Fish Bay Watershed Restoration Plan

USDA FOREST SERVICE
TONGASS NATIONAL FOREST
SITKA RANGER DISTRICT

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Overview

The Fish Bay Watershed Restoration Plan (WRP) area (Figure 1-1) includes the Fish Bay Creek watershed which has a high priority for protection and restoration among Sitka Ranger District watersheds. A Hydrologic Condition Assessment, incorporating this area was completed as part of the Sitka Sound Landscape Assessment (USDA-FS, 2004).

The Fish Bay watershed Analysis Area, hereafter known solely as the Analysis Area in this document, is consists of four 6th field Hydrologic Unit Code (HUC) watersheds that feed into the head of Fish Bay on western shore of the northern quarter of Baranof Island in Southeast Alaska. It is located about 20 air miles north of Sitka, 32 air miles west, southwest of Angoon, and 45 air miles south-southeast of Pelican. The Analysis Area is administered by the Sitka Ranger District of the Tongass National Forest. Historically it was used primarily for subsistence purposes prior to European settlement.

Beginning in the early 1900s through the 1960s, timber production occurred within the Analysis Area under management by the USDA Forest Service. Today, it continues to provide both important subsistence and natural resources to local residents, though timber harvest has been curtailed throughout the entire area due to Land Use Designation (LUD) changes under the 1997 Tongass Land and Resource Management Plan (TLMP) to the Old Growth Habitat LUD.

The USDA Forest Service has determined that the Analysis Area is vital to the subsistence, recreation, and ecosystem integrity of the area. The Analysis Area and its components have changed significantly since the peak of timber harvest in the 1960s, and as a result, the USDA Forest Service has identified several predominant issues affecting the current and future landscape and its uses. The issues described in this analysis serve as the basis for recommending actions to rehabilitate many of those ecosystem components in accordance with the Forest Plan.

Today, only approximately 7 percent of the overall Analysis Area and 25 percent of the overall riparian old-growth habitat is in a second-growth, even-aged forest structure, which previously served as valuable deer winter habitat. It is recognized that much of that forest structure will continue to be even-aged until thinning occurs. Wildlife emphasis thinning treatments to enhance upland deer and bear habitat are recommended in this analysis. Approximately 484 acres of upland acres are recommended for type of thinning.

Timber production from the Analysis Area has not occurred in the last 40 years, peaking in the 1960s. The Analysis Area is now in the Old Growth Habitat Land Use Designation (LUD) status and does not allow for future commercial timber harvest.

Hydrologic connectivity and wetlands are integral parts of watershed function in the Analysis Area. Landslides and soil erosion from roads have not been identified as a major source of resource damage to downstream ecosystems. Currently, 340 acres of harvest occur within the overall 12,412 acres of Mass Movement Index (MMI) 3 and 4

soils and 73acres of MMI 3 and 4 soils and 8 of the 12 miles of roads occur with Riparian Management Areas (RMA). Through field reconnaissance, it has been determined that sufficient regrowth of vegetation has occurred within these MMI soil sites and no stabilization efforts are recommended at this point. Furthermore, the majority of the 12 miles of roads within these watersheds, including the 8 miles within RMAs have had overgrown with vegetation. However, 22 structures, including 10 fish stream crossing structures remain. All of these remaining structures are currently failing or are at risk of complete failure within the foreseeable future. Removal of all 22 remaining stream crossing structures is recommended.

The use of the Analysis Area has always been valued by people for its important subsistence, and more recently, recreation and commercial guiding opportunities. Restoration of stream channels and riparian and uplands stands will almost certainly bring greater recreational, subsistence, and economic importance to the area. Currently, one Forest Service Recreational Cabin facility exists nearby at Piper Island west of the Analysis Area, as well as a survival shelter at Kakul Narrows. Projects to both directly enhance or limit recreational or commercial opportunities are not recommended through this analysis.

