic features of every bull trout stronghold I am familiar with or aware of in Washington and Oregon (not to mention Montana, Idaho, Nevada, formerly occupied range in California, and British Columbia as well). Extant bull trout populations are largely dependent on groundwater–influenced habitats and winter habitat conditions, and these will be resilient to climate change compared to other habitats; hence bull trout will be less adversely affected by the hydrologic effects of climate change than will other species such as Chinook salmon that are not so dependent on groundwater for survival.

A recent paper by Weekes et al. (2015) outlines how such areas of strong groundwater influence are determined by long-term geologic features, including moraines left by retreating glaciers earlier in the Quaternary, more recent or contemporary rock glaciers, rock talus, and ancient landslides and debris flow events. The unifying feature of these geomorphic controls on groundwater is that they are permanent landforms with high permeability and water storage capacity whose effects on hydrology last far beyond their initial creation by glacial or colluvial deposition. Bull trout can be seen as ecological specialists where spawning and early rearing is highly depended on the stream habitats these geologic features create, where flow and thermal conditions are relatively invariant in the face of weather events and climate shifts. Extant models of hydrologic response to climate change do not account for these critical geological influences (Weekes et al. 2015).

Some reduction of suitable habitat will occur within or adjacent to extant core areas from climate change, and more important, no new spawning and early rearing habitat for bull trout will be created by climate change or the identified recovery actions. Recovery actions primarily address connectivity among extant spawning and early rearing habitat. These are important, but utterly ineffective and irrelevant if extant spawning and early rearing habitat is not preserved to benefit from improved connectivity. The plan does not provide assurances such habitat will be preserved; to the contrary, deliberately attempts to manufacture discretion for the Service to permit the destruction of extant spawning and early rearing habitat some core areas.

Movement of migratory bull trout between core areas or stronghold populations (most or all located in areas of strong groundwater or hyporheic influence), also in my opinion is oversimplified in the climate change projections. In fact, with the exception of a few thermal springs, even the warmest waters in the pacific Northwest are too warm for bull trout migration for only two or three months of the year. The remainder of the late fall, winter and spring they are cool enough to support migration of bull trout. I fully support the many actions identified in the DRUIPs that are intended to restore movement and migration opportunities for bull trout. What I believe is not supported by science—and is extremely important to call out in comment—is this: The contention or implication that climate change, via stream warming, will further constrict bull trout migration to the extent that present day core areas will become more isolated than they are today, and that this will in turn will surely lead to extinction of stronghold populations. This in turn is seemingly interpreted by the Service to condone permitted actions that place those populations at greater risk of decline and extinction and thereby arguably jeopardize the recovery of the species. That chain of logic is scientifically untenable and largely a fiction.

Groundwater-Surface Water Linkages Require More Explicit Attention

In my previous comments on the Draft Proposed Recovery Plan (Frissell 2014) I provided an extensive discussion and scientific citations concerning the critical importance of groundwater and alluvial hyporheic waters to bull trout survival and recovery. It is clear from a reading of the draft Recovery Unit Implementation Plans that even beyond the climate change concern, the critical importance of groundwater processes and groundwater-influenced habitats for bull trout ecology and conservation has only received superficial and inconsistent recognition and treatment by the USFWS. Ignorance of and inattention to groundwater and hyporheic phenomena are manifest in the USFWS documents in the following ways: 1) failure to recognize the importance of protecting natural geologic aquifers, e.g. from proposed underground surface mines; 2) failure to identify geologically-determined coldwater/groundwater-rich streams and associated core areas as of highest priority and irreplaceable for bull trout conservation because of their high habitat values and inherent flow and temperature stability in the face of future climate change; 3) failure to recognize slope-to-stream groundwater linkages that require, for example, the protection or restoration of slope wetlands that recharge local aquifers; 4) failure to recognize the full scope and large scale of floodplain protection and restoration actions required on larger alluvial streams and rivers to protect or re-establish the natural exchange and underground storage of surface and subsurface waters that naturally recharges shallow alluvial aquifers and buffers summer and winter water temperatures against extremes. These shortcomings are endemic to the 2014 Revised Draft Recovery Plan, and in many places (too numerous to cite case by case) throughout the DRUIPs. They are not acknowledged or addressed in the June 2015 document “changes in Bull Trout Recovery Criteria.”

