

Swan Ecosystem Center

Swan Basin Restoration:

Coordinated Approaches to Water, Wildlife, Forests,
Wetlands, and Native Fish

July 30, 2010

Updated February, 2012

Prepared by:

Ali Vissichelli

Swan Ecosystem Center, Montana Watershed Coordinating Council

Montana Campus Compact, AmeriCorps VISTA

In consultation with Erickson Consulting, Inc

TABLE OF CONTENTS

Page

List of Figures

List of Tables

List of Acronyms

Acknowledgements

Chapter 1. Introduction 1

 Swan Basin Description 1

 Project Background 1

 Intent and Scope..... 1

 Goals and Objectives..... 2

Chapter 2. Methods..... 4

 Collaborative Approach..... 4

 Incorporation of EPA’s Nine Minimum Elements 5

Chapter 3. Water Quality 6

 Mission6

 Restoration Needs 6

 Swan Lake 7

 Jim Creek 7

 Goat Creek 7

 Sedimentation to Steams 7

 Additional Water Quality Threats Identified by TAG 10

 Native Fish and other Aquatic Life 10

 Drinking Water 11

 Water Supply/In Stream Flow 11

 TAG Goals and Action Strategies..... 11

 Reducing Sedimentation from Roads (BMPs) 11

 Water Quality Monitoring 12

 Education and Outreach 13

 Conclusion and Outlook 14

Chapter 4. Native Fish 16

 Introduction and Background 16

 Mission 16

 Bull Trout 16

 Background 16

 Goals and Objectives 17

 Restoration Effort 17

 Critical Habitat 17

 Westslope Cutthroat Trout 19

 Background and Goals 19

Current Status	20
Conservation Populations	20
Restoration Strategies	22
Chapter 5. Wildlife	23
Introduction and Goals	23
Restoration Needs	23
Restoration Strategies	25
Swan Valley Bear Resources	25
Future Planning	25
Chapter 6. Forest Stewardship.....	26
Introduction	26
Goal 1: Seek Opportunities for Coordination.....	26
Goal 2. Seek Opportunities for Collaboration	27
Next Steps	27
Chapter 7. Wetlands	29
Introduction	29
Restoration Needs	29
Restoration Strategies	29
Goals and Objectives	29
Process	29
Chapter 8. Conclusion
Appendices.....
[Note: Appendices A-E align with the five subcommittees of the Swan Lands Coordinating Committee. These appendices include meeting notes, annual reports, and other updates and reports generated by each subcommittee over time.]	
Appendix A Water Quality	
Appendix B Native Fish	
Appendix C Wildlife	
Appendix D Forest Stewardship	
Appendix E Wetlands	
Appendix F Management Plans and Mandates	
Appendix G 2011-2012 Expertise/Involvement of Primary Agency and Nonprofit Partners	

LIST OF FIGURES

Figure 1. Swan Basin Restoration, Project Area

Figure 2. Swan Watershed, National Hydrology Dataset Map

Figure 3. FWS Proposed 2010 Critical Habitat for Bull Trout, Swan River and Lakes

Figure 4. Westslope Cutthroat Trout Population Assessment Based on Historic Range, Swan Basin 2009

Figure 5. Westslope Cutthroat Trout Conservation Populations, Swan Basin

Figure 6. Montana Legacy Project (TNC/TPL 2010 draft)

LIST OF TABLES

Table 1. Source Allocations for Swan Lake

Table 2. Source Load Allocations for Jim and Goat Creek

Table 3. Threats to Native Fish and Other Aquatic Life

Table 4. Westslope Cutthroat Trout Conservation Population Characteristics, Swan Basin

Table 5. Restoration Priorities for Westslope Cutthroat Trout, Swan Basin

Table 6. Impacts to Wildlife from Development

LIST OF ACCRONYMS

AHOD	Areal Hypolimnetic Deficit
BMP	Best Management Practice
C.A.P.S	Crucial Area Planning for Species
CFLRP	Collaborative Forest Landscape Restoration Project
CSKT	Confederated Salish and Kootenai Tribes
DEQ	Montana Department of Environmental Quality
DNRC	Montana Department of Natural Resources and Conservation
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
FNF	Flathead National Forest (USFS)
FroSAM	Forest Roads Sediment Assessment Methodology
FRS	Forest Roads Survey
FWS	United States Fish and Wildlife Service
HUC	Hydrologic Unit Code
IGBA	Interagency Grizzly Bear Agreement
ITEEM	Integrated Transportation and Ecological Enhancements for Montana
LWD	Large Woody Debris
MCTSC	Montana Cutthroat Trout Steering Committee
MOU	Memorandum of Understanding
MTFWP	Montana Fish Wildlife & Parks
NPS	Non-Point Source
NwC	Northwest Connections
PCTC	Plum Creek Timber Company
PIBO	PACFISH/INFISH Biological Opinion Effectiveness*
POC	Particulate Organic Carbon
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
SBR	Swan Basin Restoration
SEC	Swan Ecosystem Center
SLCC	Swan Lands Coordinating Committee
SMZ	Streamside Management Zone
SVBR	Swan Valley Bear Resources
SVBTWG	Swan Valley Bull Trout Working Group

TMDL	Total Maximum Daily Load
<i>TMDL</i>	Water Quality Protection Plan and TMDL for the Swan lake Watershed
TNC	The Nature Conservancy
TPL	The Trust for Public Land
TSS	Total Suspended Solids
TU	Trout Unlimited
USFS	United States Forest Service
WCT	Westslope Cutthroat Trout
WEPP	Water Erosion Prediction Project
WRP	Watershed Restoration Plan

* PacFish is the nick name applied to the "Interim Strategies for Managing Anadromous Fish Producing Watersheds in Eastern Oregon, Washington, Idaho and Portions of California" InFish is the extension of PacFish standards for Inland Native Fish in the same area—essentially non-anadromous salmonids that were listed or considered for listing.

ACKNOWLEDGEMENTS

Producing a collaborative plan of this scale takes the time and the input of many people. It was through the participation of the Swan Lands Coordinating Committee members and the members of each of its subcommittees, Conservation Strategies, Forest Stewardship, Native Fish, Water Quality, Wetlands, and Wildlife, that this document was created. The members of the Swan Ecosystem Center staff deserve added recognition for their knowledge and support, in particular, Anne Dahl and Michael Palladini. In addition, the enthusiasm and information contributed by Beth Gardner, Flathead Nation Forest, was invaluable to the plan's completion. Special mention also goes to Robert Ray and Donna Erickson.

CHAPTER 1. INTRODUCTION

Swan Basin Description

The Swan River Basin is a subbasin of the Interior Columbia River Basin. The Swan River finds its origin at Graywolf Lake in the Mission Mountains. The river flows north, first emptying into Swan Lake, then Flathead Lake, and eventually the Pacific Ocean via the Columbia River. The Swan River valley encompasses 410,000 acres of Northwest Montana. It is a glacial valley, bordered by the Mission Mountains Wilderness on the west and by the Swan Range and Bob Marshall Wilderness on the east (Figure 1).

Approximately 93% of the basin is public land, with the remaining 7% private. Most of the basin's public land is managed by the Flathead National Forest and to a lesser extent by the Montana Department of Natural Resources and Conservation. In recent years the ownership pattern of the Swan basin has changed dramatically as a result of the Montana Legacy Project¹.

Hundreds of lakes and wetlands are scattered throughout the Valley, providing exceptional habitat for native plant and animal species, including grizzly bears, bull trout and more rare plants than anywhere else in Montana. The basin is considered to provide a critical ecological link and wildlife corridor between the Canadian Yukon to the north and Greater Yellowstone Ecosystem to the south.

Project Background

Swan Basin Restoration (SBR) evolved from a 319 Funds Agreement between the Montana Department of Environmental Quality (DEQ) and the Swan Ecosystem Center (SEC). SEC was tasked with the development of a water quality restoration plan for the Swan River Watershed, consistent with the Environmental Protection Agency's (EPA) nine minimum elements for a Watershed Restoration Plan². However, SBR's scope was soon extended to go beyond water quality, with restoration planning being geared towards the terrestrial ecosystems that

comprise the Swan River Watershed as well. This comprehensive approach was largely motivated by the acquisition of nearly 45,000 acres of former Plum Creek land as part of the Montana Legacy Project. The plan was also created with consideration for the U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program, standards for a Swan River Watershed Site Specific Plan.

Intent and Scope

The primary purpose of the SBR is to be an adaptive plan, regularly updated, that fosters coordination and collaboration among stakeholders and community members, as a means of restoring, maintaining, and protecting the Swan's aquatic, hydrologic, and terrestrial ecosystems and their beneficial uses. The SBR provides a framework for cooperation, offering avenues by which stakeholders can function collectively, while respecting and acknowledging individual agency or group constraints.

The contextual scope of the document is limited to cooperative planning, with the focus on restoration. The plan does not offer restoration techniques; rather, it identifies collective restoration needs and strategies. The restoration actions discussed are not an exhaustive list of all restorative efforts in the valley. The SBR is not a landscape assessment. In 2004, an Upper Swan Valley Landscape Assessment was prepared by the SEC.³

The geographic scope of the plan includes the Swan River Watershed in its entirety, from the Swan-Clearwater divide to the outlet of Swan Lake, between the Mission Mountain Wilderness and Swan Range. The plan's scope extends across multiple land ownerships.

This document is not regulatory. Rather, participating agencies and organizations are expected to adhere principally to their respective groups' management protocol. The strategies presented in this document are offered as guidelines and are designed to maximize the impact, scope, and efficiency of individual agency or group restoration and conservation efforts.

¹ Pre Legacy Project, Swan Valley ownership consisted of a checkerboard pattern of intermixed private, state, and federal lands with Plum Creek Timber Company lands.

² DEQ Agreement No. 209068 Attachment A, Task 3

³ Available as a PDF at swanecosystemcenter.org

Goals and Objectives

The Swan Basin Restoration Plan was developed to meet the following planning goals and objectives:

Goal (1) Produce a meaningful, dynamic, site-specific approach.

Objective (1) Coordinate with relevant stakeholders and residents.

Objective (2) Identify local resource values and needs.

Objective (3) Identify information and data needs.

Objective (4) Develop strategies for adaptive management.

Goal (2) Promote multi-agency and interdisciplinary coordination.

Objective (1) Develop/define methods for collaborative action.

Objective (2) Identify areas of mutual interest/concern.

Objective (3) Create a framework for strategic action (where feasible).

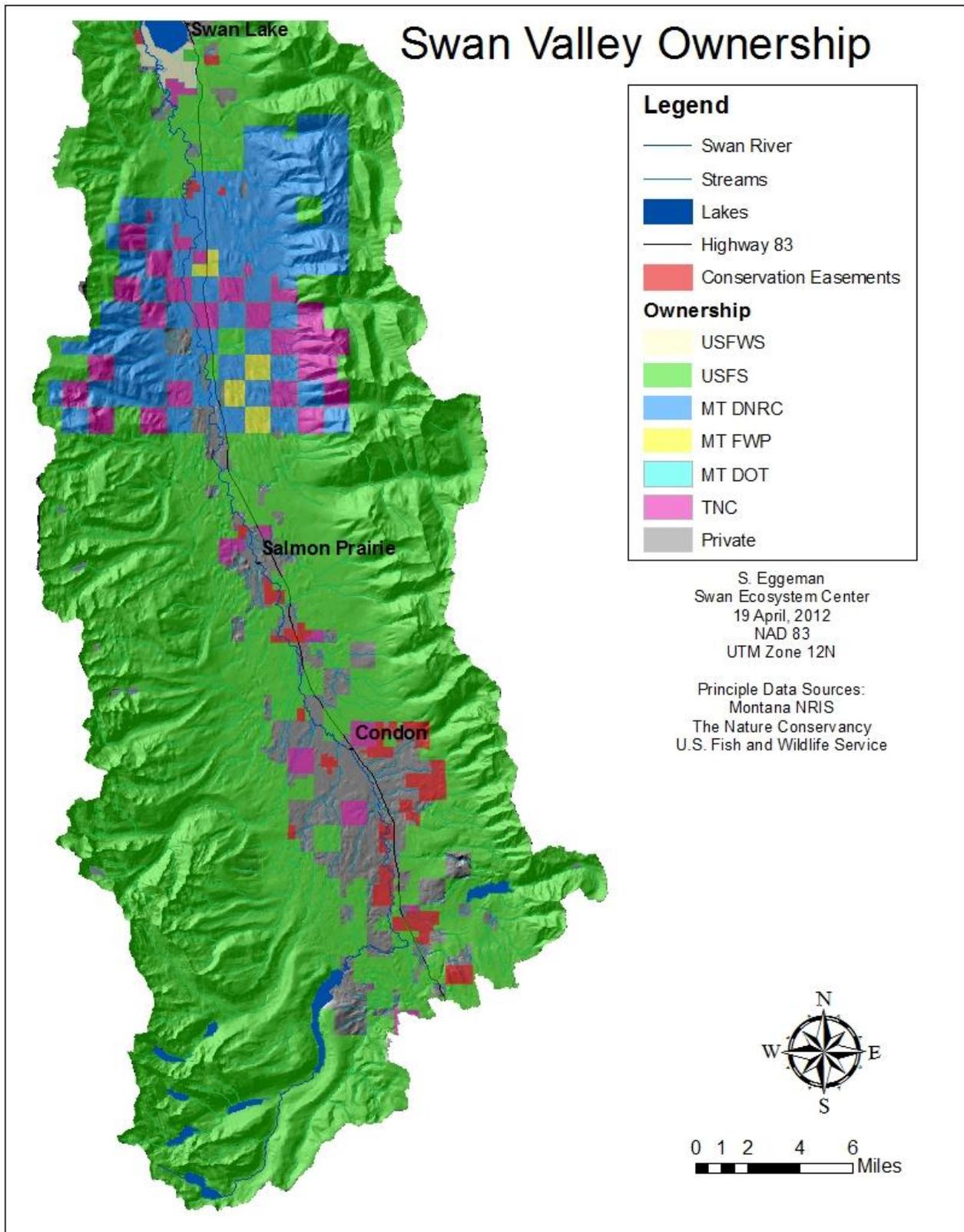


Figure 1. Swan Basin Restoration Project Area (including ownerships)