Finally, fisheries habitat and aquatic ecosystem function has been impaired along some watersheds due to riparian harvest and the conversion from conifer-dominated riparian areas to red alder-dominated riparian areas. Approximately 379 acres of riparian area that is along class 1 and 2 streams and is less than 55 years old is recommended for thinning. No in-stream rehabilitation of fisheries habitat and other aquatic ecosystem components have been identified at this time.

Low stream flows along tributary reaches may be an important limiting factor for fisheries of the Analysis Area, especially during below freezing winter periods and extended dry spells in the summertime. Low stream flows reduce or even eliminate fish rearing habitat by decreasing pool depths and volumes. Extremely low stream flows isolate pools, strand fish, and prevent their access to habitats during critical life stages. Several low gradient valley bottom streams within the Analysis Area dry up during dry weather when groundwater is the only source of stream base flows.

Figure 1-1. Vicinity Map - Fish Bay.

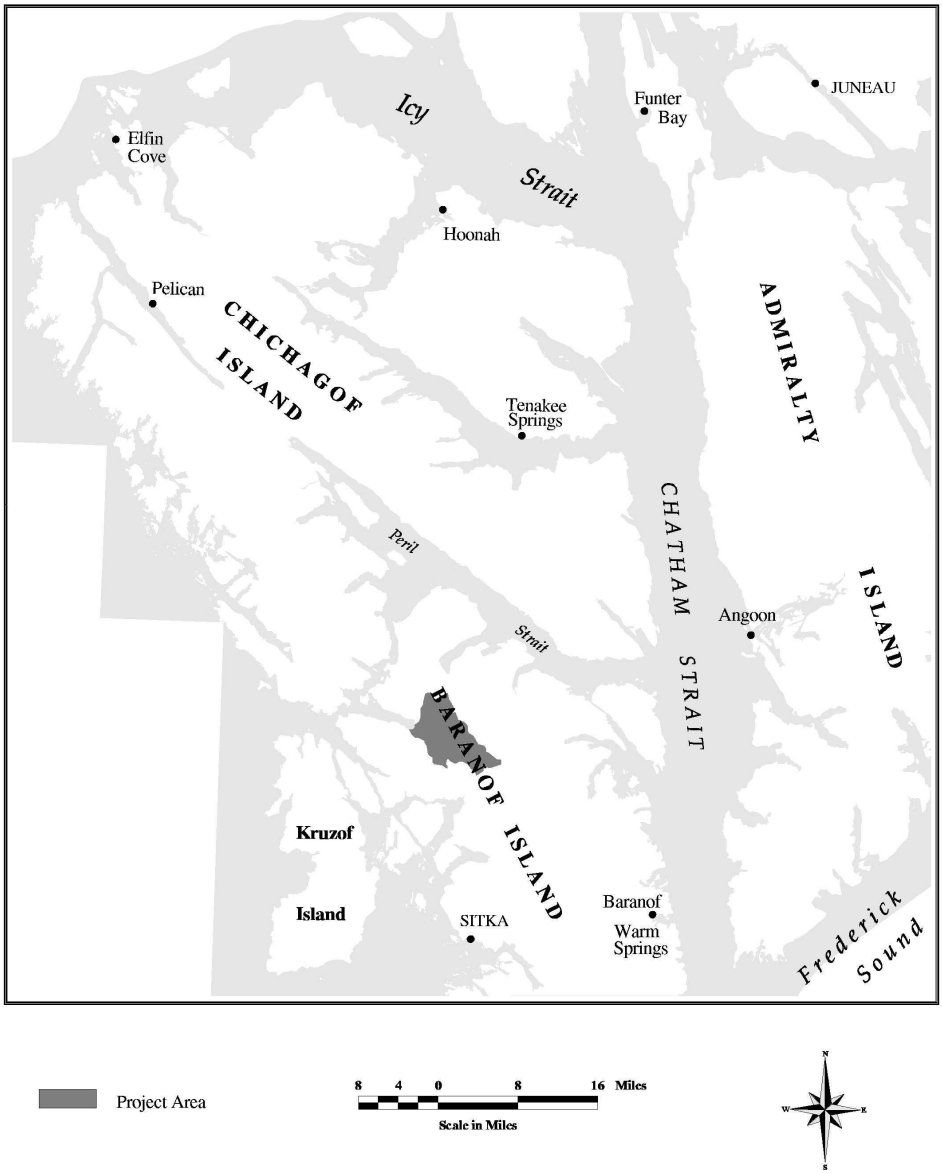
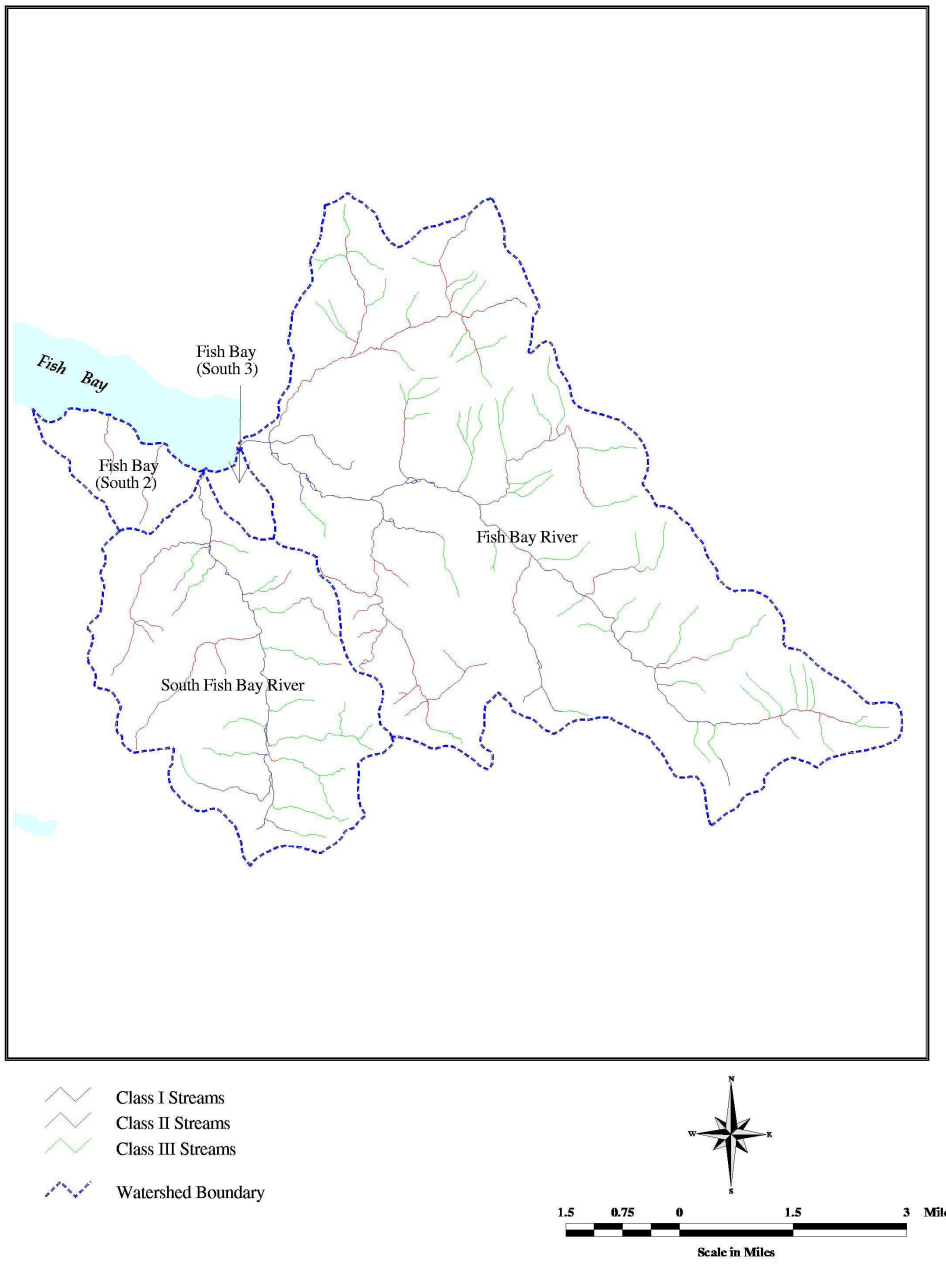


Figure 1-2. Fish Bay Watersheds.



