North Shore Development Submerged Logs Project

Environmental Assessment

Draft

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INTRODUCTION

This Draft Environmental Assessment (EA) has been prepared to determine the potential natural resource, social, and economic effects of permitting the salvage of submerged logs from past logging operations lying on the State-owned bed of Flathead Lake pursuant to a Settlement Agreement (October 2008) that was entered into by the State of Montana, Board of Land Commissioners(Land Board) and the Montana Department of Natural Resources and Conservation (DNRC) with North Shore Development Co., LLC (North Shore). This agreement determined North Shore to be the owner of all submerged logs marked with a circled "N" brand and the State of Montana to be the owner of all other submerged logs within the State-owned portion of Flathead Lake. Under this agreement, the Land Board agreed to issue North Shore an exclusive land use license for 10 years subject to requirements imposed by the Montana Environmental Policy Act (MEPA) and other applicable permits, laws and regulations. The proposed project area covers the State-owned bed of Flathead Lake north of Point Caroline and Long Beach (see map 1 of the proposed project area in the appendix).

PURPOSE AND BENEFITS OF THE PROPOSED ACTION

DNRC is proposing to grant a land use license to North Shore, in accordance with the October 2008 Settlement Agreement, to allow the salvage of submerged logs lying on the State-owned bed of Flathead Lake. In addition, the Montana Department of Environmental Quality (DEQ) is proposing to grant a 318 Authorization to North Shore for a short-term narrative water quality standard for turbidity within Flathead Lake. The project objectives are to: 1) capture the value from merchantable submerged logs lying on and in the bed of the State-owned bed of Flathead Lake; and 2) generate revenue for State of Montana school trust beneficiaries from the land use license fees and from the procurement of State owned logs. Additional benefits may include 1) the removal of navigation hazards posed by some submerged logs occurring in shallow areas of Somers Bay and 2) the increased supply of high quality historically significant wood to local manufacturers.

Under the proposed action, merchantable logs that are owned by North Shore and the State of Montana which are currently lying on the bed of Flathead Lake in Somers Bay and elsewhere in the project area, would be slowly lifted from the bottom of the lake by divers with the assistance of lift bags or cable winches so as to minimize any temporary disturbance of sediment on the lake bottom. The logs would then be floated to a staging area and taken out of the lake and transported for processing. Active log recovery operations would be limited to a designated 5-acre section of the project area. The active log recovery area would be marked with highly visible buoys so as to minimize any conflicts with recreational users. In order to maintain the integrity of the shoreline of Flathead Lake in its natural state, North Shore would not remove any logs from the shoreline or from the upslope below the low water mark in Flathead Lake. There would be no log removal activities within 1000 feet of the EPA superfund site in Somers Bay.

DECISIONS TO BE MADE

JOINT DECISION

Once the environmental analysis has been completed, including the 30-day public review period, DNRC Director Sexton and DEQ Director Opper will jointly issue a decision on the proposed action. The Decision Notice will determine 1) which alternative was selected 2) if the selected alternative meets the project objectives, 3) if the proposed project adequately addresses issues and concerns, and 4) if there is a need for further environmental analysis or to prepare an environmental impact statement. Director Sexton will soon after bring the joint decision before the Land Board for final approval.