CHAPTER 2. METHODS

Collaborative Approach

The Swan Valley has a strong history of interagency coordination, due in part to the challenges associated with the valley's checkerboard pattern of land ownership. In 1999, in response to the intended divestment of Plum Creek Timber Company lands, the Swan Ecosystem Center formed the Swans Lands Coordinating Committee (SLCC), an information-sharing stakeholder group. Subsequently, six committees emerged as subgroups of the larger SLCC. These committees evolved to address specific conservation issues, including forest stewardship, landscape conservation, water quality, wetlands, and wildlife. The newest committee, focused on the Swan Valley's native fish populations, formed in 2009 in tandem with SBR planning.

SLCC participants have included: Swan Valley residents; representatives from the Confederated and Salish Kootenai Tribes (CSKT); Flathead National Forest (FNF); Friends of the Wild Swan; Missoula County Rural Initiatives; Montana Department of Natural Resources (DNRC); Montana Fish, Wildlife, & Parks (MTFWP); Montana Land Reliance; Northwest Connections (NwC); Plum Creek Timber Company (PCTC); SEC; Swan View Coalition; The Nature Conservancy (TNC); The Trust for Public Land (TPL); Vital Ground Foundation; and several others.



Stakeholders and residents meet for a field tour regarding the Forest Service's Hemlock Elk Fuels Reduction and Forest Health Project

The plan's framework is designed to accommodate the SLCC structure, acknowledging each subcommittee's role as a collaborative body under which collective restoration planning is accomplished. The plan was created through consultation with the SLCC and its subcommittees and the application of best available science and data. The SLCC oversaw the plan's development. Its subcommittees provided the scientific and logistical information necessary to identify restoration goals and needs and prioritize and actuate projects.

Each subcommittee is unique, with its own specific goals and strategies. Therefore, the SBR does not offer one comprehensive restoration approach or strategy. To give groups the flexibility to establish a methodology that meets their specific needs and objectives, subcommittees are separated as chapters within the plan: Chapter 3 Water Quality; Chapter 4 Native Fish; Chapter 5 Wildlife; Chapter 6 Forests; Chapter 7 Wetlands. Generally, each section offers restoration goals, needs, and strategies pertaining to its resource focus; however, the approach varies according to the needs and status of each subcommittee.

While subcommittees are distinctive, they are not exclusive. It is important to note that within the watershed all five resource topics are intimately linked and most often efforts aimed towards one focus usually impacts another. For instance, while Water Quality and Native Fish are separated as distinct focal groups, the connection between them is obvious, as good water health is essential for native fish habitat.

Unlike the other subcommittees, the Conservation Strategies Committee's scope is not limited to one natural resource; rather, it extends to water quality, native fish, wetlands, wildlife, and forests, with focus placed on fostering restoration and conservation opportunities among stakeholders and residents. Due to this fundamental distinction, the Conservation Strategies Subcommittee's role in restoration was not incorporated into the plan at this time.

Incorporation of the EPA's Nine Minimum Elements

It is essential that the SBR meets the DEQ stipulated standards articulated in DEQ Agreement No. 209068, Attachment A, Task 3, which states “Contractor [Swan Ecosystem Center] will develop the water component of a comprehensive Swan Watershed Restoration Plan that meets DEQ and EPA WRP requirements. Contractor will complete a Watershed Restoration Plan (WRP) consistent with requirements for EPA’s nine minimum elements...” The EPA’s required elements are:

Clarification of these elements is offered on EPA’s website⁵. Each of these elements has been incorporated into the *Water Quality* (Chapter 3) section of the SBR.

1. An identification of the causes and sources.
2. An estimate of the load reductions expected for the management measures.
3. A description of NPS⁴ management measures that will need to be implemented.
4. An estimate of the amounts of technical and financial assistance needed.
5. An information/education component.
6. A schedule for implementing the NPS management measures.
7. A description of interim, measurable milestones.
8. A set of criteria that can be used to determine whether loading reductions are being achieved over time.
9. A monitoring component to evaluate effectiveness of the implementation efforts over time.

⁴ Non Point Source

⁵ www.epa.gov/nps/Section319/319guide03

CHAPTER 3. WATER QUALITY

Mission

The Swan River Basin holds more surface water than any other watershed in Montana, with 16% of its approximate 410,000 acres characterized as river, stream, pot hole, pond, lake, marsh, or wetland. These wetlands, riparian areas, and stream sides provide significant habitat function for native fish, including the federally-listed threatened species, bull trout, which require clear, cold streams with little sedimentation. Riparian areas are also vital to numerous wildlife species and songbirds and serve as critical habitat corridors. The superb water quality is also important for drinking water and recreational opportunities for humans. Figure 2 shows the streams within the watershed.

The Water Quality Technical Advisory Group (TAG) of the Swan Lands Coordinating Committee (SLCC) has been working since 2004 to protect the water quality and quantity in Swan Lake and its tributaries, to fully support aquatic life and protect beneficial uses. The group prioritizes implementation of water quality monitoring and watershed restoration based on recommendations provided in the Water Quality Protection Plan and TMDLs for the Swan Lake Watershed (*TMDL*) completed in 2004. TAG has included representatives from: Swan Ecosystem Center; Northwest Connections; Flathead National Forest; Friends of the Wild Swan; Plum Creek Timber Company; Missoula County Rural Initiatives; PBS&J Consulting; Montana Fish, Wildlife, and Parks; The Trust for Public Land; The Nature Conservancy; Lake County Planners Office; Montana Department of Environmental Quality; and Montana Department of Natural Resources and Conservation.

Listed below are the water quality goals outlined in the *TMDL* that the TAG has referenced to frame restoration projects⁶:

1. *Reduce the overall threat of impairment to any of the beneficial uses supported by Swan Lake;*
2. *Ensure full recovery of the cold-water fish*

⁶ *TMDL* Section 7.0, Page 83

beneficial uses to Goat and Jim Creeks;

3. *Avoid conditions where additional water bodies within the Swan Lake Watershed become impaired;*
4. *Promote a cooperative approach to water quality protection activities among landowners and other stakeholders;*
5. *Continue to monitor conditions in the watershed to identify additional impairment conditions, track progress toward protecting water bodies in the watershed, and provide early warning if water quality starts to deteriorate (DEQ 2004).*

Please see Appendix A, which includes annual updates on the accomplishments, priorities and activities of the Water Quality Technical Advisory Committee.

Restoration Needs

The following section first offers restoration needs as defined by the *TMDL*, including causes and sources of impairment and measures necessary to reach desired conditions. Also included are additional restoration needs identified by the TAG; these are organized by the following list of water quality values: native fish and other aquatic life; clean drinking water; water supply/in stream flows.

The *TMDL* identified particulate organic carbon and sedimentation as pollutants threatening or impairing the beneficial uses of Swan Lake, Goat Creek, and Jim Creek water bodies currently listed on the Montana 303 (d) list. While two specific tributaries--Jim Creek and Goat Creek-- require special consideration, the identification of Swan Lake effectively encompasses pollutant contributions from the entire Swan Valley. Table 2-1 of the *TMDL* summarizes water bodies on the 303 (d) list for 1996-2002 and the probable causes/pollutants for impairment.⁷

⁷ *TMDL*, Page 9

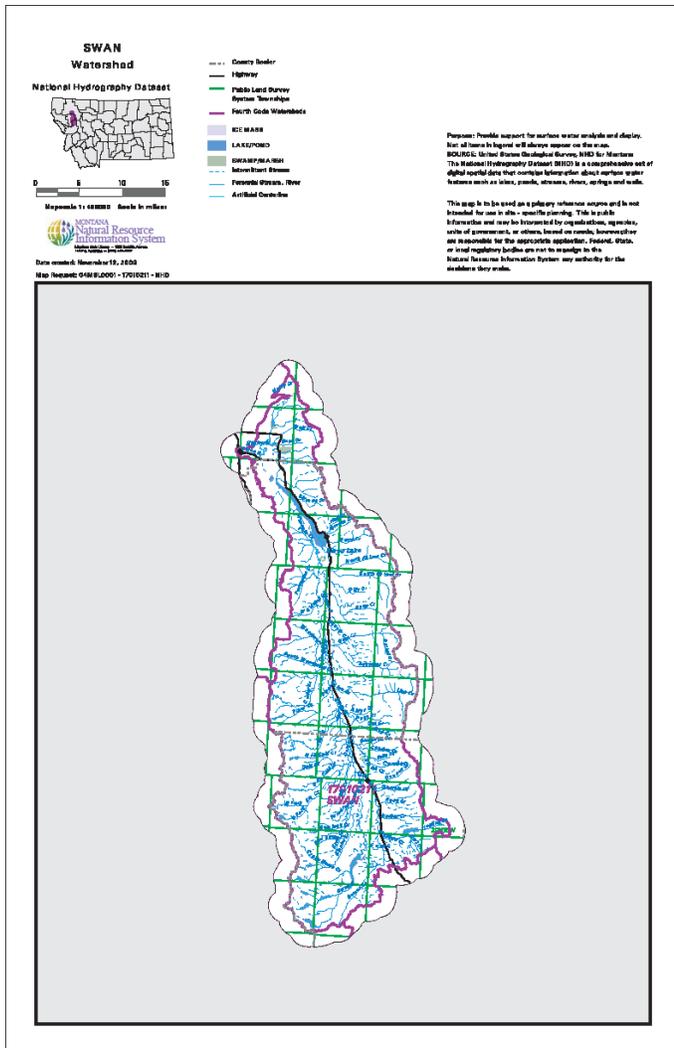


Figure 2. Swan Watershed, National Hydrography Dataset Map

See full-sized map at:

http://nris.mt.gov/gis/gisdatalib/downloads/nhd_1701021.pdf

The following information, excerpted from the *TMDL*, offers numeric targets for desired conditions and corresponding allocations, for example, the estimated load allotment to streams that will attain and maintain water quality standards. Targets and allocations are only provided for 303 (d) listed water bodies. Further clarification and justification for targets and allocations can be found in Sections 7 and 8 of the *TMDL*⁸.

Swan Lake

Primary Targets:

- No decreasing percent saturation of dissolved oxygen (DO) in the bottom waters of Swan Lake and no increase in the spatial extent of the low DO area in the lake.
- No increasing trend of nutrient and chlorophyll a concentrations, no increasing trophic state index trends, and no decreasing trend in Secchi depth values in Swan Lake.

Secondary Targets:

- No increasing trend in phosphorous, nitrogen, Total Suspended Solids (TSS) and organic carbon loads associated with human impacts entering Swan Lake from the Swan River.
- Application of Montana Adapted Forestry Best Management Practices (BMPs) at stream crossings and near stream road segments.
 - Applying BMPs to the extent practical to the top 75 sediment-producing sites identified in Section 5.2 and Appendix F.
 - Applying BMPs to all new road segments.
- No reductions in overall average riparian canopy density and no increases in the spatial extent of the riparian zone in which canopy density is less than

50% based on a comparison to the aerial photo assessment that was conducted for the TMDL based on 1997 aerial photography.

Jim Creek

Primary Targets:

- McNeil core substrate fine sediment (<6.35 mm) levels of no more than 35%.
- Pools and Large Woody Debris: 50% pools with cover and at least 50 pieces of large woody debris (LWD) per 1,000 feet of channel.
- Macro invertebrate community metrics associated with sediment must indicate full support conditions based on standard DEQ protocols.