Streamflow Characteristics

Distribution of annual streamflow is closely related to the distribution of annual precipitation. Thus, high flows occur during the fall months and low flows predominant in the summer. Most of the precipitation results in streamflow, with little going to groundwater recharge, because the thin, coarse textured soils provide little ground water storage. The lack of ground water storage results in systems that are very responsive to precipitation events.

Water Yield

A 1979 study by Harr and others in western Oregon showed water yield increases averaging 43% (29 cm) during the first five years following clearcutting a small drainage. While the largest absolute increases in yield occurred in the winter, the largest relative increases in water yield occur in the fall and spring. While the yield increases from recently clearcut small headwall basins can be large, their influence on the yield of the larger parent watershed can be overshadowed by the normal water yields from uncut or reforested areas. Estimates of potential water yield increases from large forested watersheds are in the range of 3-6%, assuming the use of 70-100 year rotation intervals (Harr 1983). After examining some 90 watershed studies worldwide, Bosch and Hewlett (1982) determined that water yield increases are usually only detected when at least 20-30% of the watershed has been harvested. Overall timber harvest for the Fish Bay River watershed where 80% of the total harvest has occurred is 6%.

Low Flows

Low flow volumes may initially increase following timber harvest, but the effect is short lived (5-10 years). In addition, the absolute difference in additional quantities of streamflow is small (Harr and Krygier 1972, Hall *et al.* 1987). Timber harvest can result in a decrease in summer low flow volumes if conifers are replaced by red alders. This is caused by red alder's greater evapotranspiration rates compared to the conifers they replaced in a watershed (Hicks et al. 1991). Though there has been alder regeneration within the harvests along riparian areas, the dominant regenerated tree species has been Sitka spruce. Beaver, which are increasing in populations within the Analysis Area over the past decade, have created several large dam complexes which hold volumes of water stored in pools along tributary channels. These structures release water slowly over time, adding to baseflows.

Low flows are a result of subsurface flow being released and is primarily dependant upon soil types, soil depths and porosity. Many soil types in the Analysis Area are shallow and coarse textured and do not retain much water. The bedrock geology in the Analysis Area also does not favor ground water accumulation.

Human influences do not appear to be greatly contributing to declining hydrologic condition (Table 1-1, Table 1-2, and Figure 1-3). However, the Analysis Area roads and associated ditchlines do capture and redistribute water, which could be influential at the stream reach scales. The high extent of forest canopy loss to clearcuts and may have altered timing and quantity of flows when initially harvested, however subsequent

regrowth of vegetation most likely has subsided these affects. The coarse valley bottom alluvium deposits where the most roads and timber harvest have occurred are most sensitive to these factors and their influence on groundwater reserves.

Table 1-1. Analysis Area Characteristics.

Watershed	Area (acres)	Harvest (acres)	RMA (acres)	RMA Harvested (acres)	MM-HAZ 3&4 (acres)	MM-Haz Harvested (acres)	Roads (miles)	Roads within RMA (miles)
Fish Bay River	21,360	1253	2909	885	10940	224	6.8	5.1
Fish Bay (South 2)	1,217	13	82	0	96	0	0.8	0.0
Fish Bay (South 3)	371	24	158	9	70	0	0.8	0.8
S. Fish Bay River	794	275	871	93	1306	116	4.0	1.9
Total	**23,742**	**1565**	**4020**	**987**	**12412**	**340**	**12.4**	**7.8**