RELEVANT AGREEMENTS, LAWS, PLANS, PERMITS, LICENSES, AND OTHER REQUIREMENTS

RELEVANT AGREEMENTS, LAWS, AND PLANS

- Settlement Agreement

North Shore is a Montana limited liability company. The company was formed in 2005 for the purpose of salvaging logs that had sunk in Flathead Lake during logging operations by the Somers Lumber Company, and which the company owned under a chain of title from the Somers Lumber Company. In September 2005 North Shore applied for and received a permit from the DEQ in connection with the proposed salvage operations (Authorization No. MTB006006 Short-Term Water Quality Standard for Turbidity Related to Construction Activity Pursuant to 75-5-318, MCA, Valid October 1, 2005 through September 30, 2006). However, in the Spring of 2006 the DNRC ordered North Shore to cease and desist any salvage operations and then commenced a legal action to determine ownership of the sunken logs. After extensive discovery in the litigation, the parties reached a settlement under which (1) the State acknowledged that North Shore as the owner of any submerged logs with a circled "N" end stamp found in or upon the State-owned bed of Flathead Lake; (2) North Shore acknowledged that the State is the owner of all other submerged logs found in or upon the State-owned bed of Flathead Lake; and (3) subject to MEPA and any required regulatory permits, the Land Board agreed to issue to North Shore a land use license under which North Shore would conduct log salvage operations on Flathead Lake. In October 2008, the Montana Eleventh Judicial District Court, Flathead County, entered a Consent Decree approving the settlement (Consent Decree).

The following have been determined to be other agreements, laws and regulations applicable to this project:

- Montana Environmental Policy Act (MEPA)

Since 1971 MEPA has been Montana's bedrock environmental law. In its simplest terms, MEPA institutes a "look before you leap" policy by requiring state agencies to consider the environmental, social, cultural and economic impacts of proposals before a project is approved. The purpose of MEPA is to foster state government decisions that are informed, accountable, open to public participation, and balanced.

- DNRC Administrative Rules for MEPA

The DNRC administrative rules under which it implements MEPA are ARM 36.2.501 through 543.

- DEQ Administrative Rules for MEPA

The DEQ administrative rules under which it implements MEPA are ARM 17.4.601 through 636.

- Lake and Lakeshore Protection Regulations, Flathead County, Montana

A Flathead County Lake and Lakeshore Construction Permit is required when working with heavy equipment from the high water mark to 20 horizontal feet above it. Since the logs are being floated directly to a trailer on a boat ramp, a Flathead County Lake and Lakeshore Construction Permit is not necessary. If in the future North Shore elects to utilize different extraction areas and utilize heavy equipment within 20 feet above the high water mark, a Flathead County Lake and Lakeshore Construction Permit would be obtained.

- Montana Water Quality Act- Water Quality Standards and Classifications

Flathead Lake is classified as an A-1 surface water (ARM 17.30.608). Under this classification, no increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA settleable solids, oils, or floating solids which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife (ARM 17.30.622).

- DNRC Real Estate Management Plan Rules (ARM 36.25.901 through 918)

The DNRC Real Estate Management Plan covers those activities related to the leasing, exchanging, or selling of School Trust lands for residential, commercial, industrial, and conservation purposes. Proceeds generated from leases, licenses, sales, and easements are used to support the beneficiaries of state school trust.

- Montana Boating Laws

The 2009-2010 Montana Boating Laws is produced by Montana Fish Wildlife and Parks (FWP). It contains specific information on the harassment of wildlife, diver down flag warning, required boating equipment and safety tips.

- FWP Aquatic Nuisance Plan

Aquatic Nuisance Species (ANS) have become a serious problem in Montana. ANS are non-indigenous plant or animal species that threaten the diversity and abundance of native species, the ecological stability of native infested waters, or the commercial, agriculture, aquacultural or recreation activities dependent on such waters. The Montana ANS Plan was an initial step in establishing a program to specifically address ANS issues. The goal of the Montana ANS Management Plan is to minimize the harmful ecological, economic and

social impact of ANS through prevention and management of introduction, population growth, and dispersal into, within, and from Montana.

- Montana Wildlife Laws- Nongame and Endangered Species Conservation Act (87-5-101 et seq., MCA) and provisions for wild birds

The Montana legislature, mindful of its constitutional obligations under Article II, section 3, and Article IX of the Montana constitution, enacted The Nongame and Endangered Species Conservation Act, in which the legislature found and declared:

1. that it is the policy of the State of Montana to manage certain nongame wildlife for human enjoyment, for scientific purposes, and to ensure their perpetuation as members of ecosystems:
2. that species or subspecies of wildlife indigenous to this State that may be found to be endangered within the State should be protected in order to maintain and, to the extent possible, enhance their numbers.
3. it is unlawful for a person to hunt, capture, possess, purchase or expose for sale, ship, or transport any wild bird, other than a game bird, or any part of the plumage, skin, or body of the bird, irrespective of whether the bird was captured or killed within the state, or to take or destroy the nest or eggs of a wild bird.

- Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana.

This Memorandum of Understanding and Conservation Agreement was developed to expedite implementation of conservation measures for westslope cutthroat trout and Yellowstone cutthroat trout throughout their respective historical ranges in Montana. This agreement is a collaborative effort among resource agencies, conservation and industry organizations, tribes, resource users, and private landowners. This Agreement serves to document Montana's efforts as part of a coordinated multi-state, range-wide effort to conserve westslope cutthroat.

- Restoration Plan for Bull Trout in the Clark Fork River Basin and Kootenai River Basin, Montana

This restoration plan for bull trout in Montana was developed collaboratively by, and is supported by the Montana Bull Trout Restoration Team. The purpose of this restoration plan is to provide the framework for a strategy to reverse or halt the decline of bull trout populations in western Montana, and restore populations in areas where they have declined. The plan is intended to guide state restoration efforts, and complement federal conservation and recovery processes.

FEDERAL, STATE AND LOCAL PERMITS OR REQUIREMENTS

- DNRC Land Use License

Under the Settlement Agreement, the Land Board agreed to authorize DNRC to issue North Shore an exclusive land use license for 10 years subject to requirements imposed by MEPA and other applicable permits, laws, and regulations.

- DEQ 318 Authorization

North Shore previously applied and received a 318 authorization from the DEQ. A 318 authorization is needed for conducting work in Montana's streams, wetlands, floodplains and other water bodies. The 318 Authorization allows the generation of turbidity/sediment for construction activity in State waters. Because the 318 authorization previously issued to North Shore is now out of date, another 318 authorization is needed.

- Lake and Lakeshore Protection Regulations, Flathead County, Montana

A Flathead County Lake and Lakeshore Construction Permit is required when working with heavy equipment from the high water mark to 20 horizontal feet above it. Since the logs are being floated directly to a trailer on a boat ramp, a Flathead County Lake and Lakeshore Construction Permit is not necessary. If in the future North Shore elects to utilize different extraction areas and utilize heavy equipment within 20 feet above the high water mark, a Flathead County Lake and Lakeshore Construction Permit would be obtained.

- Fish Wildlife and Parks Commercial Use Permit

North Shore has applied for a Montana Fish Wildlife and Parks Commercial Use Permit to use the Somers Bay boat launch to extract salvaged logs from Flathead Lake.

- U.S. Army Corps of Engineers 404 Permit

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material in wetlands, streams, rivers, and other U.S. waters. Because the project does not remove lake bed material and there would be no construction materials on the bed of Flathead Lake, a 404 permit is not needed.

- 310 permit

Montana's Natural Streambed and Land Preservation Act, also known as the 310 Law, is a State law which requires that any person planning to work in or near a perennial stream or river on private or public land must first obtain a 310 permit from the local conservation district. The Flathead Conservation District has confirmed that the proposed scope of work for the project does not require a 310 permit.

- Permit for Storm Water Discharge

The 1972 amendments to the Federal Water Pollution Control Act, later referred to as the Clean Water Act, prohibit the discharge of any pollutant to waters of the United States. In Montana a Storm Water Discharge Permit is required when construction activity results in the disturbance of equal to or greater than one acre of total land area. Because there is no land disturbance in connection with the proposed project, a Storm Water Discharge Permit would not be necessary.

- SMZ Alternative Practice

The Streamside Management Law provides minimum standards for forest practices in streamside management zones (SMZ). The SMZ encompasses a strip at least 50 feet wide on each side of a stream, lake, or other body of water, measured from the ordinary high water mark, and extends beyond the high-water mark to include wetlands and areas that provide additional protection in zones with steep slopes or erosive soils. North Shore would need to secure a SMZ alternative practice prior to conducting any activities.

