MEMORANDUM OF UNDERSTANDING
and
CONSERVATION AGREEMENT
for
WESTSLOPE CUTTHROAT TROUT
and
YELLOWSTONE CUTTHROAT TROUT
in
MONTANA

July 2007

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This Memorandum of Understanding and Conservation Agreement (Agreement) has been developed to expedite implementation of conservation measures for westslope cutthroat trout *(Oncorhynchus clarkii lewisi*; WCT) and Yellowstone cutthroat trout *(Oncorhynchus clarkii bouvieri*; YCT) throughout their respective historical ranges in Montana (Figure 1). This Agreement is a collaborative and cooperative effort among resource agencies, conservation and industry organizations, tribes, resource users, and private landowners. Threats that currently warrant designation of these two subspecies (collectively referred to as "cutthroat trout" throughout the rest of this document) as *Species of Concern* by the State of Montana, *Sensitive Species* by the U.S. Forest Service (USFS) and Montana Department of Natural Resources and Conservation (DNRC), *Special Status Species* by the Bureau of Land Management (BLM), and *Species of Special Concern* by the Crow Tribe, and as part of the reason the U.S. Fish and Wildlife Service (USFWS) previously reviewed both subspecies for potential listing under the Endangered Species Act (ESA) should be significantly reduced because of this Agreement. This Agreement will serve to document Montana's efforts as part of coordinated multi-state, range-wide efforts to conserve cutthroat trout.

I. CONSERVATION AND RESTORATION GOALS

Background

The management goals and associated objectives for cutthroat trout in Montana outlined in this Agreement were developed by the Montana Cutthroat Trout Steering Committee (MCTSC), which includes representatives from American Wildlands, Blackfeet Tribe, Crow Tribe, Confederated Salish and Kootenai Tribes, Federation of Fly-Fishers (FFF), Glacier National Park, Greater Yellowstone Coalition, Montana Chapter of the American Fisheries Society, DNRC, Montana Farm Bureau, Montana Fish, Wildlife & Parks (FWP), Montana Stockgrowers Association, Montana Trout Unlimited, Montana Wildlife Federation, Natural Resource Conservation Service (NRCS), Plum Creek, private landowners, BLM, USFWS, USFS, and Yellowstone National Park (YNP). The Montana Cutthroat Trout Technical Committee (Technical Committee), which includes fishery scientists and geneticists from state and federal agencies, tribal governments, and universities, assisted in developing this Agreement. The Technical Committee meets annually and will ensure that scientifically sound conservation strategies are used for implementation and monitoring of this Agreement. This Agreement

updates and combines two earlier five-year agreements, one for each subspecies (FWP 1999 and 2000), which expired in 2004 and 2005, respectively.

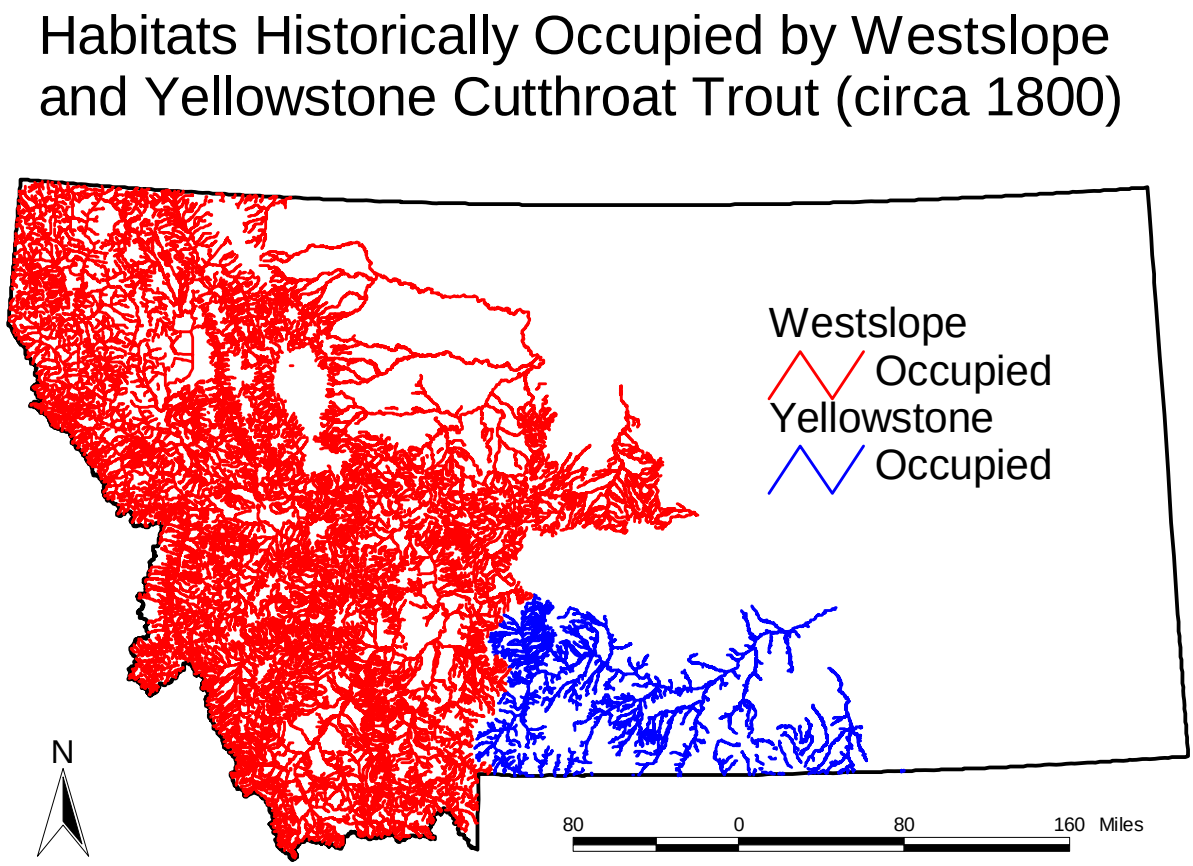


Figure 1. Map showing historically occupied (circa 1800) ranges of WCT and YCT in Montana.

Implementation of this Agreement will be accomplished through more detailed regional and/or watershed conservation programs that are developed locally (See **Agreement Assessment and Milestones** below). Regional/watershed conservation programs will be developed under the leadership, or collaborative leadership, of the entities that have responsibility for fish management and conservation activities within the particular region or watershed (i.e. state of Montana, tribal governments, National Park Service). FWP regional boundaries will be used to develop and report on local conservation efforts (Figure 2). Prior to implementing specific conservation projects that are determined to have any potentially significant environmental, social, or economic impacts, environmental assessments (EA) be prepared, with the help of all collaborators and the public, as required for all state and federally proposed projects. Decisions on each individual conservation project will be made by the agency sponsoring the project after considering the goals of this Agreement and information provided by the collaborators and the public.

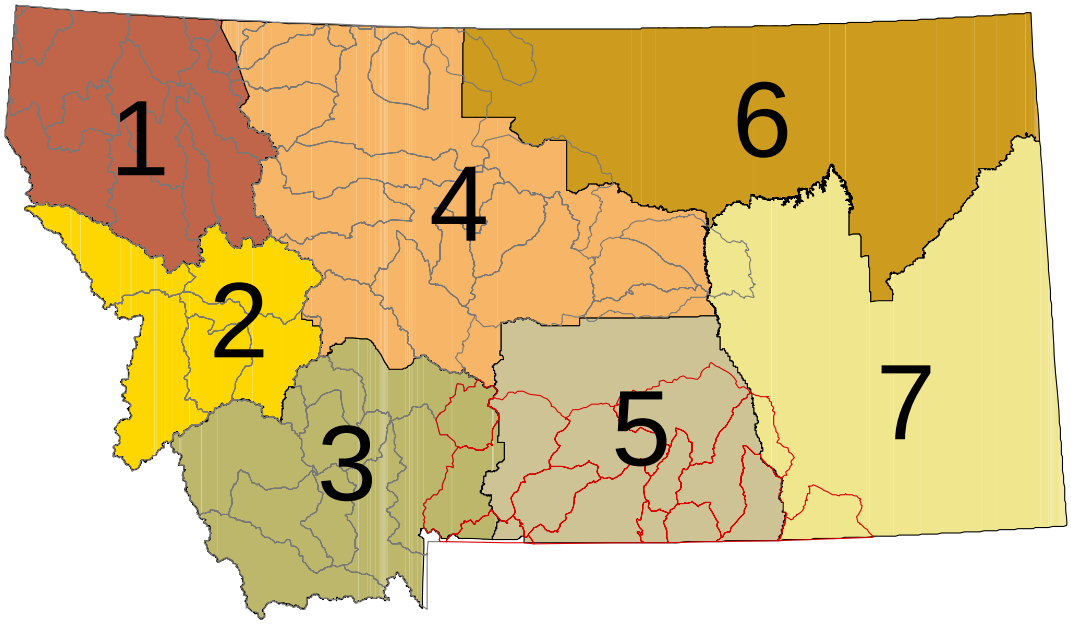


Figure 2. **Map of Montana showing FWP regional boundaries (colors) along with major river drainages (outlined) historically occupied by cutthroat trout (gray outlines represent likely historical WCT habitat and red outlines represent likely historical YCT habitat).**

Goals

The management goals for cutthroat trout in Montana are to: 1) ensure the long-term, self-sustaining persistence of each subspecies distributed across their historical ranges as identified in recent status reviews (Shepard et al. 2003; Shepard et al. 2005; May et al. 2003), 2) maintain the genetic integrity and diversity of non-introgressed populations, as well as the diversity of life histories, represented by remaining cutthroat trout populations, and 3) protect the ecological, recreational, and economic values associated with each subspecies.