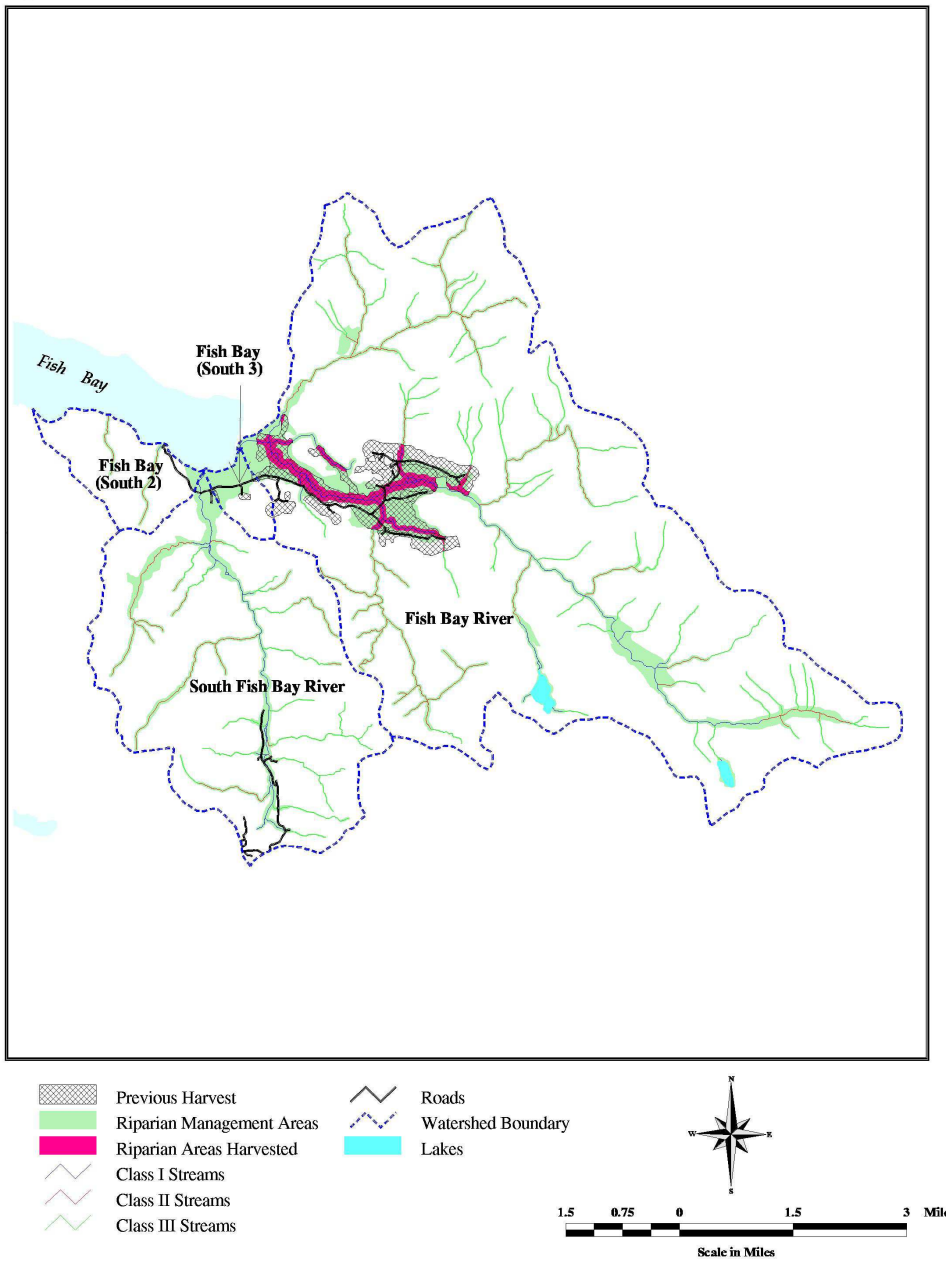
Source: Sitka Ranger District 2005 GIS Coverage.