- USFWS Compatibility Determination and Special Use Permit

This permit is required when doing any work in close proximity to a USFWS refuge or property. North Shore would not salvage any logs within 500 feet of the north shore of Flathead Lake including the Waterfowl Production Area. A special use permit would not be needed.

RELEVANT PAST, PRESENT, AND RELATED FUTURE ACTIONS

State agencies are required to consider past, present, and related future actions on state lands in the cumulative effects analysis. At present, there are currently no permitted DNRC activities in the proposed project area. The Army Corps of Engineers and DEQ have an outstanding permit for a "breakwater" on Flathead Lake to protect a boat dock, but the proposed activity is not anticipated to have an impact within the project area.

Lake trout is actively managed within the project area. In attempt to reduce lake trout populations in the lake, the Confederated Salish and Kootenai Tribes (CSKT) actively manages through a combination of sport fishing and gill netting. "Mack Days," sponsored by CSKT, is a popular lake trout fishing event that occurs twice a year. FWP has conducted gill netting within the project area near Somers Bay. These activities have been considered in the cumulative impacts analyses for individual resources listed in Chapter 3.

AGENCY AND PUBLIC INVOLVEMENT

PUBLIC INVOLVEMENT

With regard to the proposed project, the DNRC solicited initial public comments in early December 2008. The public comment period closed on January 8, 2009. Advertisements seeking public comment on the project were placed in the Missoulian, The Daily Interlake and the Bigfork Eagle. A postcard was mailed to

over 300 interested parties. Nine responses were received from the public- seven individuals and two organizations (Flathead Lakers and the Flathead Lake Biological Station). Comments focused on issues and concerns related to eleven general resource areas and are displayed in Table 1 Issues Analyzed in Further Detail and Table 2 Issues Eliminated from Further Analysis. In addition to initial public scoping, representatives from North Shore have held meetings with the Flathead Lake Biological Station to discuss the salvage operations and potential impacts it may have on the Flathead Lake ecosystem. The discussions with the Biological Station included the log retrieval process, potential mitigation measures and monitoring protocols. A newsletter updating the status of the project was mailed out to interested parties during the week of March 15, 2010.

AGENCY INVOLVEMENT

An Environmental Analysis Process Agreement (Process Agreement) was developed among the DNRC, DEQ, and North Shore in October 2009 to outline the tasks associated with the development of this project and to clearly identify duties and responsibilities of the agencies (DNRC and DEQ) and North Shore's contractor, Northwest Management, Inc. (NMI). One of the requirements of the Process Agreement was to form an Interdisciplinary Team (ID Team) to perform the environmental assessment for the project. The ID Team consists of:

1. NMI - Project Leader and resource specialists.
2. DNRC and DEQ MEPA coordinators.
3. Subcontractor resource specialists.
4. DNRC and DEQ resource specialist.

The first ID Team meeting was held November 3, 2009. In the first meeting the rules, laws and regulations that are applicable to the project, as outlined above, were discussed. A list of permits and agreements applicable to the project was also discussed. Finally individual responsibilities and timelines were established to help facilitate the MEPA process.

ISSUES IDENTIFIED THROUGH SCOPING

In the scoping process, DNRC and DEQ resource specialists, other agencies, and the public raised issues about the project's potential impacts on the environment. The ID Team reviewed the issues raised, and together determined which of the issues raised would be analyzed in greater detail, and which would be eliminated from further analysis. The following issues were considered in the development of project alternatives.