Objectives

The following objectives will be required to attain the goals of this Agreement for cutthroat trout in Montana:

Objective 1. Maintain, secure, and/or enhance all cutthroat trout populations designated as conservation populations, especially the genetically pure components.

Objective 2. Continue to survey waters to locate additional cutthroat trout populations and determine their distribution, abundance, and genetic status.

Objective 3. Seek collaborative opportunities to restore and/or expand populations of each cutthroat trout subspecies into selected suitable habitats within their respective historical ranges.

Objective 4. Continue to monitor cutthroat trout distributions, genetic status, and abundance using a robust, range-wide, statistically sound monitoring design.

Objective 5. Provide public outreach, technical information, inter-agency coordination, administrative assistance, and financial resources to meet the listed objectives and encourage conservation of cutthroat trout.

In order to conserve cutthroat trout we must significantly reduce threats to existing populations prioritized by conservation value (i.e., genetic purity, life history, local adaptation), increase their spatial distribution and abundance, and protect the genetic integrity of non-introgressed populations. Simply maintaining the status quo will not be sufficient for the long-term persistence of many existing populations. While it is certain that some existing populations will be lost, we must expand other existing populations, re-found or found new populations, and connect some of these populations to ensure their long-term persistence.

The objectives of this Agreement are not regulations, but are guidance that, if followed and achieved, should ensure that the management goals are met. Ideally, over a reasonable period of time 100% attainment of the objectives should occur. However, it is unrealistic to expect that all objectives will be attained at 100% each year because natural stochastic variability in the environment (such as drought, flood, or wildfire) will limit our ability to meet these objectives every year. An integral part of these goals will be to have at least some populations that can support some level of angler harvest because any population that is robust enough to support angler harvest will have more adult fish than are needed to maintain the population (harvestable surplus). Thus, if some type of stochastic environmental event, such as prolonged drought or a series of floods, dramatically reduces such a population, managers can respond quickly by reducing or eliminating angler harvest to allow that population to re-build quickly. The ability of populations to quickly recover from catastrophes has been termed “resiliency” (e.g., Weaver et al. 1996).

Although the goals and objectives of this Agreement are based on the most current scientific information available, the habitat needs and population dynamics of cutthroat trout are still being researched (i.e., importance of metapopulation structure versus isolation for both short-term and long-term persistence of populations). While this uncertainty will probably not change the goals and/or objectives, strategies for achieving the goals and/or objectives may need to be modified over time to reflect changes in our knowledge.

Objectives Defined

Objective 1. **Maintain, secure, and/or enhance all cutthroat trout populations in Montana designated as conservation populations, especially the genetically pure components.**

This objective is the key to long-term conservation of cutthroat trout in Montana. While the range of each subspecies has decreased from historical levels, populations of both subspecies generally remain widespread (Table 1, Figures 3 & 4). Conservation of cutthroat trout must

begin with maintaining, securing and enhancing existing populations. These populations will serve as a springboard to restoration throughout each subspecies' respective ranges. Maintaining populations that are currently stable entails protecting habitat, maintaining successful life history strategies by ensuring migratory populations have access to different seasonal and life-stage habitats, and avoiding actions that may be detrimental to these populations. Securing and enhancing populations will most frequently involve either limiting or removing nonnative species, conserving or restoring habitat (including the maintenance of in-stream flows), re-establishing connectivity among isolated populations, applying regulations that protect cutthroat trout and/or liberalizing the harvest of nonnative species, or some combination of the above. Maintaining, securing and enhancing cutthroat trout populations may also include ceasing or preventing the release of nonnative fish species into waters within watersheds that currently support (or have a high potential to support) cutthroat trout conservation populations (defined below). While the status of some populations may change, including the possibility that a few populations may be lost, based on either new information or stochastic processes, the goal of this objective is to protect and secure existing populations.

Table 1. Total miles occupied by WCT and YCT cutthroat trout by genetic status in Montana as of 2003.

Genetic Status	Total miles WCT	Total miles YCT
Genetically unaltered (>99.0%) - tested via electrophoresis or biochemical genetics	2,930	850
Introgressed (hybridized) - tested and found to be 90% to 99% target species	1,107	
Introgressed (hybridized) - tested and found to be 75% to 89% target species	452	184
Introgressed (hybridized) - tested and found to be less than 75% target species	911	6
Suspected unaltered with no record of stocking or contaminating species present	2,936	204
Potentially hybridized with records of contaminating species being stocked or occurring in stream	4,051	474
Hybridized and Pure populations co-exist in stream (reproductive isolation is suspected and genetic testing done)	531	96
Total	**12,916**	**1,813**

Representatives from most of the fish and wildlife agencies in the western U.S. met and developed a cutthroat trout conservation strategy that included three categories for classifying populations (Utah Division of Wildlife Resources (UDWR) 2000; Figures 5 and 6):

- ***Core populations*** **-** comprises populations of individuals that have no evidence of genetic introgression (hybridization) determined by genetic testing. These populations can potentially serve as donors (either in the form of fish or gametes) for restoration efforts. To avoid confusion with other species conservation plans that use the term "core" differently, this Agreement refers to "genetically pure" rather than "core" throughout the document.

- ***Conservation population*** - includes all of the "core," genetically pure, populations as described above, and also those populations that have unique ecological and behavioral traits of the subspecies. Introgressed conservation populations will typically be <10% introgressed. Often, these slightly introgressed conservation populations will either have migratory life history forms, be adapted to unique environments, be the least introgressed populations within a geographic area, or have distinctive phenotypes or behaviors that local experts deem important enough to conserve.

- ***Sportfish populations*** - wild or hatchery-sustained cutthroat trout populations that are managed primarily for the benefit of recreational fisheries. However, populations classified as sportfish populations, especially extent wild populations, may have conservation value, but their conservation value is uncertain or of lower priority than the other two categories.

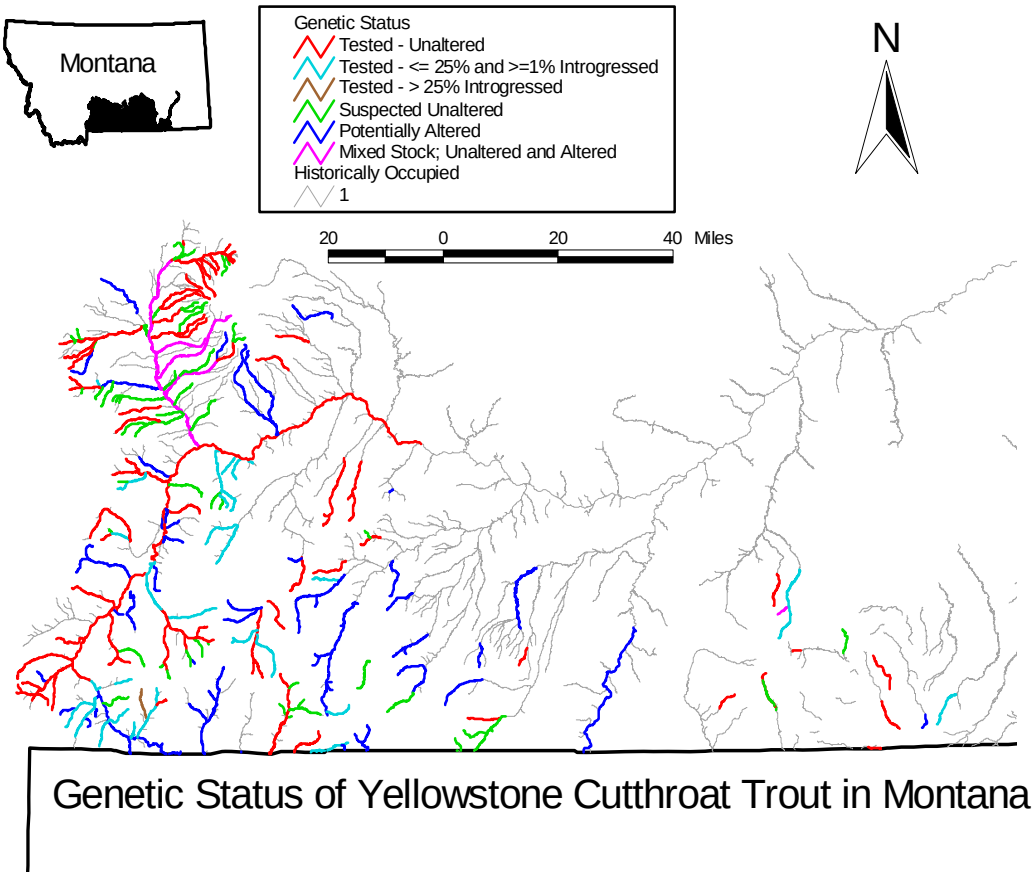


Figure 3. Populations of YCT found in Montana by genetic status overlaying historical ranges (gray lines).