Goat Creek

Primary Targets:

- Total Suspended Sediment of less than 30 mg/l during peak flow conditions.
- Macroinvertebrate community metrics associated with sediment must indicate full support conditions based on standard DEQ protocols.

Sedimentation to streams

During the initial TMDL assessment, 702 road/stream crossings were inventoried. Of these 702 crossings, 318 were noted to be sources, contributing 799 tons of sediment to streams. Crossings did not have equal impacts; only 50 sites contributed to 70% of total erosion, with all other crossings individually having a minor affect. A breakdown of sediment distribution to tributaries can be found in the *TMDL*⁹.

⁸ TMDL, Pages 83-110

⁹ TMDL Figure 5-2, Page 31

Table 1. Source Load Allocations for Swan Lake¹⁰

Source Area/Type	Allocation	Methods to Achieve Allocation
Road Erosion: Nutrient and POC ¹¹ loading associated with sediment delivery from road erosion.	40% total reduction in modeled sediment loading from road stream crossings (as defined in Section 5.2.1) based on the Forest Road Survey (FRS) method	Road BMPs.
Riparian and Streambank Protection: Nutrient and POC loading associated with eroding banks, loss of woody debris and riparian vegetation impacts.	10% decrease in total loading throughout the Swan Lake Watershed. Canopy density is used as a surrogate to measure progress.	Protect vegetation and banks on private, non-forest lands; recovery from past riparian harvest; maintain and protect adequate channel migration zones; compliance with Montana's SMZ ¹² law.
Other Timber Harvest Impacts: Nutrient and POC loading from timber harvest (other than road erosion and riparian harvest covered above); this also includes road culvert failures.	No loading increase.	Ensure that mass wasting, peak flow increases, road failures, and hillslope erosion impacts are controlled via implementation of restoration activities and BMPs and reasonable land, soil and water conservation practices.
Septic, Near-Shore (Swan Lake) and Additional Private (non-timber) Landowner Management Activities: Nutrient and POC loading from these sources.	Septic loading directly to Swan Lake: 3635 kg of nitrogen 100 kg of phosphorous per year – this reflects no increase to Swan Lake based on conservatively high loading estimates from Section 5.10. Also, no increased loading due to near-shore and other landowner property management activities.	Septic maintenance, upgrades and other BMPs; private landowner management practices to limit pollutant loading; continued training and education of septic contractors; adherence to state nondegradation policy and other applicable state and local regulations.
Road Traction Sanding	Reduced loading via development and implementation of road sanding and sediment delivery BMPs (performance-based allocation).	Development and implementation of road sanding and sediment delivery BMPs.
Airborne Sources: Nutrient loading from airborne sources.	Allocation is contingent upon Flathead Lake TMDL phase allocation approach for this source category.	Sources and loading rates need better definition.
Future Point Sources: Potential nutrient loading from yet-to-be identified point sources.	An allocation consistent with the nutrient TMDL will be developed if a point source is proposed.	Wastewater and other water treatment methods.

¹⁰ TMLD, Table 8-1, Page 100¹¹ Particulate Organic Carbon¹² Streamside Management Zone

Table 2. Source Load Allocations for Jim and Goat Creek¹³

Source Area/Type	Allocation	Methods to Achieve Allocation
Road Erosion: Sediment delivery to streams from road erosion.	Total sediment delivery load to remain below 6 tons/yr based on FRS model (Jim Creek). Total sediment delivery load in the upper Goat Creek watershed above Squeezer Creek to remain below 17 tons/yr based on FRS model (Goat Creek).	Road BMPs, restoration and reclamation; (allocation currently satisfied for Jim Creek)
Riparian and Streambank Protection: Sediment loading associated with stream storage changes and eroding banks.	Protection of streambanks and improved large woody debris recruitment using canopy density as a surrogate measure. Specific focus on increased canopy density (from current average of 0.2 to an average of 0.5) in upper reaches of Jim Creek, and no decrease in canopy density for the lower reaches of Jim Creek (Jim Creek).	Protect vegetation and banks on private, non-forest lands; recovery from past riparian harvest; maintain and protect adequate channel migration zones; compliance with Montana's SMZ law.
Other Timber Harvest Impacts: Sediment loading from timber harvest.	No sediment loading increases other than potential minor predicted impacts associated with 100% compliance with forestry BMPs.	Ensure that mass wasting, peak flow increases, road failures, and hillslope erosion impacts are controlled via implementation of BMPs, restoration and reclamation activities and reasonable land, soil and water conservation practices.

¹³ TMDL Tables 8-2 and 8-3, Pages 106 and 109 respectively

Additional water quality threats identified by the Water Quality Technical Advisory Group (TAG)

As a supplement to the *TMDL*, the TAG employed information collected from subsequent research efforts, monitoring data, professional observations, and other sources of best available science to identify current or potential threats to what the TAG

considered to be resources of value. These values are native fish and other aquatic life; clean drinking water; water supply/ in-stream flows. Listed in this section are water bodies that are known or suspected of being subjected to a threat or potential threat to resource values. This information can be used in conjunction with the *TMDL* in future project planning and prioritization

Native Fish and other aquatic life threatened value

The threats to aquatic life are listed in Table 3 by water body in priority order. Justification for ranking is provided in the “rationale” column.

Table 3. Threats to Native Fish and Other Aquatic Life

Water body	Stressor	Cause	Source	Rationale	Information Source
Cilly, Perry, Rumble, Soup, and Cooney Creeks	Little or no habitat connectivity	Poorly designed culverts block some or all of upstream fish passage	Highway 83	Culverts block the most mileage of fish habitat; Cooney Creek may be blocking bull trout	ITEEM ¹⁴ inventory
Condon, Smith, and Peterson Creeks and Beaver Lakes outflow Creek. Other barriers may exist on former Plum Creek lands and are expected to be discovered in the next few years.	Little or no habitat connectivity	Poorly designed culverts block some or all of upstream fish passage	Various Forest Service roads	Less mileage blocked than the highway culverts	2002 USFS inventory
Swan River	Elevated water temperatures and decreased summer flows	Decreasing trend of snowpack, earlier runoffs	Climate Conditions	Threat and potential impacts are of great concern, however, not ranked as highest priority because it cannot be modeled and few actionable solutions exist to address climate change as a cause	Temperature data by TAG. Flow data is assumed based on patterns observed elsewhere
Holland Creek	Elevated water temperature	Ponding	Water diversion ditch on NFS land is ponding water upstream	localized impact to Holland Creek but not critical for the rest of the Swan Valley	USFS data
Red Butte, Hemlock, and Kraft Creeks	Elevated water temperature	Loss of stream shade	2004 Crazy Horse fire	localized to those streams and will naturally decrease as vegetation returns	USFS data

¹⁴ Integrated Transportation and Ecological Enhancements for Montana

Drinking water

The potential for subdivision and development may pose a threat to drinking water (and other resource values) derived from adjacent streams or groundwater. Residential and commercial development increases the potential of septic discharge, herbicides, pesticides, fertilizers, pharmaceuticals, petroleum, and other pollutants reaching drinking water. There are no known actionable threats at this time; however, this issue should be monitored.

Water supply/ in stream flow

Insufficient water supply for both consumptive needs and aquatic life is a potential threat in Lost Creek due to an increased demand for consumptive uses. At present, an application by the water rights holder is on file to divert the stream. The application has been denied, but can be resubmitted.

TAG Goals and Strategies

Since 2004, the TAG has focused on three main goals; reduce sedimentation from roads; monitor water quality; and provide public education on water quality topics. These goals align with many of the allocation targets identified in tables 1-3.

The restoration activities undertaken by TAG follow guidelines developed in the existing Quality Assurance Project Plan (QAPP), completed in 2006 and delivered to DEQ. In addition, Sampling and Analysis Plans (SAP) address specific projects and TMDL objectives, and data collection and monitoring reports document changes in water quality. SAPs are developed and submitted to DEQ for approval prior to project implementation.

The sections below show strategies for achieving the TAG's three broad goals.

Reduce Sedimentation from Roads (BMPs)

Section 9¹⁵ of the *TMDL* defines strategies for water quality protection and improvement that address

specific land-use activities. Using the recommendations and strategies of the TMDL as a guide, the TAG has implemented successive road restoration projects annually, beginning in FY 2006. Prioritization of project sites is done yearly, aligned with the 319 Grant for Nonpoint Source Pollution funding cycle. Prioritization begins with a site recommendation from a representative of the Flathead National Forest. The TAG then evaluates the site with a field tour to identify specific source locations for repair. The tour is followed by a stakeholder discussion to finalize the proposed project area and scope. As of 2010, three restoration projects had been completed on roads classified among the top 75 sediment-producing. These restoration projects also included sites contributing sediment loads to adjacent streams that were not included in the top 75. As a result of these projects, an estimated 130 tons/year of sediment loading to streams has been reduced, according to the 2008 Swan Lake Watershed TMDL Implementation Program: Target Status Report.

While the TMDL assessment has been a valuable tool in guiding road restoration projects, its inventory was not exhaustive and there are gaps that limit its function. For example, in recent years, the TAG has identified many uninventoried sites to be significant sources of sedimentation. The TMDL only evaluated roads that crossed streams, excluding those roads close to streams that have the potential to be sources of chronic erosion. Additionally, the role of undersized or poorly installed stream culverts was not adequately considered in the initial TMDL development. Under-sized culverts may work fine for years but then catastrophically fail during a high water event and contribute very large amounts of sediment, possibly exceeding all other sources.

Ongoing BMP implementation, done independently by the USFS and DNRC also limits the TMDL for prioritizing projects. Since 2002, the Forest Service has independently (without 319 grants) reduced 60 tons of sediment (and associated nitrogen, phosphorus, and particulate organic carbon) at previously-identified sites by means of timber sale BMP improvements and appropriated funding. The work locations were in Holland, Barber, Glacier, and Beaver Creek watersheds. Future timber sales and associated BMP work planned in the Cat, Dog and Lion Creek drainages should reduce an additional 45

¹⁵ TMDL Pages 111-17

tons of sediment. Plum Creek Timber reports that they have reduced sediment to streams by an estimated 36% since the mid 1990's by means of BMPs on haul routes.

Therefore, in FY 2010-2011, two assessment projects were completed to update the status of the TMDL and inform TAG decision making in future road restoration prioritization. Both Forest Road Sediment Assessment Methodology (FroSAM) and Water Erosion Prediction Project (WEPP) monitoring was done at the top 75 sediment-producing sites identified in the TMDL. This inventory serves to monitor and evaluate progress made since the TMDL was written. Additionally, an assessment of over 100 stream crossing in the Glacier Creek sub-watershed were surveyed to estimate sediment loading. Erosion potential to all scoured streams was estimated using WEPP, a methodology consistent with Forest Service protocol. The Glacier Creek survey also included a culvert risk assessment conducted using scoring developed by the Flathead National Forest and US Fish and Wildlife Service.

With this new information the TAG will use the same project prioritizing methodology used in previous years, recommending and prioritizing restoration needs in Glacier Creek. The group intends to follow a similar strategy, working sub-watershed by sub-watershed. The TAG will select a sub-watershed (prioritization based on size of sub-watershed, ownership make-up, grizzly bear habitat, and opportunity for cooperation), gather funding to inventory the road network, prioritize and plan the restoration work and then seek funding to correct problems.

The TAG has previously worked in annual cycles but it may be more efficient to work on two sub-watersheds simultaneously and allow two years per project. It is likely that with continual road restoration projects, the entire Swan Lake watershed can have all significant road-related erosion problems resolved in about 10 years at the estimated cost of \$1,650,000. The group will continue to seek funding from DEQ's Nonpoint Source program as well as Future Fisheries and other available sources. Additionally, a new program through the Forest Service called Collaborative Forest Landscape Restoration Progra (CFLRP) is focusing restoration

efforts on the Swan Valley. In 2010, the Southwest Crown of the Continent¹⁶, which includes Swan Valley acreage, was selected to be 1 of the 10 CFLRP regions. The program will offer outstanding partnership funding to protect water quality.

Monitor Water Quality

Section 10 of the TMDL describes a water quality monitoring and assessment plan, including monitoring parameters and evaluation methods for 303 (d) listed streams¹⁷. Additionally, all project and trend monitoring follows the guidelines presented in the Swan Quality Assurance Project Plan (QAPP), approved in 2006 by DEQ.¹⁸

Pre- and post- FroSAM monitoring is done for each road restoration project. In addition, trend monitoring has occurred in Swan Lake and many of its tributaries. From 2004 to 2006, SEC collected DO concentration data in Swan Lake's north and south basins and DEQ continued this monitoring from 2007-2009. Areal Hypolimnetic Deficit (AHOD) was also incorporated into the Swan Lake monitoring program. SEC has also collected temperature data in Swan River and five of its tributaries, noted for high quality bull trout habitat, since 2005. The Flathead National Forest has conducted stream monitoring in accordance with PACFISH/INFISH Biological Opinion Effectiveness Monitoring Program (PIBO) protocol since 2008. A summary of monitoring results and water body status can be found in the Swan Lake Watershed TMDL Implementation Program: Target Status Report (PBS&J 2008)¹⁹.