Table 1-2. Analysis Area Stream Characteristics

Watershed	Area (acres)	Total Stream Miles by Class				Total Stream Miles Harvested by Class			
		1	2	3	Total	1	2	2	Total
Fish Bay River	21,360	17.7	27.0	32.1	76.9	7.0	0.4	0.4	7.8
Fish Bay (South 2)	1,217	1.0	2.3	1.1	4.3	0.0	0.0	0.0	0.0
Fish Bay (South 3)	371	4.1	2.0	0.4	6.5	0.0	0.0	0.0	0.0
S. Fish Bay River	794	4.1	1.4	3.0	8.5	0.0	0.0	0.0	0.0
Total	**23,742**	**26.8**	**32.8**	**36.7**	**96.3**	**7.0**	**0.4**	**0.4**	**7.8**

Source: Sitka Ranger District 2005 GIS Coverage.

Figure 1-3. Riparian Harvest.



Broad (Landscape) Recommendations

Riparian and Upland Thinning Treatment Areas
Within the Analysis Area, many of the previously harvested stands associated with riparian areas are approaching or have reached the age and size at which canopy closure has begun. Silviculturists and other resource specialists, including those from fisheries, wildlife, hydrology, and soils, should collectively produce prescriptions for these areas and implement thinning activities within the next ten years. Potential silvicultural treatments should address the desirable species mix, understory biodiversity, and site conditions. General suggestions for implementing riparian regeneration treatments are listed in Appendix G of the Forest Plan.

Instream Large Woody Debris
Future watershed rehabilitation should continue the placement of large wood (LW) into streams currently lacking large wood. Where available, stream survey information should be used to assess the current condition and trends of key stream habitats and to determine the locations at which additional instream LW is needed. Additional stream surveys should be completed in areas impacted by past management activities for which data are lacking.

Road Maintenance and Restoration
Roads within the Analysis Area are, for the most part, deteriorating. All of the roads within the Analysis Area have had a complete Road Condition Survey (RCS) completed on them. This data indicates that all the roads are being allowed to "brush in", however 22 stream crossing structures remain. Restoration work should involve removing the remaining 22 drainage structures.

The public has expressed a desire for more roads and better quality roads to be used for recreation purposes, and as this desire and use (of all kinds) continues to increase, the existing open road systems on the District will become even less adequate and users will likely branch out for new opportunities.

Access and Travel Management (ATM) planning and Off Highway Vehicle (OHV)for the Analysis Area is currently taking place for the entire Sitka Ranger District, including road, foot travel and OHV use. This effort will determine what road systems are necessary to meet access objectives and follow with maintenance and rehabilitation plans consistent with protection of soil and water resources. The Forest Service recently announced a proposed rule to require each forest to designate a system of roads, trails and areas slated for motor vehicle use. Once the designation process is complete, ATV use would be confined to designated routes and areas, and ATV use off these routes (cross-country travel) would be prohibited. The development of an OHV plan for the District must include the education and cooperation of ATV users.

Land Use Designations
Determine whether LUDs with the Analysis Area meet Forest Plan standards and guidelines.