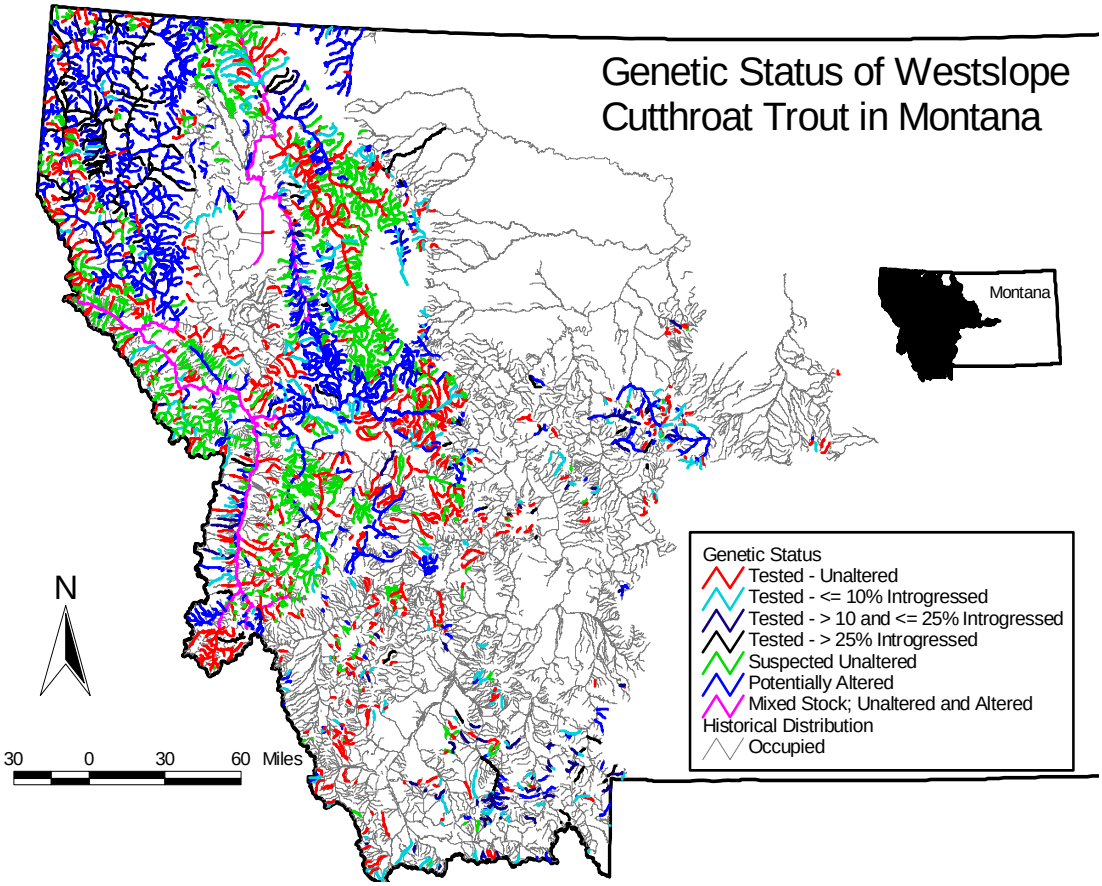


Figure 4. Populations of WCT found in Montana by genetic status overlaying historical ranges (gray lines).

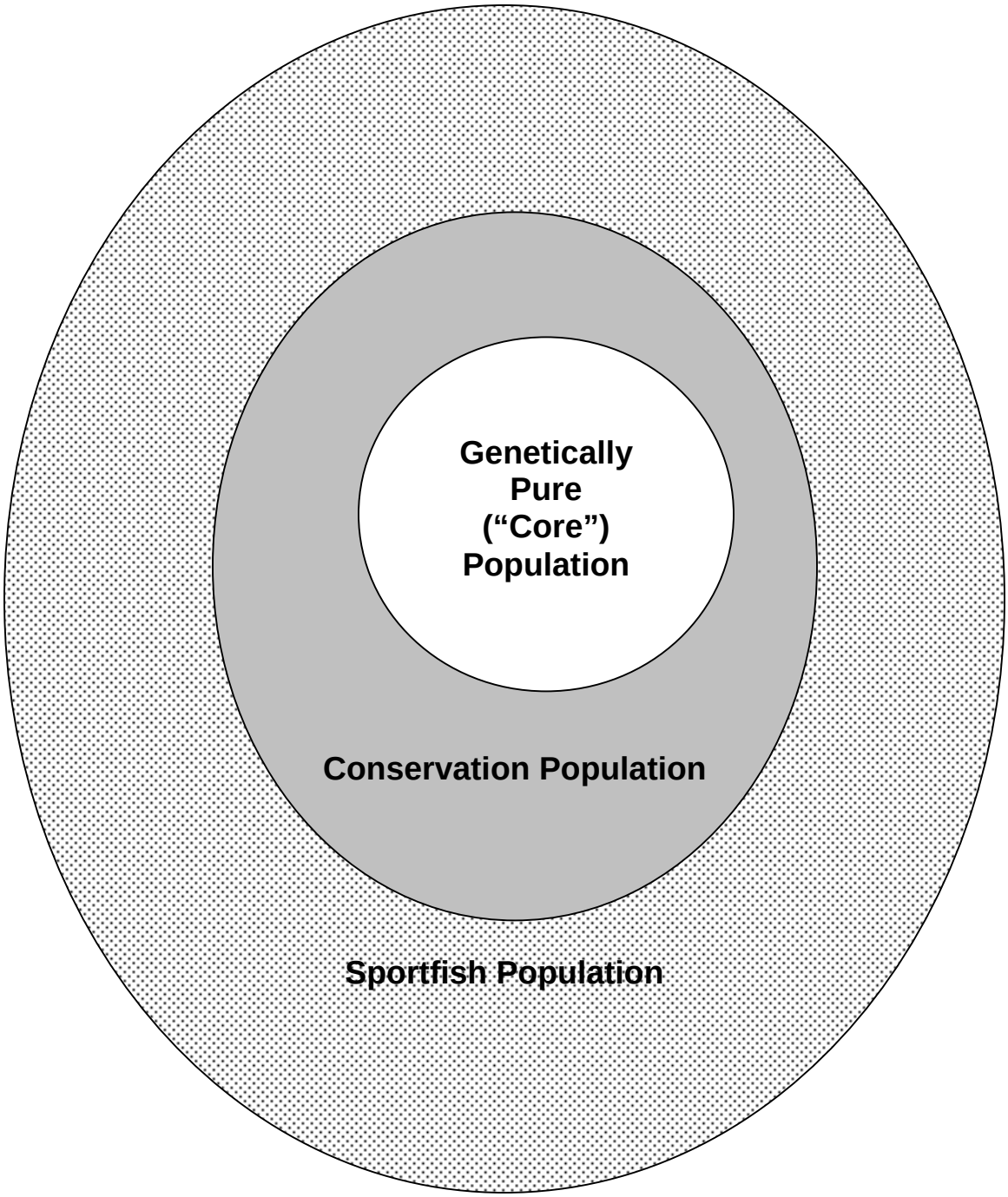
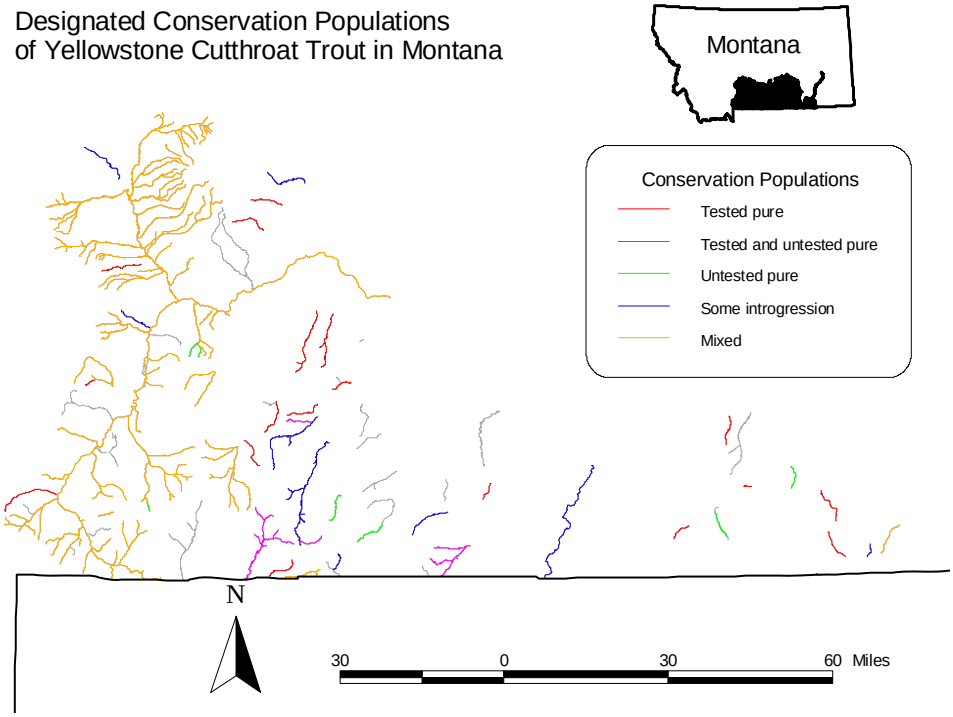


Figure 5. **Schematic diagram showing three categories of populations illustrating the nested nature of these three categories (from UDWR 2000).**