- **Pre- and post- FroSAM monitoring:** Conducted to verify correct implementation of restoration techniques. Monitoring results indicate that installing drain dips and new ditch relief culverts and other actions

¹⁶ The Southwest Crown of the Continent includes: Swan Lake Ranger District, Flathead National Forest; Seeley Lake Ranger District, Lolo National Forest; and Lincoln Ranger District, Helena National Forest.

¹⁷ TMDL Section 10, Pages 119-126

¹⁸ The QAPP is currently under revision (2012). The plan will be updated to include WEPP monitoring protocol and information regarding Beaver Creek.

¹⁹ Available at swanecosystemcenter.org

are being correctly installed and should reduce sediment to streams.

- **AHOD:** Useful tool for gauging water quality and TMDL progress in Swan Lake. It is assumed that if water quality deteriorates then the AHOD acreage would increase and this could trigger a chain reaction of undesirable impacts. Water quality monitoring has been conducted intermittently since 1990 and there appears to be no upward or downward trend. This may indicate that restoration measures are helping but further monitoring is critical.
- **Temperature monitoring:** As recommended in the Swan Lake Watershed TMDL document, temperature is monitored in the Swan River and in several critical bull trout streams to begin the process of establishing baseline conditions. Monitoring began in 2005. Several more years of data will be required to establish meaningful baseline data.
- **PIBO:** Monitoring of Swan River tributary streams began in 1997. In recent years, the protocol has been to have every stream sampled about once every 5 years. Although still a young program, preliminary results indicate no significant difference in fish habitat quality between streams with land management activities versus unmanaged streams. Results are encouraging in that it appears that modern timber management and road maintenance practices are adequately conserving good fish habitat.

As part of TAG's annual meetings, monitoring will be discussed and monitoring data gaps explored. As part of those discussions, TAG will decide which organizations are responsible for each monitoring project and what needs to be done in the planning phases.

Provide Education and Outreach

The Swan Ecosystem Center (SEC) will continue to provide water quality education and outreach, with a goal to inform and gain support among residents and

the public for water quality protection. Projects include, but are not limited to, the following programs: backcountry ranger service; water quality monitoring with students; water quality page on SEC website; private landowner outreach; and a water quality event.



Student water quality monitoring at Glacier Creek.

- **Backcountry ranger service:** Rangers provide information to residents and visitors about behavior and practices that protect water quality
- **Water quality monitoring with students:** Students from local schools, Salmon Prairie and Swan Valley Elementary monitor water quality at Glacier Creek. The goal of this effort is to give students the opportunity to understand the science behind good water quality at the practical level. Results are posted at mtwatercourse.org/index.php
- **Water quality page on SEC website:** Information about the Swan Lake watershed, TAG, restoration and monitoring projects, and events and outreach is offered at www.swanecosystemcenter.org
- **Water quality event:** Annual exhibits that offer water quality education and outreach.

Conclusion and Outlook

The TAG meets annually to set goals, recommend project activities, and identify potential partners and funding sources. Budgets are then developed for specific projects that can be completed over the next several months. If needed, grant funding is solicited. Please see Appendix A for information on projects planned, timeframes, and work accomplished.

[Right] John Wachsmuth [top] (MTFWP) and Beth Gardner (FNF) [below] speak with visitors at the 2009 water quality event, part of Huckleberry Days, Swan Lake.



CHAPTER 4. NATIVE FISH

Introduction and Background

Diverse native and non-native fish species occupy the high quality waters of the Swan River basin. Native species include bull trout, westslope cutthroat trout, mountain whitefish, pygmy whitefish, slimy sculpin, northern pikeminnow, peamouth, longnose sucker, and largescale sucker. Non-natives include lake trout, rainbow trout, kokanee salmon, brook trout, northern pike, yellow perch, largemouth bass, lake whitefish, brook stickleback, central mudminnow, and pumpkinseed (Fish, Wildlife & Parks). This chapter focuses principally on bull trout, federally listed as “threatened” and westslope cutthroat trout, a Montana “species of special concern.” These two species serve as management indicator species to all others.

Historically, bull trout and westslope cutthroat trout maintained a robust and stable range in the lake and its tributaries. However, in the last 50 years, both populations have become a concern for government agencies, conservation organizations, and fishing groups.

In 2009, a group of stakeholders identified the need for a more concentrated effort for westslope cutthroat trout restoration in the Swan watershed and formed the Native Fish Subcommittee of the SLCC. Participation in the Native Fish Subcommittee consists of representatives from Flathead Trout Unlimited (TU); Montana Department of Natural Resources and Conservation; Montana Fish, Wildlife & Parks; US Fish and Wildlife Service (FWS); USFS Flathead National Forest; Northwest Connections; and Swan Ecosystem Center.

The Native Fish Subcommittee encourages restoration of the Swan Basin’s threatened native fish populations through coordinated management and monitoring and efficient implementation of existing conservation and restoration plans.

Please see Appendix B for updates on the Native Fish Subcommittee’s accomplishments, activities and priorities.

Bull Trout

Background

The Swan basin’s cold, clear waters provide high quality habitat for native bull trout populations and have allowed the species to remain stable despite its “threatened” status under the Endangered Species Act. Swan Lake populations are even considered healthy enough to be one of very few lakes in the United States that permits bull trout recreational harvest. However, the presence of non-native lake trout in the system is considered to be a real threat to bull trout’s security in the Swan.

Concern for this threat came in the late 1990’s when anglers reported catching adult-sized (20-30 inch) lake trout in Swan Lake and the Swan River. Surveys completed in the Swan Lake watershed, from 2003-2005, revealed a growing presence of juvenile lake trout, indicating reproductive success within the system. Fear that lake trout’s expanding population would ultimately diminish or eradicate bull trout populations is based on similar fisheries elsewhere that proved unable to cope with stress of lake trout competition.

Significant progress has been made in addressing threats to bull trout in the Swan basin due to the collaborative efforts of the multi-agency, Swan Valley Bull Trout Working Group (SVBTWG), which formed in 2004. This group has a Memorandum of Understanding, referred to hereinafter as bull trout MOU²⁰, signed in 2005. The SVBTWG formed with representatives from MTFWP; DNRC; TU; FWS; FNF; and CSKT, for the purpose of developing “coordinated conservation measures for the long-term protection of bull trout in the Swan River watershed, Montana and addressing the threat of lake trout to the ecological integrity of bull trout in the Swan River watershed.”

Goals and Objectives: Bull Trout

The Swan Lands Native Fish Subcommittee is

²⁰ MOU available online:
http://www.montanatu.org/issuesandprojects/library%20files/fin_al_mou.pdf

committed to implementing the goals and strategies defined by the bull trout MOU:

Goal *“The management goal for bull trout in Swan Lake and the Swan River drainage (including Holland and Lindbergh Lakes) is to ensure the long-term, self-sustaining persistence of bull trout as the dominant piscivore within this ecosystem. In order to accomplish that goal we will emphasize the migratory life history strategy of bull trout; strive to maintain genetic diversity; and protect or enhance current distribution and abundance of bull trout local populations. Attainment of the management goal should result in a continuing opportunity to sustain recreational fishing opportunities for bull trout.”*

Objective 1 *Assess the threat that a reproducing lake trout population in Swan Lake and drainage presents to the existing bull trout resource.*

Objective 2 *Design an effective monitoring program in order to document population trends of bull trout and lake trout in the Swan drainage.*

Objective 3 *Organize and implement a Work Group action plan, to include a research agenda, educational and outreach program, and fishery management recommendations.*

Restoration Effort

Projects undertaken by the SVBTWG over the past several years include a lake trout distribution and feasibility control study, a mark and recapture population estimate, and depletion estimate. A three-year lake trout removal project began in 2009. According to the SVBTWG *Experimental Removal of Lake Trout in Swan Lake, MT: 2009 Annual Report*, the objective of the project is to “evaluate the efficacy of gill nets as a management tool to control the expansion of the lake trout population while minimizing the impact of these non-native fish on the bull trout and kokanee fisheries.” The short-term goal is to remove 50% of lake trout. In its inaugural year the effort resulted in the removal of 5,213 lake trout. This is a 54% reduction of lake

trout over 165mm in length and suggests that the project has a viable chance for success. The project continues into 2010 field season. The group prepares annual progress reports that offer population status and restoration strategies and accomplishments²¹.

Critical habitat

Bull trout’s “threatened” listing under the Endangered Species Act places the species under federal regulation. The USFWS has designated Swan Lake and 17 of its tributaries as bull trout Critical Habitat (Figure 3)²².

²¹ Links to reports from 2004-present are available through Trout Unlimited at www.montanatu.org.

²² More information about FWS’s Critical Habitat designations for bull trout is available online at www.fws.gov/pacific/bulltrout/CrHabitat.

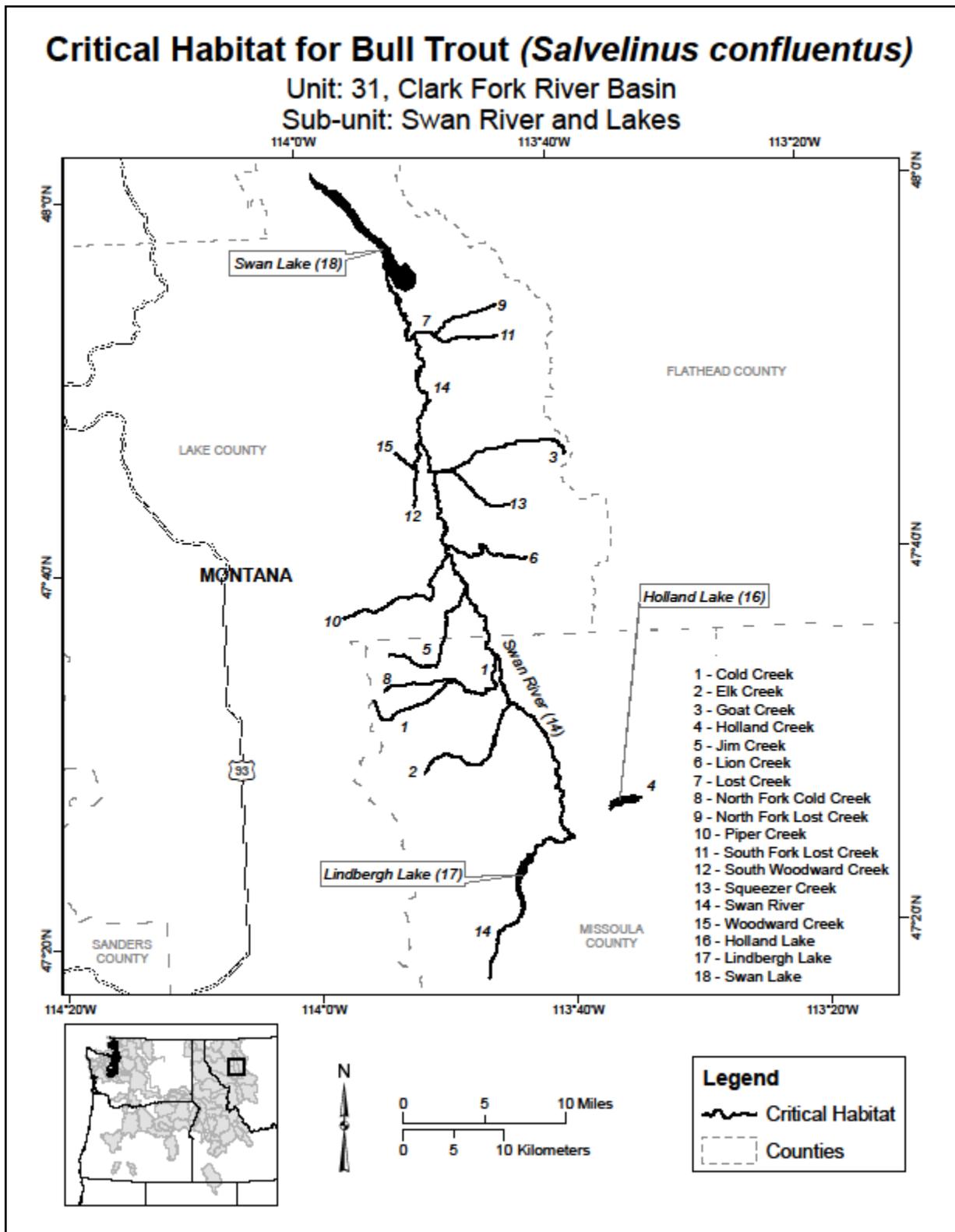


Figure 3. FWS Proposed 2010 Critical Habitat for Bull Trout, Swan River and Lakes

Westslope Cutthroat Trout

Background and goals

Steps have been taken to aid in the recovery of westslope cutthroat trout throughout Montana, with a Memorandum of Understanding, referred to hereinafter as cutthroat trout MOU, signed in 2007. The short-term priority of the Native Fish Subcommittee is to establish a SRB management plan for westslope cutthroat trout. Objectives are to:

1. Determine the current status of westslope cutthroat trout: identification of pure populations or those that can be expanded; identify populations at risk.
2. Designate focus areas within the watershed.
3. Prioritize restoration projects.
4. Implement restoration strategies as per the westslope cutthroat trout MOU.