Recommendations Specific for the Analysis Area

- Develop road rehabilitation plans focused on maintaining natural distribution of surface and groundwater.
- Consider second growth management objectives in harvested riparian areas. Primary objective should be recovery of old growth structure and canopy for wildlife and fisheries habitat.
- Consider second growth management objectives in harvested beach fringe areas. Primary objective should be recovery of old growth structure and canopy to restore/enhance deer winter range habitat.
- Consider second growth management objectives in harvested upland areas. Primary objective should be recovery of old growth structure and canopy to restore wildlife habitat.
- Update the existing stream and riparian GIS layers using field verification, digital orthophoto overlays, and aerial photo interpretation.
- Complete additional stream surveys for representative channel reaches to assess the current condition and trends of key stream habitat within planning area watersheds. As directed in the 1997 Forest Plan, compare stream survey information (by channel type) to Regional Fish Habitat Variables.
- The Fish Bay Road System, which is currently in a non-development LUD, is in poor condition. An opportunity exists to improve portions of the Fish Bay Road System for non-motorized use along the existing road prism. Non-motorized traffic on Road 7580 would be in keeping with the LUD. In addition, keeping the road on the National Forest Road System is preferable to decommissioning it because this road could be reconstructed as part of a proposed public road project.
- Remove the existing 22 stream crossing structures and repair other problem areas identified within the RCS.
- Close roads within non-development LUDs, with consideration of possible reconstruction in the future along the portion of the Forest Road for passenger vehicle use as proposed in the *Southeast Alaska Proposed Public Road and Ferry Projects Report*.
- Where roads occur in Old-growth Habitat Reserves, develop or update road management objectives to meet the objectives of the Land Use Designation.
- Close roads to OHVs.
- Thin 379 acres in previously harvested RMAs for Fisheries and Watershed improvements.
- Thinning 484 acres of previously harvested upland areas for wildlife habitat improvements.
- Monitor previous instream large wood (LW) work and evaluate further opportunities

and/or need for LW projects.

- Develop the hot spring and provide hike-in access.
- Landscape conditions within the Old-growth Habitat Reserve do not provide the appropriate type of recreation experience for this LUD. An opportunity exists to thin trees to help bring this LUD into better compliance with the Forest Plan.
- With the help of ADF&G, identify important Brown Bear foraging areas.

Monitoring and Information Needs

A variety of hydrologic information needs are briefly identified here

1. How does seasonal and annual streamflow vary in response to continued climate change? Maintain stream gages on the Sitka Ranger District.

2. How do low flows vary during rainless weather in valley bottom and lowland areas? Maintain/add district stream gages.

3. How does groundwater influence low flows in watershed with and without management activities? Install and maintain monitoring wells on the District.

4. What is the stream temperature regime in these watersheds and their tributaries with respect to state water quality criteria (focus on low flows and harvested reaches)? Install continuous temperature instruments (and/or maintain those near stream gages) and add air temperature.

5. What are the long term trends in channel morphology and habitat features along harvested reaches within the Analysis Area? Repeat Tier II surveys and establish monumented Tier III surveys and cross sections.

6. How is LWD recruitment in the Analysis Area watersheds affecting LWD distribution and function? Tag and monitor key pieces.

Restoration Strategy

This section outlines the restoration strategy designed to meet the objectives for the Analysis Area. Table 1-3 displays the criteria used to prioritize watershed improvement activities. The following sections provide detailed project descriptions, objectives, benefits, timelines and estimated project costs.

Table 1-3. Criteria for Prioritizing Analysis Area Watershed Improvement Activities.

Driving Factor (HCA)	Restoration Issues/Concerns/ Objectives	Relative Degree of Influence	Relative Probability of Success for Restoration	Rehab Priority
Timber harvest and Young Growth Mgt (Flow).	Reduced canopy may accelerate snowmelt, resulting in earlier depletion of groundwater reserves. Rapid release of shrubs may increase evapo-transpiration loss. **Objective: Implement thinning treatments for dense, young growth stands to accelerate development of mature forest canopy structure.**	Low	Low in the short-term	**#1**
Timber harvest and Young Growth Mgt (Stream Habitat).	Reduced riparian tree heights and stand age due to harvest resulting in future source of LWD deficit **Objective: Implement thinning treatments for dense, young growth stands to accelerate development of mature forest canopy structure. Increase tree diameter upon snagging will increase Key LWD counts, improving Stream Habitat.**	Moderate to high at the stream reach scale.	High	**#2**