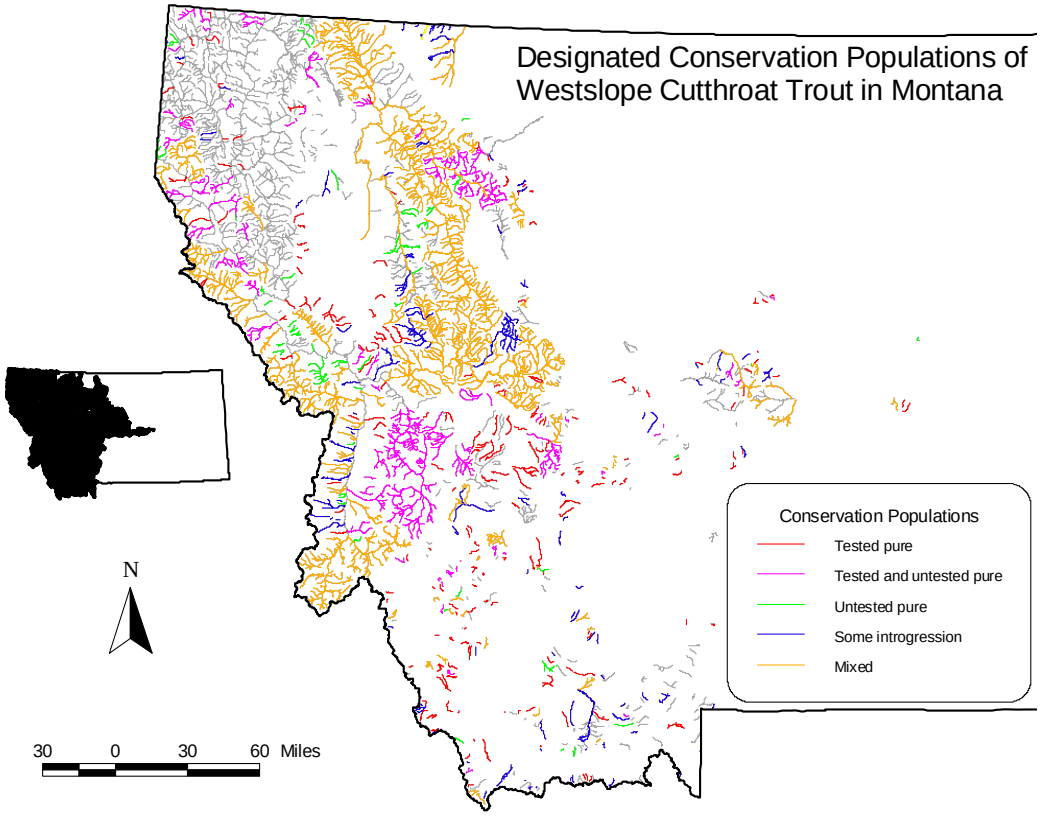


Figure 6. **YCT (top) and WCT (bottom) populations designated as conservation populations by genetic make-up in Montana.**

These classifications (UDWR 2000) provide the framework for this Agreement and are consistent with the two strategies Shepard et al. (2005) found are being implemented in the western United States to conserve cutthroat trout. One strategy emphasizes conserving genetic integrity by isolating genetically pure cutthroat trout populations that have no evidence of genetic introgression to prevent the potential for future introgression. These smaller, isolated cutthroat trout populations will be more susceptible to population-level risks due to isolation, small population size, and temporal environmental or demographic variability. However, their isolation makes them less susceptible to risks from genetic introgression, competition and predation by introduced fish species, risks of invasion and impacts of aquatic nuisance species, or the introduction of harmful diseases. The second strategy emphasizes maintaining connectivity among populations (metapopulations) by protecting large areas of contiguous habitat, thus allowing cutthroat trout the best opportunity to express all life-history traits, especially migratory life-histories. While metapopulations will be less vulnerable to population risks such as temporal environmental and demographic variability, isolation, and small population size, their connectedness makes them more susceptible to risks from genetic introgression, aquatic nuisance species introductions, and the potential for disease. Thus, risks inherent in these two different conservation strategies are dramatically different. Implementing these two conservation strategies in concert within Montana, *and where possible, within watersheds*, should ensure long-term persistence of cutthroat trout.

The intent of this agreement is to ensure the continued existence of genetically pure populations. Where there are slightly introgressed conservation populations with unique genetic or life history attributes, it is unlikely that they would be replaced by genetically pure cutthroat trout to create a new population. A possible exception would be when a slightly introgressed conservation population threatens the genetic integrity of one or more genetically pure population(s) that are designated as conservation populations. Local biologists, using strategies identified by the Technical Committee, would make these types of management decisions.

As a general policy, FWP will not supplement existing lotic cutthroat trout populations. In some instances, genetically pure cutthroat trout from captive or wild populations could be used to establish/reestablish new conservation populations within historical range in locations where cutthroat do not presently occur, after review by the Technical Committee. In instances where conservation populations are founded from genetically pure captive or wild donor sources, they will be managed as conservation populations. Demographic rescue of small populations by adding a few genetically pure individuals originating from other populations, or the genetic swamping of introgressed extent populations through the addition of numerous genetically pure individuals from other populations may be evaluated as conservation strategies. However, the decision to implement either of these strategies will be made with the input of the Technical Committee on a case-by-case basis and monitoring will be required wherever these strategies are implemented to fully evaluate their effects.

Genetic introgression risks from sympatric, nonnative rainbow trout appear to be different between Yellowstone and most WCT. Most data suggest that if reproductive isolation exists, it is usually maintained by temporal differences, sometimes in concert with spatial differences, in spawning between cutthroat trout and rainbow trout (Brown and Mackay 1995; Schmetterling and McEvoy 2000; Schmetterling 2001; De Rito 2004; Henderson et al. 2000). For example, De

Rito (2004) found a difference in spawning time between rainbow and YCT of about six weeks in the upper Yellowstone River. This difference in spawning time has apparently limited introgression between Yellowstone cutthroat and rainbow trout in the upper Yellowstone River drainage for nearly a century. Thus, risks of genetic introgression with rainbow trout may vary among streams and river basins and be related to local conditions, the particular strain of rainbow trout that was originally stocked, and the subspecies and individual local cutthroat trout population. This issue deserves more investigation.

Objective 2. Continue to survey waters to locate additional cutthroat trout populations and determine their distribution, abundance, and genetic status.

The complete current distribution and genetic status of each cutthroat trout subspecies within the state is not known with certainty, especially for WCT west of the Continental Divide. There are waters within the historical ranges of these two subspecies in Montana that have never been surveyed. Many other waters have not been recently (<10 years) surveyed, so changes may have occurred. Signatories to this Agreement will collaborate to continue surveying waters, as feasible, that have either never been, or have not recently been, surveyed. In regional or watershed scale plans, waters that have either never, or recently been surveyed will be designated as needing further investigation.

Objective 3. Seek collaborative opportunities to restore and/or expand each cutthroat trout subspecies into selected suitable habitats within their respective historical ranges.

Efforts will be made to re-establish cutthroat trout populations within their historical range. These efforts may involve expanding existing populations or establishing "new" populations, primarily through translocation (Minckley 1995). While an emphasis will be made to re-establish populations in habitats where they were known to historically occur, often it will not be known with certainty whether a particular stream reach was, or was not, historically occupied. In some cases, "new" populations may be established in habitats within the historical range that may not have been historically occupied. Any cutthroat trout population that is established as a conservation population within the broad geographical boundary of the historical range will be conserved under this Agreement.

Regional or watershed plans will specify opportunities to establish or expand cutthroat trout populations. These plans will set up a classification system for existing populations using these criteria:

- Populations that are moderately secure without further management actions.
- Populations that are currently at risk, but could be secured with some management actions with a reasonable likelihood of success.
- Populations that would require a high level of management actions with doubtful likelihood of success.
- Populations for which risk and management opportunities are relatively uncertain.

In addition, surveyed habitats not currently occupied by cutthroat trout, will be classified with regard to their suitability to support cutthroat trout; proximity to existing cutthroat trout

populations; and feasibility to establish a cutthroat trout conservation population (Gard and Randall 2004).

Any effort associated with this objective will require extensive collaboration among FWP, federal land managers, other state agencies, tribal governments, and private landowners and water users that might be affected. FWP and USFWS negotiated a Candidate Conservation Agreement with Assurances (CCAA) for reestablished or introduced WCT. This agreement allows FWP to set up criteria by which landowners who work with FWP to expand or establish WCT populations can be included under this CCAA (through a Certificate of Inclusion). As long as landowners meet agreed upon criteria, those included landowners will meet their obligations under ESA, should this subspecies be listed under the ESA in the future. The signatories agree to work on developing additional CCAAs for cutthroat (e.g., for introduction of YCT or for enhancing existing cutthroat conservation populations) when appropriate.

Objective 4. Continue to monitor cutthroat trout distributions, genetic status, and abundance using a robust, range-wide, statistically sound monitoring design.

Monitoring of many existing cutthroat trout populations is presently occurring and it is important that this monitoring continue; however, the current monitoring employs a variety of methodologies and sample designs that often make it difficult to fairly compare results among populations. The signatories agree to continue monitoring efforts while evaluating mutually agreed-upon methods and sampling designs that could be applied range-wide for each subspecies. A monitoring design that incorporates a probabilistic method of site selection with presence-absence sampling (MacKenzie et al. 2002; MacKenzie et al. 2003; MacKenzie et al. 2006), combined with a limited amount of population abundance and genetic sampling will be evaluated as a monitoring program. In addition to monitoring the distributions, abundances, and genetic status of each subspecies, conservation management actions will also be monitored to document what conservations actions are being accomplished, how various conservation actions are affecting local cutthroat trout populations, and applying that information to refine future actions in an adaptive management approach (Bearlin et al. 2002).

Signatories to this agreement agree to provide their monitoring information to FWP through the Montana Fisheries information System (MFISH) database and collaboratively evaluate monitoring and conservation programs through participation in local and/or regional efforts. Monitoring information will be used to evaluate the success of conservation efforts outlined in this agreement as detailed in Part III below (AGREEMENT IMPLEMENTATION, ASSESSMENT, AND MILESTONES).