Historically westslope cutthroat trout enjoyed wide abundance in the Swan, occupying an estimated 500 miles of the watershed's stream habitat. In the 1940's, rainbow and brook trout were introduced to the Swan watershed. Both species found reproductive success. Brook trout are widely distributed in many tributaries and rainbow trout dominate the Swan River. Additionally, some Yellowstone cutthroat trout and golden trout were stocked in mountain lakes. Their presence in the system threatens the westslope cutthroat's stability, impacting resource availability (in the case of brook trout and other species) and genetic purity (in the case of rainbow trout). Other factors, such as timber harvest and angler overharvest, may have also been a population stress to westslope cutthroat over time. Westslope cutthroat populations across the state of Montana have encountered similar threats, and the species has declined.

The *Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana* was developed and signed in 2007 by the Montana Cutthroat Trout Steering Committee (MCTSC)²³. The MCTSC includes multiple stakeholders across Montana including, but not limited to CSKT,

²³ cutthroat MOU available online: <http://MTFWP.iis.mt.gov/content/getItem.aspx?id=28662>

MTFWP, DNRC, PCTC, TU, USFS, and USFWS. Suggested implementation of the agreement would be "through more detailed regional and/or watershed conservation programs that are developed locally." As such, the Swan Lands Native Fish Committee's Swan Westslope Cutthroat Trout (WCT) Restoration Strategy is being developed to the following goals defined in the cutthroat MOU:

1. *Ensure the long-term, self-sustaining persistence of each subspecies distributed across their historic range (identified in 2003, 2005 statewide status of westslope cutthroat trout in the U.S.).*
2. *Maintain the genetic integrity and diversity of non-introgressed populations, as well as diversity of life histories.*
3. *Protect the ecological, recreational, and economic values associated with [westslope cutthroat trout].*

The objectives are:

1. Maintain, secure, and/or enhance all "conservation populations."²⁴
2. Continued effort to determine the status of cutthroat populations.
3. Seek collaborative opportunities to restore and/or expand populations.
4. Continued monitoring.
5. Provide public outreach, technical information, inter-agency coordination, administrative assistance, and financial resources to meet objectives and conserve cutthroat trout.

²⁴ A "conservation population" is any population comprised of individuals that have no evidence of genetic introgression determined by genetic testing or populations with unique ecological or behavioral traits; a more detailed definition is available through the cutthroat MOU.

Current status

Figure 4 depicts the current status of westslope cutthroat trout in their historic range of steam habitat in the Swan Basin. Values were derived from a 2009 inter-agency data compilation and represent best available knowledge as of this date; values are subject to change in accordance with new data.

Conservation populations

The 20% of stream habitat occupied by genetically unaltered westslope cutthroat is not contiguous. Pure populations are currently known to be in 17 distinct stream segments and are designated as “conservation populations” (Figure 5). These populations show great variation in size, genetic purity, and security, all of which are considered by the Native Fish Subcommittee for project prioritization. Table 4 shows a summary of the 17 conservation populations (Swan WCT Restoration Strategy).

Figure 4. Westslope cutthroat trout population assessment based on historic range, Swan Basin 2009
(note: the status of cutthroat trout in lakes is not incorporated into this assessment)

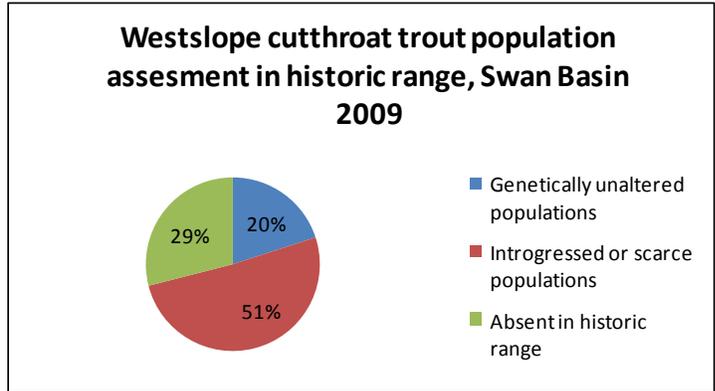


Table 4. Westslope Cutthroat Trout Conservation Population Characteristics, Swan Basin (Alphabetical).

Name	Length (miles)	Population Total ²⁵	Genetic Purity (percent)	Threats
Bond	2.7	421	100 (estim.)	Brook trout, hybridization
Cedar	4.4	5,570	100	None
Cooney	5.4	Unknown	100	Brook trout, development
Dog	6.2	2,100	95-100	Brook trout, hybridization
Groom	2.9	1,000	100 (estim.)	Brook trout
Herrick Run	1.8	290	100	Demographic or stochastic risks
Kraft	11.9 miles	12,200	95-100	Brook trout, hybridization
Lindbergh-Crystal	10.4	1,100	Unknown	Brook trout, hybridization
Lion	3.3	Unknown	Unknown	None
NF Lost	3.8 miles	807	100	Brook trout
SF Lost	Unknown	Unknown	Unknown	Unknown
Owl	1.3	147	100 (estim.)	Brook trout, demographic or stochastic risks
Piper	4.9	3,200	Unknown	Brook trout
Pony	1.3	1,092	99	Brook trout, hybridization
Sixmile	3.1	2,000	100 (estim.)	None
Whitetail	0.5	300-750	100	Unknown
Wolf	3 miles	1700	95-99	Hybridization

²⁵ Numbers in italics indicate a supposed population estimate

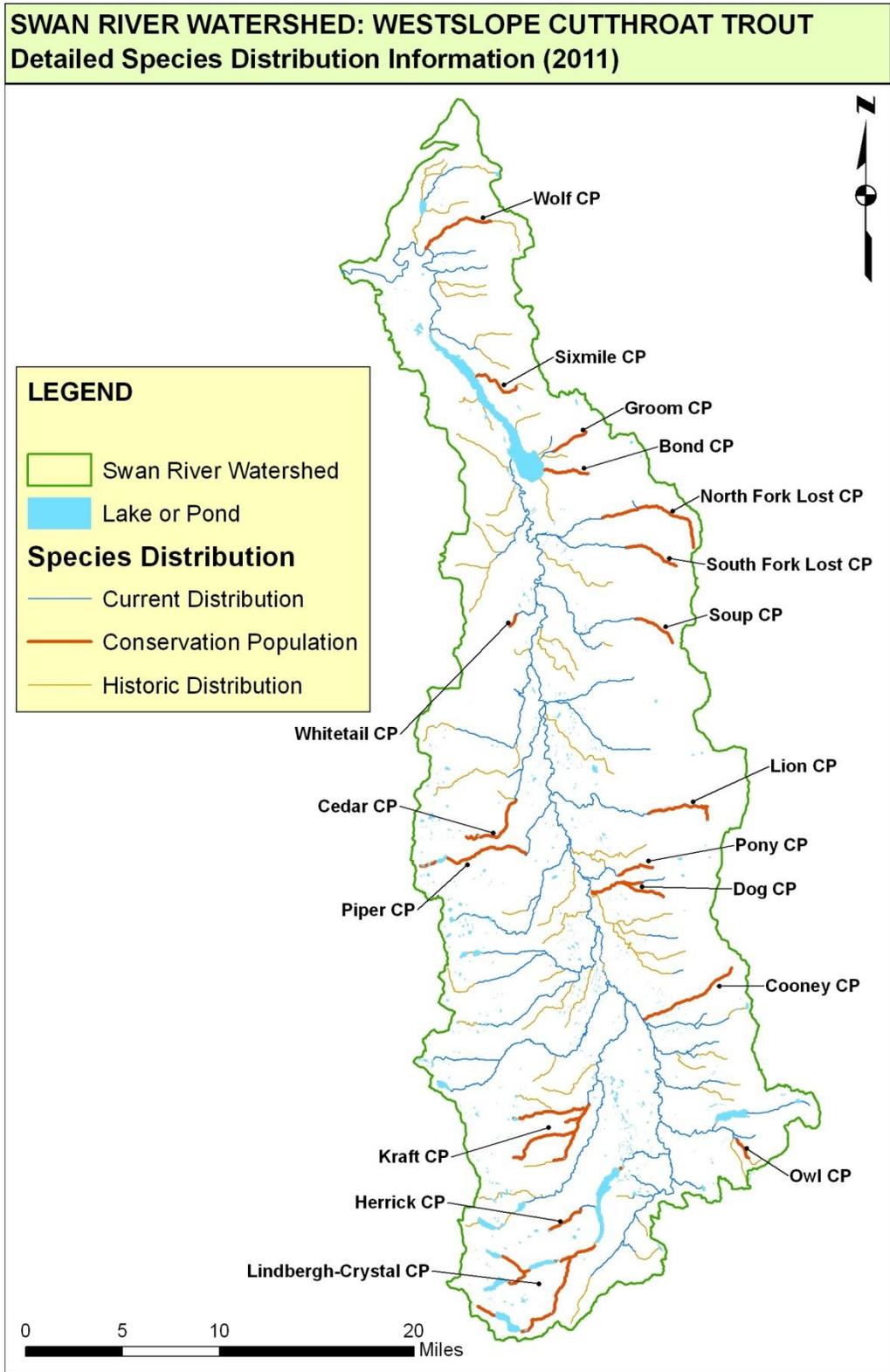


Figure 5. Westslope Cutthroat Trout Conservation Populations, Swan Basin

Restoration strategies

The Native Fish Subcommittee has developed a prioritization matrix of restoration strategies. Table 5 offers restoration actions for each of the 17 conservation populations. Actions are coded by priority. An implementation schedule has not yet been developed. Priorities are based upon

available knowledge and subject to future assessment coordinated by the Native Fish Subcommittee.

Table 5. Restoration Priorities for Westslope Cutthroat Trout, Swan Basin

Site	High Priority	Moderate Priority	Low Priority
Bond	—	—	Evaluate barrier feasibility Brook trout suppression
Cedar	Restoration of lakes, if needed	Evaluate and secure barrier	Reduce risk of wildfire
Cooney	Decision about Hwy 83 culvert		Private landowner agreement
Dog	—	Needs evaluation	—
Groom	—	Needs evaluation	
Herrick Run	—	—	Habitat restoration
Kraft	Install barrier	Suppress brook trout, if needed	—
Lindbergh-Crystal	—	Needs evaluation	—
Lion	—	—	—
NF Lost		Create secure barrier	Suppress brook trout
SF Lost	Unknown	Unknown	Unknown
Owl	Secure barrier Eradicate brook trout	—	—
Piper	—	—	Reduce risk of wildfire
Pony	—	Needs evaluation	
Sixmile	—	—	Private landowner agreement
Whitetail	Brook trout eradication immediately downstream	Expand to additional tributaries	—
Wolf	—	Evaluate and secure barrier	Private landowner agreement

CHAPTER 5. WILDLIFE

Introduction and Goals

In addition to aquatic species, diverse and abundant terrestrial and avian wildlife species also benefit from the Swan basin's high quality habitat. They include but are not limited to grizzly and black bear, lynx, wolverine, mountain lion, bobcat, whitetail and mule deer, elk, mountain goat, moose, bald and golden eagle, peregrine falcon, common loon, and northern goshawk.

Initially, the Swan Lands Wildlife Subcommittee coalesced around the critical status of the Swan Valley's grizzly bear populations. While the group's short-term action strategies are still geared mostly toward grizzly bears, the subcommittee's focus has since broadened to include other of the basin's native wildlife.

The subcommittee's goals are to: 1) sustain abundant and diverse aquatic, avian, and terrestrial native species; and 2) facilitate opportunities for human communities to exist in the natural environment, with stress on positive cohabitation with wildlife.

Objectives are to:

1. Promote coordination among land owners and managers.
2. Promote data sharing and species reporting among stakeholders and with the public.
3. Expand and maintain public outreach, education, and assistance.
4. Implement action strategies associated with urgent need.

Please see Appendix C for updates and reports that show the Wildlife Subcommittee's accomplishments, activities and priorities.