Four major sources of groundwater influence and buffering of streams that support bull trout spawning and early rearing: 1) Deep, long-residence groundwater associated with bedrock fracturing and other geologic structures; 2) shallow slope aquifers, commonly associated with ancient Quaternary glacial or periglacial deposits of sediment and soil that are recharged by wetland complexes and associated upland processes, or in some cases by lakes deep enough to retain cold water at depth, with water stored over time frames of months to a few years percolating subsurface to recharge adjacent or connected streams; 3) delayed ice melt, storage, and percolation of runoff through coarse-textured colluvial (periglacial and landslide) deposits in mountain tributaries; 4) shallow aquifers associated with hyporheic entrainment of stream and riverine surface waters in alluvial deposits, and discharge back into those surface waters. Recharge of alluvial aquifers by winter and spring snowmelt, rain-on-snow, or rainfall results in storage of cold water for periods ranging from weeks to months, lagged discharge of stored cold water back into surface waters during the hottest summer and early fall months.

Threats exist to each of the above groundwater sources, including deep bedrock mining, loss of wetlands, and loss of river channel complexity and floodplain functions through floodplain development and river channel modifications by roads and railways, water withdrawals, and river regulation by reservoirs.

The Draft Recovery Plan and DRUIPs provide no specific identification or means of protection of these groundwater sources that are so critical for bull trout habitat, with the exception of generic listing of water withdrawals as a threat in the Coastal RU (which is given no specific identified recovery action!). These documents provide no description of how proposed actions will restore or expand groundwater influence where it has been historically lost.

Recovery actions in the DRUIPs seem to fail to recognize the full scope and large scale of floodplain protection and restoration actions required on larger alluvial streams and rivers to protect or re-establish the natural exchange and underground storage of surface and subsurface waters that naturally recharges shallow alluvial aquifers and buffers summer and winter water temperatures against extremes. These may include changes of land use and ownership in high-value bottomlands, protection of forests from logging to restore natural bank stability and a sustained supply of large wood, provision for extensive channel migration and switching during floods. Actions needed may entail removal of existing revetments and control structures as well as removal of roads and other infrastructure, and protecting waters across the floodplain as well as the local alluvial aquifer from excessive withdrawals.

No Specific Biological or Other Criteria Are Established for Judging When "Threats are Managed" for Specific Populations and Habitats, and the Delisting Process Triggered.

Recovery actions to "Manage Threats" to be effective must 1) identify all threats accurately and completely with regard to the physical and biological mechanisms, 2) identify extant or proposed specific policy and management mechanisms that either protect these mechanisms from future threats or alleviate and reverse existing harms; 3) identify administrative and management actions necessary for protection and recovery and ensure that they are being, or will be implemented with the explicit consideration of bull trout recovery; 4) verify that the assumptions about threats and their recovery actions are leading to biological recovery of bull trout populations (monitoring). As detailed in my previous comments, examples cited by the Service in the 2014 Draft Recovery Plan, and many hinted at in the DRUIPs, imply that the Service's view of what is meant by threats being "managed" is exceedingly unrealistic, superficial, glossed, and inaccurate

Moreover it appears illogical and untenable, and a major error of hubris for the USFWS to assume all threats have been accurately identified in any system, or that identified recovery actions will be sufficient to protect and recover bull trout, and that no unexpected or surprising conditions, events, or outcomes that complicate recovery actions. ***This fundamental uncertainty and the imperfection and severe limitations of scientific models of threats and of management outcomes is the reason that recovery must ultimately be judged by the biological response and trend of specific populations, which integrates the outcome of all management actions.*** Given a realistic, unvarnished appraisal of ecosystem dynamics and uncertainties in the outcomes we can expect from management actions, I see no defensible alternative to biological population data must continue to remain in the driver's seat to guide priority-setting and evaluation of success in recovery actions. The alternative proposed by the USFWS to base recovery on the single undefined phrase, "*threats are managed*," is an unworkable and ill-defined construct that is likely to lead managers and the public down a garden path of presumed recovery that serves to mask endangerment and extinction.

Without needed corrections, the Proposed Draft Recovery Plan and its DRUIPs in my opinion would undermine, rather than faithfully execute, the plain statutory intent of the Endangered Species Act.

LITERATURE CITED

Frissell, C.A. 2014. Comments on the Revised Draft Recovery Plan for the Coterminous United States Population of Bull Trout (Salvelinus confluentus), U. S. Fish and Wildlife Service Portland, Oregon. Submitted to USFWS 14 December 2014.

Weekes, A. A., C. E. Torgerson, D. R. Montgomery, A. Woodward, and S.M. Bolton. 2015. Hydrologic response to valley-scale structure in alpine headwaters. Hydrologic Processes 29:356-372. doi 10.1002/hyp.10141