Objective 5. Provide public outreach, technical information, inter-agency coordination, administrative assistance, and financial resources to meet the listed objectives and encourage the conservation of cutthroat trout.

Public outreach is an important component of native fish conservation and the conservation of cutthroat trout is no exception (Schmetterling and Bernd-Cohen 2002). Signatories to this Agreement will work independently and collaboratively to inform the public about why conservation of cutthroat trout is important, how this Agreement was collaboratively negotiated,

and its importance. The signatories will involve the public in all conservation projects and provide updates on the progress of cutthroat trout conservation in Montana. An effective way of maintaining public awareness of cutthroat trout conservation issues is by ensuring recreational angling opportunities. Recreational angling opportunities will often be restricted to catch-and-release, but may include allowing harvest of cutthroat trout from certain populations or regions where populations are deemed healthy enough to provide for regulated angler use while ensuring the persistence of the populations.

Significant numbers of cutthroat trout populations reside either entirely or partly on private lands. Private landowners are key partners in implementing conservation projects for cutthroat trout. It is important that open lines of communication and access to administrative and technical assistance be available to private landowners wherever possible. Such assistance could include coordination of habitat restoration projects on private lands, grant writing, technical assistance regarding land and water management, and the development of mutually acceptable ESA agreements (e.g., Habitat Conservation Plans (HCPs), Safe Harbor Agreements (SHA), and CCAAs). Many landowners lack the resources or technical expertise to apply for grants, manage restoration projects, or write conservation agreements. To encourage cooperation with private landowners, these types of services will be offered to landowners and community organizations such as watershed groups.

ESA agreements will be developed in close collaboration with interested landowners as part of the planning and environmental review process associated with conservation or expansion of existing populations [as required under the Montana Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA)]. Every effort will be made to include private landowners as early as possible in the process. Provisions included in ESA agreements will be negotiated with landowners to meet the biological needs of affected cutthroat trout populations, while protecting landowners' management activities. The signatories will continue exploring additional incentives to encourage more landowners to nurture populations of cutthroat trout occurring on their lands through maintenance of in-stream flows, critical habitat preservation or enhancement, or other means.

The importance of this objective cannot be overemphasized. The success of any regional/watershed level conservation plan will depend upon the cooperation and collaboration of fish managers, land managers, anglers, private landowners, and water users. This Agreement emphasizes cooperative efforts between landowners and managers as well as other resource users, tribes, and agencies as the key to cutthroat trout preservation and enhancement. Cooperation will be maximized if the responsible agencies provide the necessary information and assistance to other cooperating entities.

II. AGREEMENT

By signing this Agreement, the signatories accept the goals and objectives contained herein, will incorporate them into their respective planning and budgeting processes, and will strive to accomplish the goals and objectives as defined by the criteria below. Further, the signatories commit to use their budgeting processes to gain the resources necessary to work towards accomplishment of goals and objectives of this Agreement (Reference Section V - Authority,

Non-Fund Obligating Document). Implementation of this Agreement, and achievement of its goals and objectives should ensure the long-term viability of cutthroat trout.

Nothing in this agreement, including its goals and objectives, shall interfere with the recovery of any species presently listed under the ESA; thus, the conservation of cutthroat trout must be balanced with needs of other native species, especially those listed under ESA. It must be realized that neither this Agreement, nor any other regulatory (e.g., ESA), or voluntary planning effort, will result in complete restoration of cutthroat trout throughout their historical ranges. Many of the threats that have led to the current status of cutthroat trout in Montana are irreversible. For example, introductions of nonnative species have eliminated cutthroat trout from portions of their range, especially in main stem rivers, or compromised their genetic integrity due to introgression. Because of the size and complexity of the waters where these introduced species have become established, it may not be technically possible to remove nonnative species from many of them. For some waters it may not be socially acceptable to remove nonnative fish, even if their removal is technically feasible. Therefore, the signatories strive to reduce threats to the viability of cutthroat trout through this Agreement by concurrently protecting, establishing, and expanding cutthroat trout populations to ensure their long-term persistence in Montana.

III. AGREEMENT IMPLEMENTATION, ASSESSMENT, AND MILESTONES

This Agreement provides goals and objectives for conserving cutthroat trout in Montana. Implementation of this Agreement will be through regional and/or watershed scale conservation documents that will be developed locally for each subspecies. These documents will identify all known conservation populations (including their genetic status and rationale for their conservation designation), define potential short-term and long-term conservation strategies for maintaining and securing existing conservation populations, and collaboratively identify suitable areas for expansion, replication, and establishment of populations. Conservation populations were initially identified as part of earlier range-wide status reviews for both subspecies (Shepard et al. 2003; Shepard et al. 2005; May et al. 2003). These identified conservation populations will be further evaluated when regional/watershed conservation documents are developed to classify each population as genetically pure, conservation or sportfish populations. Additional conservation populations may be added, as they are located or established, when appropriate.

These regional/watershed scale conservation documents will also evaluate and recommend locations where connectivity among neighboring populations can either be maintained or restored to allow metapopulation demographic processes to operate. The previous WCT agreement (FWP 1999) set targets for the number of interconnected WCT populations within each of five major river basins. Each interconnected population was expected to inhabit at least 50 miles of habitat; however, little scientific information supports a particular minimum length of habitat that must be occupied to ensure persistence. This 50-mile target was based on having at least five interconnected populations that each inhabited at least 10 miles of habitat. For WCT, many populations that occupy at least 50 miles of connected habitat exist west of the Continental Divide, but no known populations that occupy this much connected habitat currently exist within the Missouri River basin east of the divide. The original WCT agreement

acknowledged that it might be difficult to find suitable habitats where WCT could be restored to at least 50 miles of connected habitats in some of the basins, particularly in the Upper Missouri River basin. However, efforts will be made to connect as much habitat as feasible in these areas. Currently, projects are underway to restore WCT to over 50 miles of connected habitats in the Cherry Creek drainage, in the Madison River basin, and in about 30 miles of habitats in the South Fork Judith basin. For YCT, two conservation populations that inhabit over 50 miles of habitat were identified (May et al. 2003). One occupies the Shields River basin and the other occupies the Yellowstone River upstream of Springdale, Montana.

Developing and implementing conservation actions will require a hierarchical approach with this Agreement setting the goals and objectives for conservation. The regional/watershed scale conservation documents developed for each subspecies will provide additional details, broad targets, and anticipated schedules with input from the Steering and Technical committees. Actual conservation project planning and implementation will be done at a more local level (e.g., administrative region, county, etc.) and these conservation plans will be collaborative efforts with public participation. For most conservation projects, a formal EA or Environmental Impact Statements (EIS) will be prepared that details each project and encourage additional public participation to decide what actions are most appropriate.

To assess the success of conservation actions driven by the objectives of this Agreement, the overall trajectory of cutthroat trout populations (increasing, stable, or declining) across the range of each subspecies in Montana, and the progress of cooperators in meeting terms of the Agreement, require tangible measures of progress. Current baselines, measured by the number of populations and number of miles occupied by WCT and YCT have been documented as part of two status assessments (Shepard et al. 2003; May et al. 2003; Shepard et al. 2005). These status assessments quantified the known current distributions for these two subspecies by genetic status and for populations designated as conservation populations (Table 1). The data used in these status assessments were summarized for Montana for this Agreement (Appendix A).

Populations of WCT and YCT that were designated by biologists as having conservation value in the above status assessments were stratified into: 1) populations that consisted entirely of potentially genetically pure (genetic testing documented <1% introgression) components; 2) populations that contained both genetically tested pure components with untested components suspected to be pure; 3) populations where no genetic testing had been completed, but that are suspected to be pure; 4) mixed populations (both genetically pure and known or suspected hybridized fish); and 5) populations that are known or suspected to be introgressed (Figure 6). The number of populations, miles occupied, and average estimated demographic and genetic risks for each of these strata by subspecies were summarized from these status reviews and will serve as a baseline for evaluating future conservation efforts based on this Agreement (Table 2).

Designated conservation populations of WCT made up of genetically tested <1% introgressed ("pure") populations occupied an estimated 935 miles (N=197). A combination of both genetically tested and suspected pure WCT occupied an estimated 1,649 miles (N=60). WCT suspected to be pure, but not tested, occupied an estimated 311 miles (N=55), a mixture of populations (with pure and potentially hybridized fish) occupied an estimated 4,786 miles

(N=73), and fish that were suspected or tested to have introgression occupied 727 miles (N=98; Table 2). Most river basins contained several conservation populations (Appendix B).

Table 2. Stream miles and number of conservation populations occupied by YCT and WCT conservation populations by genetic status in Montana. These data were based on assessments done in 1999 and 2002 for WCT (FWP 1999; as updated by Shepard et al. 2003; see Appendix A) and done in 2000 for YCT (FWP 2000; as updated by May et al. 2003; see Appendix A). "Genetic Risk Scores" can range from 1 to 4, while "Demographic Risk Scores" can range from 3 to 16. Genetic and demographic risks were not assessed for 24 WCT conservation populations that were located on tribal lands.