Restoration Needs

To begin restoration planning, the Wildlife Subcommittee first outlined potential restoration

needs for wildlife by cohort, considering threats, the cause(s) for these threats, and the known or potential severity of each threat (Appendix A). Cohorts are ungulates; large and mid-sized carnivores; small mammals/rodents; cavity nesters; avian predators; migratory waterfowl; neotropical migrants; fire-dependent bird species; amphibians and reptiles; and pollinators.

The subcommittee then distinguished those threats that were felt to be of greatest concern, which could be reasonably addressed. Human (residential) development was identified as the greatest threat to wildlife, coupled with four high-priority impacts. First, housing developments fragment the landscape, reducing or eliminating connectivity, which inhibits wildlife movement. Second, development may eliminate and/or reduce cover retention (both security screening and overstory cover). Third, agricultural and residential land conversion can alter and/or disturb habitat. Lastly, the increased potential for negative human-wildlife interaction correlates with increased residential density. Negative interactions include habituation and human attractants that can result in management deaths and intolerance, misunderstanding, and insufficient public outreach and education.

Additionally, forest management was identified, not as a threat, but as critical to wildlife security. Forestry management should be monitored, refined, and maintained.

Table 6. Impacts to Wildlife from Development

Impact	Sources of Information	Information Gaps	Existing Restoration Projects
Loss and/or reduction of habitat connectivity	MTFWP subdivision commentary ; MTFWP winter range maps/aerial photos; MTFWP C.A.P.S ²⁶	Reliable historical estimates and reliable population viability information for small mammals/rodents	—
Habitat alteration and/or disturbance	Aerial photos; MTFWP C.A.P.S	—	—
Loss and/or reduction of cover retention	DNRC GIS databases on mapped winter range; MFWP Winter Range Maps; Aerial photos/GIS modeling for security area; Agency Stand Level Inventory GIS databases; NwC tracking data	—	—
Negative human-wildlife interaction: Management deaths associated with habituation, human attractants	MTFWP Mortality records; IGBC ²⁷ guidelines; State of Montana structure digitization	Unreported conflicts/ mortalities	Bear Resistant Garbage Container Loaner Program; SVBR ²⁸ property consulting
Negative human-wildlife interaction: Intolerance; misidentification; insufficient public knowledge	MTFWP mortality records; MTFWP game warden; Swan Valley Bear Ranger	Unreported conflicts/ mortalities	MTFWP hunter education, online education; SVBR Bear Fair, Wake-up Social

²⁶ MTFWP Crucial Area Planning for Species

²⁷ Interagency Grizzly Bear Agreement

²⁸ Swan Valley Bear Resources

Restoration Strategies

This section presents restoration strategies for the high-priority impacts identified above, offering both a summary of existing programs aimed at addressing needs and approaches for future consideration.

Swan Valley Bear Resources

Swan Valley Bear Resources (SVBR) is a smaller task force of the Wildlife Subcommittee that provides community resources to promote a positive coexistence between people and bears. SVBR active partners include NwC, SEC, and the Swan Valley Bear Ranger, with support from DNRC, MTFWP, USFWS, USFS, Defenders of Wildlife, Interagency Grizzly Bear Committee, and private donations.

Many of the initiatives executed by the SVBR serve to address the high priority concern of negative human-wildlife interactions. While other defined impacts are considered to be of greater threat, actionable solutions are limited by the regulations and protocols of county planning. Negative human-wildlife interaction is more easily addressed by community programs.

Swan Valley Bear News, Bear Fair, and Spring Wake-up Social are education and outreach programs that provide opportunity for experts in the bear research, management, and conservation fields to relay information to the residents, in an attempt to combat issues such as insufficient public knowledge and/or public intolerance. Property consultation and a Bear Resistant Garbage Container Loaner Program serve to limit the human attractants on private property. More information about these projects is available in the 2009 SVBR annual report²⁹.

The SVBR plans to continue its effort to promote human-bear co-existence. Specific projects include a bear conflict/observation database, neighborhood networking, fencing projects, and continuation of existing programs.



[Above] Fencing project prescribed by SVBR property consultation program, funded through SVBR by the Northern Rockies Conservation Cooperative.
[Left] Bear-resistant garbage bin available through SVBR Loaner Program.

Future planning

To more specifically address the threat of human development and the consequences associated with it, the Wildlife Subcommittee has developed the following strategies:

1. Promote coordination among stakeholders and private residents as they are planning habitat-altering activities;
2. Develop 'best practices' for developers and others wishing to promote wildlife co-existence and reduce impacts to overall habitat quality and connectivity;
3. Work with Rural Initiatives, federal and state agencies, and local conservation organization on inventories and analyses aimed at addressing the pattern of human development.

²⁹ Available online: www.swanecosystemcenter.org/documents/stewardship/wildlife/SwanValleyBearResources-AnnualReport-2009.pdf

CHAPTER 6. FOREST STEWARDSHIP

Introduction

The forests of the Swan Valley are among the most diverse and productive in Montana. These forests play an integral role in sustaining the Valley's ecosystems and the community. The Forest Stewardship Subcommittee brings public and private land owners and land managers together to ensure that the forests of the Swan Valley continue to support a local wood products industry, healthy wildlife populations, diverse native plant communities and ample recreational opportunities. Participants in the Forest Stewardship Subcommittee currently include representatives from the Department of natural Resources and Conservation, Flathead national Forest, Northwest Connections, Swan Ecosystem Center, The Trust for Public Land, The Nature Conservancy, Northwest Management, as well as private residents and contractors.

For the past several years, the group has focused on management challenges associated with the Valley's checkerboard ownership pattern and, more recently, the blocking of that checkerboard stemming from the Montana Legacy Project. Now that the Legacy Project (Figure 6.) is implemented the subcommittee has the opportunity to focus its efforts more exclusively on restoration and sustainability. This new opportunity is met by new challenges, one of which is the unfamiliar and, at times, complex conditions of The Nature Conservancy/Trust for Public Land's Fiber Supply Agreement with Plum Creek Timber Company³⁰.

Given the group's transitional status, the subcommittee members are unable to develop restoration priorities and projects at this time. Instead, the subcommittee developed preliminary objectives and actionable steps that will aid in future coordinated and collaborative restoration. Since each agency has its own forest plan or mandate, there is more potential for coordination than true collaboration

³⁰ Agreement between TPL/TNC and PCTC whereby TNC/TPL is obligated to provide 92 MM board feet of timber to Plum Creek over 10 years, harvested off Legacy lands. Harvest will be third party certified as sustainable forestry.

Please see Appendix D for updates and reports that show the Forest Stewardship Subcommittee's accomplishments, activities and priorities.

Goal 1. Seek Opportunities for Coordination

One goal of the Forest Stewardship Subcommittee is to productively use limited dollars and time. Coordination between agencies and groups is essential for achieving this goal, so that individual efforts are not wasted or duplicated and all relevant funding options are being explored. In order to facilitate better coordination, the Forest Stewardship Subcommittee proposes the following objectives/strategies:

1. *Emphasis upon forest management.* The group promotes active forest management to restore or sustain mutual resource values, using means deemed appropriate respective to each agency (List of agency mandates available in Appendix B);
2. *Encouragement of private forestland management and restoration.* To facilitate good forest management practices on and restoration of the watershed's privately owned forestlands the group aims to promote the development and/or expansion of programs that provide technical and financial assistance to landowners for completion of on-the-ground conservation and restoration projects.
3. *End of year coordination meetings.* The group seeks to continue meeting annually or bi-annually for the purpose of disseminating information, regarding projects and funding.
4. *Attention to collective impact.* To ensure management is environmentally appropriate and cost beneficial, strategies look at landscape scale impacts.

5. *Mapping initiative.* To better coordinate individual projects, the group proposes map overlays showing planned work areas. Possible components include DNRC planned projects for the next three years, FNF planned projects for the next three years, and Northwest Management forest inventory. In addition to the outlook mapping described above, the subcommittee proposes mapping to illustrate the cumulative effects of public and private forest management. Components may include fuels mitigation work done by DNRC, FNF, and private residents through SEC actuated grants.

Goal 2. Seek Opportunities for Collaboration

The Forest Stewardship Subcommittee identified a forest roads assessment as the greatest opportunity to collaborate. Roads are linked with all restoration efforts to be done in the basin. Weed management, fuels mitigation, road restoration, habitat restoration, vegetation management, and most other activities require roads. The conversion of Legacy lands to federal land provides a valuable opportunity to regard the basin's current road system through a process that involves agency managers, logging contractors, conservationists, and other stakeholders in forest resources. Roads may be the single most important area for common management purposes.

Next Steps

Following the completion of primary objectives some next steps for the Forest Stewardship Subcommittee include:

- Spatially explicit planning with identification of priority need areas
- Weed management strategies, aligned with CFLRP funding.

CHAPTER 7. WETLANDS

Introduction

One of the most unique and ecologically important aspects of the Swan basin is its abundance and variety of wetlands. These wetlands, and all of the connected riparian linkages that run between them, function as high quality habitat for many of the basin's most sensitive plant and animal species. Important ecosystem services such as water purification, flood control and groundwater recharge are achieved through these wetlands.

The Wetlands Subcommittee functions mainly through partnerships with private and public landowners in the Swan Valley to prevent wetlands conversion and to restore high priority wetlands. The subcommittee was formed in 2008 to identify, assess, prioritize and conserve wetlands for the benefit of people, fish, wildlife and native plants.

Please see Appendix E for updates and reports that show the Wetlands Subcommittee's accomplishments, activities and priorities.

Restoration Needs

The need for wetland restoration in the Swan basin is the consequence of three primary threats or sources of impairment.

1. Full or partial wetland drainage. Prevalent on former homestead lands where drainage occurred to create pasture land.



Ditch draining large glacial wetland on private ownership in the Kraft Creek area.

2. Dredging or deepening of natural wetland basins, which diminishes or eliminates ecological value
3. Poor management; *i.e.* poor grazing practices that degrade wetland health.

Restoration Strategy

Goals and objectives

The goal of the Wetland Subcommittee's restoration and conservation strategy is to produce a visual "roadmap" that will aid in choosing collaborative and cooperative projects on wetlands in need of restoration or conservation.

Objectives are to:

- Rank each wetlands in the Swan River watershed as a "high", "moderate" or "low" priority for protection/restoration;
- Produce a visual display of prioritization results to assist in development of wetland protection/restoration strategies, including identification and implementation of specific projects.

Process

The subcommittee began by choosing conservation targets. The conservation targets were selected to be indicators of the health and productivity of the system. Conservation targets were identified to be: loons; trumpeter swans; plant species of concern; herpetofauna diversity; and wetland resources/waterfowl.

For each conservation target, a set of criteria (based on scientific data and expert opinion) was developed. The criteria served as a filter by which habitat was evaluated and subsequently ranked. Criteria were developed to discern sections of highest value or potential value to the conservation target, not to identify areas of greatest stress. The criteria for each conservation target can be found in Appendix C. Spatial analysis was then conducted using these criteria filters, illustrating sections of highest value. It is these spatial outputs that will

serve as the foundation by which project areas are determined.

Figures 7-X show the results from the criteria-based spatial analysis³¹.

³¹ Note: Spatial analysis and development of this plan were done concurrently. Completion of these analyses did not occur in time for project prioritization based on these results to be included in this document.

CHAPTER 8. CONCLUSION

Swan Basin Restoration is meant to be a living document that should be altered or added to as new information becomes available and as SLCC subcommittees better define their respective roles within the watershed, particularly moving beyond the Legacy Project. Swan Basin Restoration has the potential to not only guide restoration planning for subcommittees individually, but also for the SLCC committee structure as a whole, offering greater opportunity for coordination among subcommittees. The SLCC structure is a model for cooperative watershed management. Continued efforts to enhance the ability of agencies and groups to communicate and coordinate with each other will serve to benefit the Swan basin's natural resources.

Periodic Review and Revision of the SRB Plan

This plan will be kept alive and current in two main ways. Each subcommittee will prepare a short update, at least annually, that outlines its accomplishments, activities, and priorities for that year. These reports are added to Appendices A-E. Second, every three years, each subcommittee reviews its restoration planning goals, objectives and strategies found in Chapters 3-7, considering best available scientific information, results of prior projects, funding capacity, and other factors.