Timber harvest and Young Growth Mgt (Wildlife Habitat).	Reduced tree heights and stand age due to harvest resulting in stem exclusion structure and reduced understory vegetation in riparian, upland and beach fringe stands. **Objective: Implement wildlife emphasis thinning treatments for dense, young growth stands to accelerate development of mature forest canopy structure to improve deer winter range and bear habitat.**	Moderate to high at the local stream reach and/or stand scale.	Low in the short-term, High in long-term	**#3**
Roads and Runoff Diversions	Some roads intercept groundwater and have altered hydraulic gradients, reducing groundwater available to streams. Some roads capture, divert surface water and block fish passage. Bedload deposition up and downstream of removed crossing structures constrictions can result in disappearance of surface flow in vicinity of road during low flow periods. **Objectives: Restore adequate stream flow conveyance, cross drainage and fish passage along all roads.**	Moderate to high at sub-basin or stream reach scale	High	**#4**
ATV trails	Unhardened ATV trails capture/divert surface water, reducing groundwater storage. **Objective: Eliminate 100% of undesignated ATV trail miles. Restore affected wetlands and stream channels.**	Moderate to high at stream reach scale	Moderate to high	**#5**

Project Descriptions and Implementation Schedule:

1. Fish Bay Watershed Group Young Growth Riparian Treatments.

Site Type/Description: Current riparian stand compositions consist of 381 total trees per acre, with conifer densities at 253 trees per acre. Conifer size distribution show the majority of trees are small in diameter and suppressed by other conifers and high density alders (128 trees per acre).

Treatment Objective/Description: Implement thinning strategies that will improve second-growth canopy conditions to improve low flows, riparian wildlife habitat and accelerate dominant tree growth for future sources of instream LWD. Objective will involve treatment of 379 acres of previously harvested riparian stands to reduce tree density and improve understory development. Thinning treatments should consist of a combination of girdling and thinning alders to release conifers to a minimum 20 foot by 20 foot.

Benefits: : Restored riparian habitat and increased conifer growth for future sources of LWD along 7.4 miles of Class 1 and 2 fish streams, improved fish rearing habitat in natural stream channels, improved bank stability and watershed function.

Outputs: 379 acres of riparian habitat restored

Project Phase/FY: Design and Restoration, FY 2007

Estimated Cost: $180,025

Funding Type(s): NFVW

Activity Type: Watershed Stewardship

Partnership Contribution: N/A

2. Fish Bay Watershed Group Young Growth Upland Treatments.

Site Type/Description : Current upland stand compositions consist of 545 total trees per acre, with conifer densities at 356 trees per acre. Conifer size distribution show the majority of trees are small in diameter and suppressed by other conifers and alders (190 trees per acre).

Treatment Objective/Description: Implement thinning strategies that will improve second-growth canopy conditions to improve wildlife habitat. Objectives will involve treatment 220 acres of previously harvested upland and beach fringe stands to reduce tree density and improve understory development. Thinning treatments should consist of a combination of girdling, thinning and gap creations to meat wildlife habitat objectives.

Benefits: Restored wildlife habitat and increased understory development to enhance and restore deer winter range habitat and survivability.

Outputs: 220 acres of wildlife habitat restored

Project Phase/FY: Design and Restoration, FY 2007

Estimated Cost: $104,500

Funding Type(s): NFWF

Activity Type: Wildlife Stewardship

Partnership Contribution: N/A

3. Analysis Area Water Quality, Fish Habitat and Passage Improvements

Site Type/Description: 12 miles of system road: Scope of problems identified through the RCS process. 22 stream crossing structures remain, 10 of which area on class 1 or 2 fish streams.

Treatment Objective/Description: Remove all remaining 22 structures through the use of explosives so as not to cause excessive disturbance of vegetated road surface.

Benefits: Restored anadromous and resident fish access, reduced sedimentation and improved watershed function and water quality.

Outputs: 12miles of system road restored.

Project Phase/FY: Design and Restoration, FY 2007

Estimated Cost: $48,600

Funding Type(s): CMRD, TRTR, NFWF, NFAF

Activity Type: Watershed Stewardship

Partnership Contribution: n/a