Subspecies Type of population	Miles	Number of Populations	Mean Genetic Risk Score	Mean Demographic Risk Score
Yellowstone				
Genetically tested pure	105	14	1.57	7.91
Tested pure with potential pure	64	5	1.60	6.24
Potential pure only	20	5	1.40	6.24
Mixed	1,256	14	2.71	7.45
Suspected altered only	150	7	2.71	5.26
Total for miles and number, mean for risks	**1,596**	**45**	**2.09**	**6.98**
Westslope				
Genetically tested pure	935	197	1.82	11.72
Tested pure with potential pure	1,649	60	1.88	9.43
Potential pure only	311	55	1.51	10.72
Mixed	4,786	73	2.76	8.76
Suspected altered only	727	98	2.48	11.01
Total for miles and number, mean for risks	**8,408**	**483**	**2.08**	**10.69**

Designated conservation populations of YCT that consisted of genetically tested <1 % introgressed ("pure") populations occupied an estimated 105 miles (N=14). A combination of both genetically tested and suspected pure YCT occupied an estimated 64 miles (N=5). YCT suspected to be pure, but not tested, occupied an estimated 20 miles (N=5), and a mixture of populations (with pure and potentially hybridized fish) occupied an estimated 2,854 miles (N=14).

Genetic sampling that identified pure populations was based on the best information available, which often relied on small sample sizes. Future genetic sampling may discover introgression, but it will sometimes be difficult to determine whether this introgression was present during original sampling or a result of a change in genetic status between sampling events. An attempt will be made to attribute future changes in genetic status to sample size problems or to likely real changes in the population's genetics.

Maintaining and securing existing cutthroat trout populations will take a significant amount of effort over the next decade. Securing existing populations will be a higher priority than establishing additional populations during the next decade and this strategy is consistent with accepted priorities for conserving native species (Propst et al. 1992; Rieman and McIntyre 1993;

Allendorf et al. 1997; Lentsch and Converse 1999; Rieman and Dunham 2000;). Securing a population means that imminent threats to the population have been successfully reduced to a level that promotes persistence of that population.

To assess our progress towards achieving the management goals and objectives for cutthroat trout in Montana through this Agreement we will maintain the number and miles occupied by designated conservation populations, while working to decrease the mean genetic risk and demographic risk scores for these conservation populations through management actions. We will annually estimate number and miles occupied by conservation populations, stratified by genetic status, and compare these estimates to the baseline (Table 2) during the next five years (the expected duration of this Agreement). We will update genetic and demographic risks when these risks change for any conservation population and then annually compare mean estimates of genetic and demographic risks to the baseline (Table 2). We will also compare the distributions of these risk scores through time to assess how our management is reducing risk to the various categories of conserved populations (Figure 7).

Monitoring data summaries will be provided annually to the Cutthroat Trout Coordinator of FWP by cooperating agency biologists. Cutthroat trout presence-absence, population abundance, fish community changes, and genetics monitoring data will be housed in the MFISH database maintained by FWP. Conservation actions implemented each year will also be added to the Fish Restoration database maintained by FWP in MFISH. Monitoring data maintained by MFISH will be summarized annually by the Cutthroat Trout Coordinator of FWP, and will be reported to the Steering Committee to assess progress towards meeting Agreement objectives. These data will be used to annually update the status review database for each subspecies and to periodically evaluate threats to, and security of, identified conservation populations (i.e. every five to ten years).

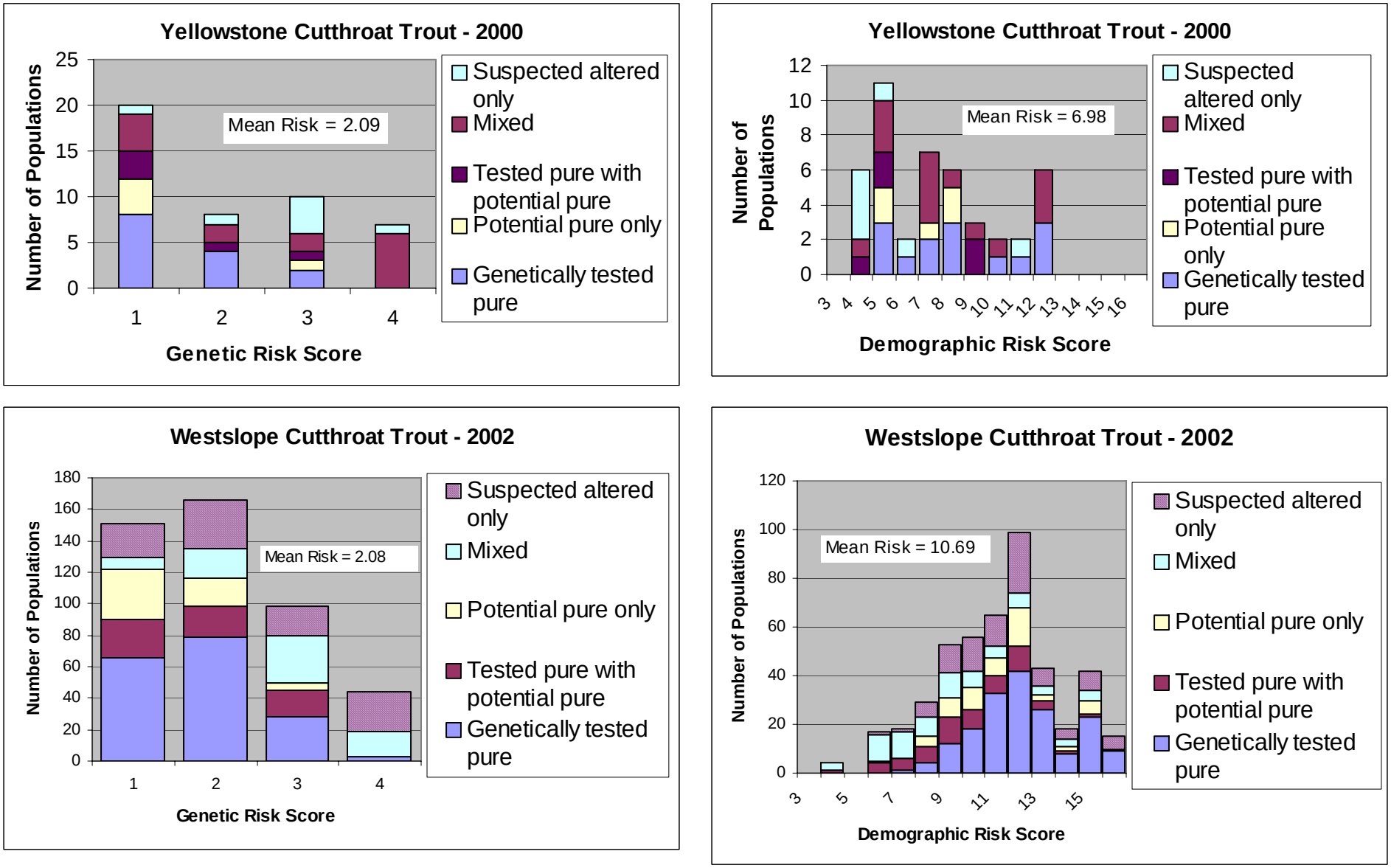


Figure 7. **Genetic and demographic risk frequencies for YCT in 2000 (top two graphs) and WCT in 1999 (bottom two graphs). "Genetic Risk Scores" can range from 1 to 4, while "Demographic Risk Scores" can range from 3 to 16.**

Progress, as described above, and the effectiveness this Agreement will be evaluated annually by the Steering and Technical Committees to ensure that: 1) progress is being made towards this Agreement's goals and objectives; and 2) all Signatories are implementing this Agreement. Participants agree to provide information for FWP's MFISH database that will facilitate the preparation of an executive summary report to be prepared annually. At the end of this Agreement (or in five years), the participants will assist in preparing a report documenting specific progress towards meeting the above goals and objectives (including the development of subspecies conservation plans and/or regional/watershed scale plans and implementation of individual restoration and conservation projects) and progress towards meeting identified measurable population goals identified in specific plans. In addition, the five-year report will document progress and shortcomings in policy, budgets, and staffing dedicated to cutthroat trout conservation and, where necessary, identify suggested remedies. All signatories, under the leadership of FWP's Cutthroat Trout Coordinator, will assist in cooperatively developing annual reports.

For the purposes of determining the progress of this agreement, participants agree to the following mileposts:

- Draft a statewide YCT Conservation Plan by December 31, 2007.

- Complete watershed or regional plans for at least two YCT designated conservation areas by January 1, 2008.

- Complete at least two regional plans (regional plans will follow FWP regional boundaries and must encompass more than two fourth-code watersheds), four watershed plans, or a combination of the above two planning efforts that result in planning for at least four watersheds for conservation of WCT by January 1, 2009.

- Work on 40 conservation projects for WCT and 10 for YCT each year.

- Update statewide distribution and genetic status information annually for each subspecies by January 1 each year. Incorporate data from the recently completed range-wide status assessment for YCT by June 1, 2007. Update Montana's portion of the range-wide assessment for westslope cutthroat by January 1, 2009. Ideally this will be part of a range-wide assessment; however, Montana does not have control over participation by other states in this update. Compare the genetic risk and demographic risk ratings assigned by these more recent assessments to ratings assigned during the earlier assessment to determine trends in these risks over time for each subspecies.

- Maintain the number and miles of conservation populations, including those conservation populations that are genetically pure, at levels at least as high as identified for WCT in 1999 and for YCT in 2000 (Table 2A; Appendix A);

- Annually work to reduce genetic and demographic risks to conservation populations, as measured by the overall mean genetic and demographic risk scores summarized across all

conservation populations for each subspecies, by implementation of conservation projects (Table 2 and Figure 7).