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

Value	Stressor	Cause/Source	Cause/source rating (High, moderate, low)	Known/ potential problems and problem areas	Sources of Information	Information Gaps	Comments
Ungulates							
	Loss of winter range/ habitat stacking and over-browsing						
		Forest management activity in critical winter range	High	Areas (of varied ownership) east of Swan River, especially areas with south, southwest aspects that have been clear-cut or heavily thinned - north side at the mouth of Lion Canyon and similar areas at the mouths of major tributaries coming out of the Swan (i.e. Cooney, Holland, Goat, Squeezer, etc)	Winter Range maps: MFWP; DNRC; Aerial photos of PC lands	Effects on seasonal ranges from climate change; long-term effects from wildland-urban interface management	PC may have GIS database on their land that they have shared with USFS or TNC
		Fuels reduction in winter range	Moderate	In order of potential for negative effects to thermal cover on winter range: Meadow Smith project, Cooney McKay project, and Holland Pierce project	MFWP Winter Range Maps; Aerial photos of predominately FS sections; Monitoring results post treatment	Effects on seasonal ranges from climate change; long-term effects from WUI fuels mgmt	
		Residential development	High	Permanent loss on many residential properties; See above	MDFWP Winter Range Maps; Aerial photos		
		Disturbance related to humans and domestic pets	Low			Extent of the problem	
	Loss of habitat connectivity						
		Forest management	Moderate	Legacy lands	MDFWP Winter Range Maps; Aerial photos		

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		Development	Moderate	Permanent loss on many residential properties, areas of new development	Subdivision commentary by MFWP; MFWP winter range maps/aerial photos		
	Threats to security habitat (increases human/animal encounters during hunting season or other times)				GIS modeling for security areas e.g. buffer 1/2 mile from active roads etc. literature reflects different modeling for species		
		High road densities	Low	PC/former PC ownership seem to have the highest road densities	Agency/PC GIS road density databases; SVGBCA (closure effectiveness figures) and (USFS) A19 monitoring reports		Over time, if not used, roads will re-vegetate and become less of a negative factor to wildlife security
		Road Closure violations (damaged gates, 4-wheeler and motorcycle use)	Low	Forestlands adjacent to private property and older PC closure areas	Annual SVGBCA (closure effectiveness figures) and (USFS)A19 monitoring report	Extent of violations (e.g. levels of illegal OHV use and effects on security)	
		Low cover habitat ratios or lack of screening cover from open roads caused by excessive harvesting	Moderate	Private land (agricultural conversion, residence areas, PCTC legacy lands)	Agency Stand Level Inventory GIS databases; Security modeling/ MFWP Winter Range Maps/ Aerial photos		
		Long distances to cover caused by excessive harvesting	Moderate	Private land (agricultural conversion, residence areas, PCTC legacy lands)	MDFWP Winter Range Maps / Aerial photos		
	Highway mortality			http://mdtinfo.mdt.mt.gov/research/docs/research_proj/seeley/final_report.pdf	Montana DOT (Pat Basting) or FWP		Links to two studies done by MDT, one specifically deals with WVC's on Hwy 83

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		Speed limit	High	Hwy. 83	MDFWP, Highway Dept., anecdotal		
		Traffic volume (see MDOT report)	High (see MDT report)	Hwy. 83 (see MDT report)	MDFWP, Highway Dept., anecdotal		
	Disease						
		Human feeding of deer and elk - potential for chronic wasting disease	Low				
		Disease transmission from livestock to wild populations	Low		Grazing permits by USFS or DNRC; FWP biologists	How much livestock use in Swan on priv. property?	possibly affecting mt. goat populations?
Large Carnivores							
	Management deaths						
		Habituation- human attractants	High (for bears)	Areas adjacent to private property; areas coded MS:1 by IGBC	IGBC guidelines and structure digitization by State of Montana; MFWP Mortality records	Unreported conflicts/ mortalities	
		Livestock	Low-moderate				No livestock losses have been confirmed so far (for wolves), but at least one claim of harassment of horses. But it's only a matter of time as there are some/many small producers throughout the valley that have goats, sheep, llamas, horses, cattle, etc well integrated within the urban interface. I believe there has been at least 1 instance of livestock loss/grizzly bear - last year?
	Illegal killing						

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		Misidentification, lack of education	Moderate (for bears)		MFWP mortality records	unreported conflicts/ mortalities	
		Malicious/ low tolerance	low-high	Areas adjacent to private property		unreported mortalities	1 documented illegal mortality documented
	Negative human/wildlife interactions/ perceptions						
		Increased density of residential development	Moderate-High	Areas adjacent to private property	MDFWP reports; Bear Ranger; game warden	Unreported incidents	
		Deer feed, bringing prey close to homes	Low	Areas adjacent to private property; desire to have deer and other wildlife in yard	MDFWP reports; Bear Ranger; game warden	Unreported incidents	
		Gardens, livestock	Moderate	Areas adjacent to private property	IGBC guidelines and season dietary habits of bears; MFWP reports; Bear Ranger; game warden	Unreported incidents	
		Intolerance/ misunderstanding/ low public knowledge	Moderate; High wolves	Areas adjacent to private property	MDFWP reports; Bear Ranger; game warden	Unreported incidents	
	Highway mortality				NwC tracking data or MTFWP telemetry data; MDOT (Pat Basting)	Are certain crossing areas preferred by large carnivores?	

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		Carcasses along highway	Moderate	Adjacent to Hwy 83 or forest roads (wolves)	Highway Dept. and MDFWP		1 forest road vehicle collision documented so far and 1 highway mortality (for wolves).
		High bisects-need for natural habitat					
	Limited food source			White bark pine, berry crops, drought, climate change, fire suppression		What is going on with army-cutworm moths and other important high elevation insect food resources for bears?	
		Natural fluctuations in food source can be worsened by management decisions (e.g. not aligning hunting quotas to adjust for prey abundance)	Moderate			Other protein source for bears besides declining white bark pine?	Although there may be other factors further influencing ungulate populations like FWP tag sales and veg manipulation in winter range, white-tailed deer pops would normally fluctuate and wolf population otherwise robust enough to adapt on their own.
		Insects and disease	Moderate				
		Climate change	Low to Moderate		Prescriptive literature appearing through UMT, USFWS, USGS, and private organizations	How climate change will actually affect wildlife?	
	Loss/reduction of habitat connectivity						

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		Fire suppression				Effects of fire suppression and forest management on lynx forage habitat?	
		Forest management practices	Moderate		Canada Lynx Conservation Assessment and Strategy; Aerial photos		
	Habitat alteration/disturbance						
		Residential development	High	Private land (agricultural conversion, residence areas)	Aerial photos		
		Inappropriate forest management for wildlife species	Moderate				
		Timber harvest in sensitive areas; forest management/winter range	Moderate				
	Threats to security habitat (increases human/animal encounters during hunting season or other times)						

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		High road densities	Low to Moderate	PC/former PC ownership appears to have the highest road densities- older PC closure areas adjacent to forestlands; Miscommunication between agencies for actual travel behind gated roads; forestlands adjacent to private property	Agency/PC GIS road density databases; SVGBCA and A19 monitoring reports	If agencies are contacting F.S. district to travel behind gates?	Forest Service tracks administrative road usage important for other agencies to coordinate; Over time, if not used, roads will re-vegetate and become less of a negative factor
		Road Closure violations (damaged gates, 4-wheeler and motorcycle use)	Moderate	Private land (agricultural conversion, residence areas, PCTC legacy lands)	Annual SVGBCA monitoring report (Closure effectiveness figures); security modeling; MFWP Winter Range Maps; Aerial photos	Extent of violations (e.g. levels of illegal OHV use and effects on security)	
		Low cover habitat ratios or lack of screening cover from open roads caused by excessive harvesting	Moderate	Private land (agricultural conversion, residence areas, PCTC legacy lands)	Agency stand level inventory GIS databases; MFWP Winter Range Maps; Aerial photos		
		Long distances to cover caused by excessive harvesting	Moderate	Private land (agricultural conversion, residence areas, PCTC legacy lands)	MDFWP Winter Range Maps / Aerial photos		
Mid-size Carnivores							
	Over trapping			Trapping quotas, trapper education	FWP		
		Road densities combined with isolated patches of good habitat	Moderate		Agency GIS databases/ air photos/FWP biologists; MFWP trapping records	Unreported trapping results	

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		state trapping quotas don't accurately reflect Swan Valley populations	Low			Reliable population viability info	
	Forest fragmentation			In adequate representation of mesic old growth, mature, structural complexity, and multi-storied forest, especially in low elevations (valley bottom). Much of the former Plum Creek sections that have been clear-cut are problematic, especially areas across all ownerships that have been clear-cut too close to streams which are typically mature, mesic, and structurally complex. Examples include, Glacier Creek, Cooney Creek, Smith Creek, Cold Creek, and pretty much every other major Swan River tributary.	Agency stand level inventory GIS databases/ air photos		
		Timber harvest that does not necessarily recognize and/or adequately preserve natural corridors	Moderate		NwC tracking database and MT Natural Heritage database; Aerial photos	Where or If species occur in the Swan?	
		Highway 83	Low	Along highway corridor			
	Habitat loss/reduction						
		Inappropriate forest management for wildlife species	High	Highest potential on private and PCTC legacy lands; also potential on FS forestlands	Historical information; GIS modeling; aerial photos		
		Wetland alteration--dredging, digging	High	Private lands	County records and aerial photos	Extent of alteration on private property	Specific to riparian/wetland species

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		Weeds	Moderate to High	All managed lands	Some noxious weed surveys are available	Extent of problem	
	Threats to security habitat (increases human/animal encounters during hunting season or other times)						
		High road densities		Same as above			
		Road Closure violations (damaged gates, 4-wheeler and motorcycle use)		Same as above			
		Low cover habitat ratios or lack of screening cover from open roads caused by excessive harvesting		Same as above			
		Long distances to cover caused by excessive harvesting		Same as above			
	Limited winter prey base	Habitat quality reductions due to timber harvest/management	Moderate to High	Highest potential on private and PCTC legacy lands; also potential on FS forestlands	Stand exams and other vegetation surveys done by FS.	Habitat information for private lands	
	Climate change		Low to Moderate	Same as above			
Small mammals/rodents						fuels reduction effects on small mammal communities	

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

	Habitat loss/reduction		Low to Moderate	Removal of downed woody debris for fuels reduction	Timber harvest records for FS and PCTC, aerial photos, historical vegetation records	Reliable historical estimates and reliable population viability information	
	habitat connectivity	roads	low				
Cavity Nesters							
	Lack of suitable nest sites						
		Snag removal from firewood cutting	High	Road closure violations lead to additional large snag removal along road corridors -open roads and near private property	Anecdotal and firewood permit records/conversations		
		Lack of snag recruitment due to moderate and high severity fire exclusion	High	Forestlands	Fire History records	Reliable historical information on snag availability	
		Removal of snags by post-fire and insect/disease salvage logging	Moderate	PCTC Legacy lands	Aerial photos and logging records for PCTC		
		lack of large diameter snags recruitment due to harvest of mature (live) trees	High	PC Legacy lands	Agency stand level inventory GIS databases; Aerial photos and logging records for PC		
Avian predators							
	Decreased ability to locate and capture prey (importance varies by species)						

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		Increase in small/young tree densities due to fire exclusion	Low	Ponderosa pine stands	Historical vegetation records for the Swan Valley; also broad scale studies		
		Harvest of suitable perch sites -i.e. larger trees (can be issue for short-duration perch-an-scan hunters)	Low	Private lands and PCTC Legacy lands	Aerial photos and forest mgmt records for PCTC		
	Reproductive failure						
		Harvest of nest trees	Moderate	Same as snag discussion			
		Timber harvest around nest site during breeding season	Moderate	Same as snag discussion			
	Loss of suitable nest sites for eagles and ospreys	Removal of large snags, lack of large snag recruitment	Moderate	Adjacent to lakes; especially near residences/cabins	Aerial photos; habitat surveys	Historical info on habitat quality	
Migratory waterfowl							
	interference during nesting					What role mid to upper elevation lakes play for migratory birds in the Swan?	
		boats/ jet skies	Moderate to High	Lakes with homes	Loon Ranger reports; anecdotal; surveys	Unreported incidents and mortalities	
		human activity on the shoreline					
	stress preventing nesting at new/historic sites						
		Boat traffic	Moderate to High	Lakes with homes	Loon Ranger reports; anecdotal; surveys	Unreported incidents and mortalities	
		Development					

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

		Recreation					
	Loss of breeding habitat	Manipulation/destruction of wetland and riparian habitats	High	Private property; especially where agricultural conversion has taken place	Past and present aerial photos; anecdotal	Reliable historical information on snag availability	
Neotropical migrants	Loss of high quality nesting and foraging habitat					a variety of Forest Service and Avian Center point counts	
		Manipulation/destruction of wetland and riparian areas	High	Private property; especially where agricultural conversion has taken place	Past and present aerial photos; anecdotal	Reliable historical information on snag availability	
		Loss of structural and compositional complexity in forest stands	Moderate	Highest potential for problem areas would be private and PCTC Legacy lands		Extent of negative effects is not known	
Fire-dependent bird species							
	Loss of suitable foraging habitat	Landscape-scale fire exclusion	High			Reliable population viability needs	
	Loss of suitable nest sites						
		Moderate/high severity fire exclusion	High			Reliable population viability needs	
		Post-fire salvage logging	Moderate to High			Reliable population viability needs	

Appendix A – Threats to Wildlife in the Swan Basin as Identified by the Swan Lands Wildlife Subcommittee

Amphibians & reptiles	Habitat loss/reduction				Amphibian surveys (FS; other?); older vs. newer aerial photos		
		Climate change	Low to Moderate			Extent of problem; historical vs. existing reference points.	
		Development	High	Private lands	Aerial photos; county records		
		Wetland alteration	High	Private lands	Aerial photos; county records		
Pollinators							
	Lack of food source	Weeds				Extent of problem; historical vs. existing reference points.	