Expansion of westslope and YCT within their historic range is an objective of this agreement. A consistent policy and associated protocol among parties to this agreement are necessary to establish guidelines on what are appropriate strains or stocks that should be used for replicating current populations or establishing new populations. FWP's Broodstock Committee will detail how decisions will be made as to which donor stocks will be used, what screening will be done to ensure genetic purity and acceptable disease risk of donor stocks, how gametes will be collected from adults, and where and how progeny will be hatched and reared. Regional groups will decide the allocation of the progeny to recipient streams and how these activities will be funded. Participants in this agreement agree to work with the Technical Committee, regional groups, and the FWP Broodstock Committee to adopt guidelines within one year of signing this agreement for protocols to determine appropriate strains and stocks for replicating current cutthroat trout populations or for establishing new populations in historical habitats.

As mentioned above, there are two strategies for conservation. One strategy promotes isolation of cutthroat trout populations that currently have little or no detectable introgression to reduce short-term risks of genetic introgression, competition and predation by nonnative fish species, invasion and impacts of aquatic nuisance species, and the introduction of harmful diseases. The other strategy promotes connectivity to reduce long-term risks to population persistence associated with stochastic environmental and demographic processes. This Agreement acknowledges that both strategies will need to be implemented to 1) conserve genetic integrity of some populations and 2) conserve migratory life histories and allow long-term metapopulation dynamics to operate in other populations. In addition, cutthroat trout co-occur with other native species, like bull trout, that are dependent upon connectivity between habitats and will require that connectivity between many different habitats be preserved or enhanced. However, details of how to implement these two strategies within particular geographic areas have not yet been determined. Since actions that promote physical isolation or provide increased connectivity may have different short-term and long-term conservation risks, actions that propose either of these strategies must have explicit evaluations of the likely risks and trade-offs of pursuing either of these strategies for a particular population (typically this will be done during the EA for a proposed project). Ideally, these risk evaluations will be made both at the level of the local population and in the context of cutthroat trout conservation within the larger river drainage basin the population occupies. These decisions will probably have to be made on a watershed-by- watershed basis, where the relative risk of hybridization resulting from restoring connectivity will be weighed against the potential risks of isolation. Part of this risk analysis will depend upon the number of pure populations in that watershed (e.g., connecting habitats occupied by a genetically pure population to habitats occupied by introgressed cutthroat in a basin where there were few genetically pure cutthroat populations would have a higher genetic risk for a basin with few genetically pure populations versus a basin that had many genetically pure populations) and benefits to other species such as bull trout.

The signatories to this agreement acknowledge that public support is essential to successful cutthroat trout conservation. Therefore, the signatories will endeavor to ensure that cutthroat trout conservation will be balanced with the need to maintain popular and economically

important recreational fisheries, while promoting the need for conservation of native cutthroat trout to the public (as agreed to in Objective 5 of this Agreement).

IV. ACTION TO BE TAKEN IF GOALS NOT ACHIEVED

If annual monitoring shows a decline in the number and miles occupied by conservation populations (stratified by genetic status), or that no progress is being made to reduce risks for at least some conservation populations through management actions over any three-year period for either subspecies, the signatories agree to have their staffs examine the data to determine: 1) where specific population losses have occurred; 2) assess what factors are responsible for each loss; and 3) report back to all signatories with specific mitigation measures required to reverse the declining trend. The Steering Committee will act collaboratively and expeditiously, through all means available to its signatory members, to reverse the declining trend and ensure the persistence of the subspecies. If conservation and restoration efforts are not meeting commitments detailed in this Agreement over any annual period (as detailed in annual reports), the Steering Committee will meet to determine why and to develop plans that will rectify the shortcomings.

V. OTHER SPECIES INVOLVED

The primary focus of this Agreement is the conservation and enhancement of westslope and YCT and the ecosystems upon which they depend; however, most other native aquatic and riparian-dependent species occurring within or adjacent to cutthroat trout habitat will also benefit. Most notable of these vertebrate species within the range of WCT are bull trout (*Salvelinus confluentus*), inland redband trout (*Oncorhynchus mykiss gairdneri*), Arctic grayling (*Thymallus arcticus*), tailed frogs (*Ascaphus truei*), and spotted frogs (*Rana luteiventris*). By using an ecosystem approach, the accomplishment of actions identified in this Agreement and the resulting regional/watershed scale conservation plans should significantly reduce or eliminate threats for several species. In some cases it may be necessary, or desirable, to open access to habitats supporting a non-introgressed population of cutthroat trout, potentially increasing risk for introgression, in order to enhance migratory populations of either other native fish species (i.e., bull trout or grayling) or migratory populations of cutthroat trout. Each of these specific cases will be evaluated on a case-by-case basis and every effort will be made to conserve at least a portion of the extant non-introgressed cutthroat trout population and/or mitigate the loss of existing genetically pure populations with establishment into alternative suitable habitats.

VI. AUTHORITY

- The signatory parties hereto enter into this Conservation Agreement under federal and state law, as applicable, including, but not limited to Section 2(c)(2) of the ESA, which states, "the policy of Congress is that Federal agencies shall cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species."

- All parties to this Agreement recognize that they each have specific statutory responsibilities that cannot be abdicated, particularly with respect to the management and conservation of wildlife, their habitat, and the management, development and allocation of water resources. Nothing in this Agreement is intended to abrogate any of the parties' respective responsibilities. Each signatory has final approval authority for any activities undertaken as a result of this Agreement on the lands owned or administered by the signatory party.

- This Agreement is subject to, and is intended to be consistent with, all applicable Federal and State laws and interstate compacts.

- This instrument in no way restricts the parties involved from participating in similar activities with other public or private agencies, organizations, or individuals.

- Modifications within the scope of this document shall be made only after the public has been notified and provided an opportunity to comment, and only after written consent has been obtained from all the signatories.

- **Non-Fund Obligating Document**: This Agreement is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the signatories to this Agreement will be handled in accordance with applicable laws, regulations, and procedures including those for Government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the signatories and shall be independently authorized by appropriate statutory authority. This Agreement does not provide such authority. Specifically, this Agreement does not establish authority for noncompetitive award to the cooperator of any contract or other agreement. Any contract or agreement for training or other services must fully comply with all applicable requirements for competition.

VII. REFERENCES

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VIII. SIGNATORS

We, the undersigned accept the goals and objectives contained herein, will incorporate them into our respective planning and budgeting process, and will strive to accomplish the goals and objectives within identified time frames.

American Wildlands

Tom Skeele, Executive Director — Date: 6/7/07

Confederated Salish and Kootenai Tribe

James A. Steele Jr., Chairman — Date: 5/24/07

Federation of Fly-Fishers

Bob Wiltshire, Chief Operating Officer — Date: 5/14/2007

Greater Yellowstone Coalition

Scott Bosse, Rivers Conservation Coordinator — Date: 5/29/07

Montana Chapter American Fisheries Society

Leanne Roulson, President — Date: 5-22-2007

Montana Cutthroat Trout Technical Committee

Brad Shepard, Chairman — Date: 6/11/2007

Montana Department of Environmental Quality

Richard Opper, Director — Date: 5/21/07

Montana Department of Natural Resources and Conservation

Mary Sexton, Director — Date: 5/21/07

Montana Farm Bureau Federation

Dave McClure, President — Date: 5/11/07

Montana Fish, Wildlife & Parks

M. Jeff Hagener, Director — Date: 5/9/07

Montana Stockgrowers Association

Steve Roth, President — Date

Steve Roth, President — Date

Montana Trout Unlimited

Bruce Farling, Executive Director — Date: 5/31/07

Montana Wildlife Federation

Craig Sharpe 7/10/07

Craig Sharpe, Executive Director Date

USDA Natural Resource Conservation Service

Carol Maley, Acting State Cons. 5/29/07

Dave White, State Conservationist Date

USDI Bureau of Land Management

Gene Terland 5/31/07

Gene Terland , State Director Date

USDI Fish and Wildlife Service

R. Mark Wilson 6-8-07

Mark Wilson, Ecological Services Field Supervisor Date

USDA Forest Service

Thomas J. Tidwell

Tom Tidwell, Regional Forester Date

Yellowstone National Park

Yellowstone National Park

10 July 2007

Chris Lehnertz, Deputy Superintendent Date

Brian D. Sugden
Hydrologist

Plum Creek Timber Company, Inc.
PO Box 1990
500-12th Avenue West
Columbia Falls, MT 59912
406-892-6368 fax: 406-892-6171
brian.sugden@plumcreek.com

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Plum Creek

May 25, 2007

Chris Hunter
Chief of Fisheries
Montana Department of Fish, Wildlife and Parks
PO Box 200701
Helena, MT 59620-0701

Re: Montana Cutthroat Trout MOU / Conservation Agreement

Dear Chris:

We have had a chance to review the MOU and conservation agreement (CE) for cutthroat trout in Montana that you recently sent to Rick Holley. We support the objectives outlined in the MOU/CE, and believe that it presents an excellent framework for the Department to facilitate cutthroat conservation and recovery, particularly among public natural resource management agencies. As you know, in 2000 Plum Creek entered into the Native Fish Habitat Conservation Plan (NFHCP) to conserve native salmonids (including westslope cutthroat) on Company lands in western Montana. This 30-year agreement with the US Fish and Wildlife Service outlines 56 commitments by Plum Creek to ensure maintenance and recovery of habitat. We are pleased to see that the MOU acknowledges the important role that HCPs provide on private lands.

We believe that the NFHCP is already fulfilling many of the objectives outlined in the MOU. Moreover, it is a binding agreement for Plum Creek and was recognized by the USFWS as a more desirable alternative to federal listing for westslope cutthroat trout. While Plum Creek elects to not be a formal signatory to the MOU, we believe there are synergies that can be recognized and achieved in these parallel efforts. Coordination with the Department and other MOU participants will benefit Plum Creek's NFHCP conservation efforts relative to identifying needs for additional cutthroat surveys and/or genetic analysis. Please contact me if you would like to discuss this matter further.

Sincerely,

Brian D. Sugden

Brian D. Sugden
Forest Hydrologist
Native Fish HCP Coordinator

cc: Brad Shepard
Travis Horton

Appendix A
Methods for Summarizing WCT and YCT Assessments for 2007 Agreement

Information that forms the baseline conditions for WCT and YCT set forth in the 2007 Agreement were computed as follows.

1. Baseline data were obtained from the range-wide status assessment done for WCT in 2002 (Shepard et al. 2003) and for YCT in 2001 (May et al. 2003).

2. For westslope and YCT, the outline of the state of Montana was overlain on the assessment GIS hydrography (stream and river) layer (1:100,000 scale) and the range-wide hydrography layer was clipped to represent only streams within Montana.

3. After these hydrography layers were clipped to represent streams within Montana, stream miles occupied by each subspecies were recalculated for each reach based on the miles on the clipped hydrography and the upper and lower bounds (in stream miles) for the distribution of the subspecies within each stream. For example, the stream miles at the bottom and top boundaries of the clipped layers were computed from the Latitude Longitude Identification (LLID) information as stream miles. If the lower bound mile of the cutthroat distribution within the database was smaller (below) the new lower boundary of the clipped stream layer and if the lower boundary of new clipped stream layer was less than the upper bound of database cutthroat distribution, the lower bound of the cutthroat distribution was recomputed as the lower bound of the stream. The same procedure was done for the upper boundaries. After adjusting these boundaries for Montana streams, the distances occupied were re-calculated.

4. For WCT the fourth-code watersheds that were mostly in Idaho (Moyie, Middle Salmon, North Fork Clearwater, Lemhi, Upper Coeur d' Alene, South Fork Coeur d'Alene, St. Joe, Upper Selway, and Lochsa) were deleted. Most of these watersheds had very little area in Montana, except the Moyie, and management of cutthroat trout populations within these watersheds will be led primarily by Idaho with support from Montana.

5. For YCT all portions of fourth-code watersheds that were within Montana were included.

6. The number of streams and number of miles that supported each subspecies, by genetic status, were then computed based on these Montana distributions.

7. The designated YCT conservation populations were stratified into the following five strata (Table 1A).

Table 1 Strata used to classify designated conservation populations.

ID	Description
A	Genetically tested pure
B	Tested pure with potential pure
C	Potential pure only
D	Suspected altered only
E	Mixed* – pure and altered

* Note: the "Mixed" class above indicated some streams, or stream segments, supported genetically tested "pure" populations (<1% introgression) and other streams, or stream segments, supported either genetically tested introgressed populations or untested and suspected introgressed populations.

To stratify the designated WCT conservation populations into these same five strata, Brad Shepard checked the genetic status of each stream's population (multiple streams for each metapopulation that represented sub-populations) that made up each designated conservation population and classified each conservation population into one of the above five classes.

8. For each of the above five classes of conservation populations the total miles of stream and the number of different conservation populations were summed to show the total miles and number of conservation populations by subspecies and by conservation class.

9. The same summary was done by 4th code hydrologic unit code (HUC) for each subspecies to show the geographic distribution of conservation populations by class.

10. Means were computed for the genetic risk score and the composite population demographic risk by subspecies and conservation class. The composite population risk score was computed according to the formula: Composite Risk = 0.7*(Temporal Variability) + 1.2*(Population Size) + 1.6*(Population Productivity) + 0.5*(Isolation).

11. Frequencies for individual genetic and composite population risk scores were also displayed for each subspecies.

To assess potential differences between the earlier WCT Conservation Agreement (FWP 1999) and the current condition, the total miles by genetic class were compared (Table 2A). It appears that little changed in status and that the assessment methodology is consistent between 1999 and 2002, and it is suspected that most change involved additional genetic sampling of populations.

Table 2A. Miles of stream by genetic status for WCT in Montana during 1999 (FWP 1999) and 2002 (data from Shepard et al. 2002) along with change (miles in 1999 subtracted from miles in 2002 with parentheses around a value indicating a negative value).

Genetic status	1999	2002	Change
Tested and <1% introgressed	2,616	2,930	314
Tested and 1 to 10% introgressed	819	1,107	288
Tested and >10% introgressed	1,004	1,363	359
Untested	8,407	6,987	(1,420)
Tested pure and hybrids	N/A	531	531
Total	**12,846**	**12,918**	**72**

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Appendix B
Miles Occupied by and Number of Conservation Populations by 4th Code Hydrologic Unit

Table B1. Miles of streams and rivers occupied by westslope cutthroat trout conservation populations by river basin and genetic type of population.

Basin Name	Genetically tested pure	Mixed	Potential pure only	Suspected altered only	Tested pure with potential pure	Total
Belly				23		23
St. Mary	3[a/]	95		34		131
Red Rock	74	14	12	49	4	152
Beaverhead	45	11	13	13	7	89
Ruby	34	31		39		104
Big Hole	67	46	6	12	35	167
Jefferson	4	3	4	11		23
Boulder	29			3		32
Madison	12	3	8	20	3	47
Gallatin	4			15		19
Upper Missouri	34	20	2	14	10	80
Upper Missouri-Dearborn	3					3
Smith	19			13		32
Sun	3	4		10		18
Belt	16	28	3	9	14	71
Two Medicine	19	31	4	10	21	85
Teton	6	44				49
Arrow	1				4	5
Judith	7	64		12		83
Flatwillow	6					6
Box Elder			2			2
Upper Kootenai	18		15	17	79	129
Fisher	15				12	26
Yaak	19		13	5	40	76
Upper Clark Fork	204	119		30	94	448
Flint-Rock	8				580	588
Blackfoot	34	1,209		172	34	1,450
Middle Clark Fork	36	457	111	18	87	709
Bitterroot	46	722	20	118	112	1,018
North Fork Flathead	4	446			17	468
Middle Fork Flathead		209	12	9	310	540
Flathead Lake		80	3	7		90
South Fork Flathead		844	23			866
Stillwater	5				51	56
Swan	5	18	35	43		100
Lower Flathead	138	20		20		179
Lower Clark Fork	20	268	25		134	448
Total	**938**	**4,786**	**311**	**727**	**1,649**	**8,411**

Table B2. Number of westslope cutthroat trout conservation populations by river basin and genetic type of population.

Basin Name	Genetically tested pure	Mixed	Potential pure only	Suspected altered only	Tested pure with potential pure	Total
Belly				2		2
St. Mary	1[a/]	1		5		7
Red Rock	18	1	5	13	1	38
Beaverhead	10	2	2	3	1	18
Ruby	7	3		6		16
Big Hole	24	8	2	4	7	45
Jefferson	2	1	1	3		7
Boulder	5			1		6
Madison	1	1	1	9	1	13
Gallatin	2			2		4
Upper Missouri	12	3	1	2	3	21
Upper Missouri-Dearborn	1					1
Smith	8			4		12
Sun	1	1		3		5
Belt	8	4	2	2	2	18
Two Medicine	6	1	1	3	1	12
Teton	2	2				4
Arrow	1				1	2
Judith	2	4		1		7
Flatwillow	1					1
Box Elder			1			1
Upper Kootenai	4		5	3	7	19
Fisher	3				1	4
Yaak	4		1	1	3	9
Upper Clark Fork	27	3		4	3	37
Flint-Rock	2				4	6
Blackfoot	6	7		3	1	17
Middle Clark Fork	5	6	12	1	5	29
Bitterroot	7	11	6	14	5	43
North Fork Flathead	1	1			1	3
Middle Fork Flathead		1	1	1	2	5
Flathead Lake		1	1	1		3
South Fork Flathead		2	2			4
Stillwater	1				3	4
Swan	2	1	7	4		14
Lower Flathead	21	1		3		25
Lower Clark Fork	3	7	4		8	22
Total	**198**	**73**	**55**	**98**	**60**	**484**

[a/] Wild Creek genetically pure population added by Robbin Wagner of FWS

Table B3. Miles of Yellowstone cutthroat trout conservation populations by river basin and genetic type of population.

Name	Genetically tested pure	Mixed	Potential pure only	Suspected altered only	Tested pure with potential pure	Total
Clarks Fork Yellowstone	4			71	21	**96**
Pryor	6					**6**
Shields	8	330		11		**349**
Stillwater	11		13	52	11	**87**
Upper Yellowstone	69	897	7	17		**991**
Yellowstone Headwaters	7	28			32	**67**
Big Horn[1/]	12					**12**
Total	**117**	**1,256**	**20**	**151**	**64**	**1,608**

[1/] Big Horn populations added by Robbin Wagner of FWS

Table B4. Number of Yellowstone cutthroat trout conservation populations by river basin and genetic type of population.

Name	Genetically tested pure	Mixed	Potential pure only	Suspected altered only	Tested pure with potential pure	Total
Clarks Fork Yellowstone	1			2	1	**4**
Pryor	1					**1**
Shields	1	1		1		**3**
Stillwater	2		2	2	2	**8**
Upper Yellowstone	8	11	3	2		**24**
Yellowstone Headwaters	1	2			2	**5**
Big Horn[1/]	3					**3**
Total	**17**	**14**	**5**	**7**	**5**	**48**

[1/] Big Horn populations added by Robbin Wagner of FWS