Appendix B – List of Management Plans and Mandates

Flathead National Forest Land and Resource Management Plan (Forest Plan) provides the Flathead National Forest with management direction towards defined goals. The plan includes: desired conditions; objectives; guidelines; suitability of areas; special areas. The Forest Plan does not establish law, regulations, or policy.

State Forest Land Management Plan is programmatic plan for the Department of natural Resources. It provides general policies and guidelines for management, but does not offer precise targets for individual resources or offer site-specific land use planning.

The U.S. Fish and Wildlife Service administers the **Endangered Species Act** for native fish and wildlife. The act stipulates development of recovery planning and provides enforcement of federal protection laws.

The **Swan Valley Grizzly Bear Conservation Agreement** with the Plum Creek Timber Company and The Nature Conservancy, Department of Natural Resources and Conservation, US Forest Service, and the US Fish and Wildlife Service.

Montana Administrative Rules for Forest Management, **Streamside Management Zones: Best Management Practices** for Forestry indicate measures designed to protect soil and water resources.

The following table, provided by Missoula County Rural Initiatives, lists the existing regulations for land development in Missoula County:

Name and Permitting Agency	Extent of Protection	Setback or Regulation
<p>A. Montana Natural Streambed and Land Preservation Act (310 Permit)</p> <p>Missoula Conservation District</p>	<p>Streambed and immediate banks of perennial streams/rivers</p>	<p>Regulates (prohibits some activities) ground disturbing activities in or on the banks of a stream on <u>private projects</u>.</p> <p>Prohibits the removal of stream bank vegetation within the immediate banks of the stream. “Immediate” is not defined by a distance.</p> <p>Some buffer widths have been set for some streams and rivers ranging from a minimum of 10 feet on small streams up to 50 feet on large streams and rivers.</p>
<p>B. Stream Protection Act (124 Permit)</p> <p>Montana Fish Wildlife and Parks</p>	<p>Streambed and immediate bank</p>	<p>Regulates (prohibits some activities) ground disturbing activities on the bed or banks of a stream on <u>public projects</u>.</p>
<p>C. Montana Floodplain and Floodway Management Act</p> <p>Missoula County/Floodplain Administrator</p>	<p>100 year floodplain as identified by FEMA.</p>	<p>No building in the floodway – variable distance</p>

Appendix B – List of Management Plans and Mandates

Name and Permitting Agency	Extent of Protection	Setback or Regulation
<p>D. Federal Clean Water Act (404 permit)</p> <p>U.S. Army Corp of Engineers - Permit U.S. Environmental Protection Agency - Enforcement</p>	<p>Navigable waters of the United States</p>	<p>Regulates (does not prohibit) activities occurring in and around waters of the United States. Often applied to wetland protection.</p>
<p>E. Federal Rivers and Harbors Act (Section 10 Permit)</p> <p>U.S. Army Corp of Engineers</p>	<p>Federally Listed Navigable Waterways</p>	<p>Regulates construction of any structure in or over any federally listed navigable waters of the United States.</p>
<p>F. Short-term Water Quality Standard for Turbidity (318 permit)</p> <p>Montana Department of Environmental Quality</p>	<p>Construction near stream.</p>	<p>Any activity in any state water that will cause unavoidable short term violations of water quality standards must apply for a permit.</p>
<p>G. Montana Land Use License of Easement on Navigable Water Ways</p> <p>U.S. Army Corp of Engineers</p>	<p>Lands below low water mark on navigable water ways</p>	<p>Regulates construction, placement, or modification of a structure or improvements in, over, below, or above a navigable stream</p>
<p>H. Montana Water Use Act (Water Rights Permit)</p> <p>Montana Department of Natural Resources and Conservation (DNRC)</p>	<p>Regulates water quantity not water quality</p>	<p>Regulates water quantity in regards to surface and groundwater</p>
<p>I. Montana Water Use Act (Water Reservations)</p> <p>Montana Department of Natural Resources and Conservation (DNRC)</p>	<p>Regulates water quantity not water quality</p>	<p>Regulates water quantity in regards to surface and groundwater</p>

Appendix B – List of Management Plans and Mandates

Name and Permitting Agency	Extent of Protection	Setback or Regulation
<p>J. Stormwater Discharge Permit</p> <p>Montana Department of Environmental Quality</p>	<p>Regulates runoff from ground disturbing activities on more than 1 acre</p>	<p>Regulates activities within 100 feet of a stream.</p>
<p>L. Local Regulations: Riparian Resource Protection Zone</p> <p>City of Missoula</p>	<p>No net loss of riparian area</p>	<p>Variable depending on site</p>
<p>L. Local Regulations: Subdivision Regulations</p> <p>Missoula County</p>	<p>Boundary of riparian vegetation</p>	<p>Variable depending on extent of existing vegetation</p>
<p>L. Local Regulations: Shoreline Regulations</p> <p>Missoula County</p>	<p>Shorelines and beds of lakes, adjacent wetlands, ponds 20 acres or greater</p>	<p>20' shoreline protection zone</p>
<p>L. Local Regulations: Septic Permit</p> <p>Missoula County/Health Dept.</p>	<p>Septic systems and components</p>	<p>50' septic components 100' septic system 100' from floodplain/floodprone area</p>
<p>General Mining Laws/Small Miner's Placer and Dredge Operations</p> <p>Montana Department of Environmental Quality</p>	<p>Mining Projects</p>	<p>Apply to anyone operating a placer, dredge, hardrock, coal, sand, or gravel mine on private or public land.</p>

Swan River Watershed Wetland Prioritization Analysis Criteria Outline

Objectives:

- Rank each wetland in the Swan River watershed as a “high”, “moderate” or “low” priority for protection/restoration using the criteria in the following outline (criteria will be weighted based on scientific data and expert opinion).
- Produce a visual display of prioritization results to assist in development of wetland protection/restoration strategies, including identification and implementation of specific projects.

Note: Filters under each conservation value (i.e. under each Roman numeral) are hierarchical; “A.” ranks higher than “B.”, “1.” ranks higher than “2.”, “a” ranks higher than “b”, “1)” ranks higher than “2)”. Major conservation values are not hierarchical (e.g. loons are not a higher priority than water howellia).

Criteria Outline:

I. Loons

A. Filters for evaluating loon habitat (Hammond 2009, G. Bissell personal communication, C. Hammond personal communication)

1. Occupied territorial wetland: nesting has occurred or was attempted in the last five years (Coded as “A” in 2009 Conservation Plan for the Common Loon in Montana, Appendix A).
2. Historic territorial wetland: nesting has not been attempted in the last five years. Either old nesting records exist or territorial pair has occupied wetland during nesting season (Coded as “B” in 2009 Conservation Plan for the Common Loon in Montana, Appendix A).
3. Potential territorial wetland (< 5000 ft elevation)

a. Occupied territory within 10 miles

- 1) Single, permanent wetland > 13 acres with suitable foraging wetland(s) within 6 miles (suitable foraging wetland = permanent, semi-permanent water regime, > 5 acres)
- 2) Single, permanent wetland > 13 acres with no suitable foraging wetlands within 6 miles
- 3) Permanent wetland > 5 acres with permanent or semi-permanent wetland(s) within 6 miles (for foraging)

b. No occupied territory within 10 miles

Appendix C. Wetland Prioritization Criteria Outline

- 1) Single, permanent wetland > 13 acres with suitable foraging wetland(s) within 6 miles (suitable foraging wetland = permanent, semi-permanent water regime, > 5 acres)
- 2) Single, permanent wetland > 13 acres with no suitable foraging wetlands within 6 miles
- 3) Permanent wetland > 5 acres with permanent, semi- permanent wetland(s) within 6 miles (for foraging)

4. Foraging wetland

- a. Critical nesting-season foraging wetland, whether or not used for nesting (Coded as “F1” in 2009 Conservation Plan for the Common Loon in Montana, Appendix A).
- b. Nesting season foraging wetland: frequently used by loons for nesting-season foraging but not critical foraging habitat. Observations of loons occur 50% or more of the years surveyed but are not likely a nearby nesting pair (Coded as “F2” in 2009 Conservation Plan for the Common Loon in Montana, Appendix A).

II. Trumpeter Swans

A. Filters for evaluating trumpeter swan habitat (Mitchell 1994)

1. Potential territorial wetland (must have following characteristics: semi-permanent/permanent water regime, > 5 acres, < 5000 ft elevation, >10% emergent vegetation natural or artificial islands , minimum of 100 ft open water , foraging (seasonal/temporary) wetlands within four square mile area of potential territory)

III. Plant Species of Concern (Shelly 1997, Woessner 2001, M. Mantas personal communication, S. Mincemoyer personal communication)

A. Filters for evaluating plant species of concern occurrence

1. Water howellia

- a. Documented howellia wetland.
- b. Potential howellia wetland: depressional wetland with following characteristics - 3100-4500 ft elevation, receding water regimes, < 2.5 acres

2. Fen occurrence (fens support more plant species of concern than any other wetland type in the watershed, including fen-dependent species, and are considered rare).

Appendix C. Wetland Prioritization Criteria Outline

- a. Known fen location (compiled fen spatial data for Swan Valley will be available from MT NHP - spring, 2010).

3. Documented occurrence of any other rare plant.

IV. Herpetofauna Diversity (MT Field Guide 2010, B. Gardiner personal communication, B. Maxwell personal communication)

A. Filters for evaluating herpetofauna habitat

1. Wetland with 5 or greater reptile/amphibian species
2. Wetland with 3-4 reptile/amphibian species
3. Wetland with 1-2 reptile/amphibian species

V. Wetland Resources / Breeding waterfowl

A. Filters for evaluating wetland resources / breeding waterfowl habitat (breeding waterfowl use a complex of different wetland types and densities through the different stages of the breeding season)

1. Wetland density within a one mile radius of focal wetland (one mile = approximate home range size of breeding female mallard).
 - a. > 20 wetland basins within one mile
 - b. 16-20 wetland basins within one mile
 - c. 11-15 wetland basins within one mile
 - d. 6-10 wetland basins within one mile
 - e. 1-5 wetland basins within one mile
2. Wetland acres within a one mile radius of focal wetland.
 - a. >100 wetland acres within one mile
 - b. 81-100 wetland acres within one mile
 - c. 61-80 wetland acres within one mile
 - d. 41-60 wetland acres within one mile
 - e. 21-40 wetland acres within one mile
 - f. 1-20 wetland acres within one mile

Appendix C. Wetland Prioritization Criteria Outline

3. Wetland types within a one mile radius of focal wetland (using Cowardin System: permanent, semi- permanent, seasonal, temporary, saturated, riparian wetland, riverine)
 - a...g. list # of types within one mile hierarchically, with all 7 types present receiving the highest weight to just one type present receiving the lowest weight.

Literature Cited

- Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online.
- Hammond, C. A. H. 2009. Conservation Plan for the Common Loon in Montana. Montana Department of Fish, Wildlife and Parks, Kalispell, MT.
- Mitchell, C. D. 1994. Trumpeter Swan (*Cygnus buccinator*). IN The Birds of North America, No. 105 (A. Poole and F. Gill, editors). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Montana Field Guide. 2010. Western Toad — *Bufo boreas*. . Retrieved on March 16, 2010, from http://FieldGuide.mt.gov/detail_AAABB01030.aspx
- Shelly, J.S. 1997. Conservation Strategy: *Howellia aquatilis*. USDA Forest Service Flathead National Forest, Kalispell, Montana.
- U.S. Fish & Wildlife Service. 1994. National Wetlands Inventory Data. U.S. Fish & Wildlife Service National Wetlands Inventory, St. Petersburg, Florida.
- Montana Field Guide. 2010. Western Toad — *Bufo boreas*. . Retrieved on March 16, 2010, from http://FieldGuide.mt.gov/detail_AAABB01030.aspx
- Woessner, W.W. 2001. Preserving the function of unique wetlands critical to the survival of water howellia in the Swan Valley, Montana. Montana Department of Environmental Quality, Helena, Montana.

Appendix D. List of Participating Agencies

Missoula County Rural Initiatives

Montana Department of Environmental Quality

Montana Department of Natural Resources and Conservation

Montana Fish Wildlife & Parks

Northwest Connections

The Nature Conservancy

PBS&J Consulting

Swan Ecosystem Center

The Trust for Public Land

US Fish and Wildlife Service

USDA Forest Service, Flathead National Forest