TABLE 1 ISSUES ANALYZED IN FURTHER DETAIL

Resource Area	Issue	Where Addressed in EA
Cumulative Effects	Salvage operations would have cumulative effects on Flathead Lake's water quality.	Chapter 1, Page 6, Chapter 3, Page 19.
Economic	There is a weak market for wood products. Additional mitigation costs associated with removing the logs would make the logs expensive. The economic value of Flathead Lake exceeds the value of logs.	Chapter 3, Page 33- 34 (Economics) . .
Fisheries	Removal of logs could impair fish habitat, opportunities for forage. Removal activities pose increased risk of contamination.	Chapter 3, Page 27-28.
Lake Ecology	Logs provide habitat for aquatic invertebrates. Removal of logs could disrupt lake biota and food web. Impacts to near shore insect habitat.	Chapter 3, Page 27-28. Chapter 3, Page 27-28 Chapter 2, Page 14.
Recreation	Logs pose navigation hazard.	Chapter 2, Page 15.
Water Quality	Further nutrient inputs could exceed TMDLs. Operations could contribute to further decline of dissolved oxygen. Mitigation would not protect water quality. Effect of sediment on water quality, dissolved oxygen, creosote, petrochemicals and other toxic materials.	Chapter 3, Pages 17-19. Chapter 3, Pages 17-19. . Chapter 3, Page 18-19.

Resource Area	Issue	Where Addressed in EA
Environmental Review	Independent scientific review should be conducted. Incorporate best available science, peer reviewed, including Flathead Lake Biological Station (FLBS) data.	Appendix A Chapter 3, Pages 17-19.
Socio-Cultural	Project could impact right to clean and healthful environment.	Chapter 3, Page 21.

TABLE 2 ISSUES ELIMINATED FROM FURTHER ANALYSIS

Issue	Rationale
Erosion/wetlands impact along North Shore	There would be no logs removed from the lakeshore. There would be no log removal activities within 1,000 feet of the Somers Bay superfund site, upwards of 500 feet from the low water mark along the north shore of Flathead Lake and a variable buffer distance (depending on the location of any legal water intake wells)along the east and west shores. North Shore would only salvage logs that are lying directly on the bottom of Flathead Lake. Any logs lying or submerged on the upslope to the low water mark would not be salvaged. Within Somers Bay 200 logs that were initially staged there have dispersed throughout the bay and would be salvaged. There would be no impact on erosion and subsequent loss of wetlands along the north shoreline and the U.S. Fish and Wildlife Service Waterfowl Production Area. The only logs removed would be those from past logging operations. Recruitment trees transported into the lake from the Flathead River would not be disturbed.
State should conduct an EIS	After the Draft EA has been distributed for public review and comments from the public have been addressed, the Decisionmakers (Directors Sexton and Opper) will issue a Decision Notice. Part of the joint decision will be to determine if the proposed action will impose significant impacts to the human environment according to the criteria listed in each agency's administrative rules for MEPA (ARM 36.2.524 and ARM 17.4.608). According to these ARMs, if the proposed action poses significant

	adverse impacts to the human environment, then an EIS would be required.
Identification and removal of only the Somers Lumber logs	Logs with the circled "N" end stamp would be removed under the land use license. Other logs that are on the lake bottom as a result of past logging activities may also be removed under the land use license with additional rent to be paid to the State in connection with such removal.
Salvage operation will set a precedent for other similar actions	The scope of this EA is limited to activities proposed by North Shore in the project area described. Any actions outside of the scope of this EA will be subject to appropriate environmental review.

CHAPTER 2 – ALTERNATIVES

DEVELOPMENT OF ALTERNATIVES

The following alternatives were developed by the proponent, North Shore, DNRC and DEQ personnel, public comments, and ID team input.

DESCRIPTION OF THE ALTERNATIVES

ALTERNATIVE A—NO ACTION

Under the no-action alternative no salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state. This alternative will be used as a basis for comparing the effects that the Action Alternative would have on the environment.

ALTERNATIVE B—ACTION

Under the action alternative, merchantable submerged logs would be removed from the State-owned bed of Flathead Lake. The sunken logs would be slowly lifted from the bottom of the lake by divers with the assistance of lift bags or cable winches so as to minimize any temporary disturbance of sediment on the lake bottom. The logs would then be secured to a pontoon boat and moved to landings where they would be floated onto a trailer and transported to a staging area.

PROPOSED PROJECT AREA

The proposed project area includes State-owned lake bed below the low watermark north of Pt. Caroline on the west shore and Long Beach on the east shore of Flathead Lake. North Shore would not conduct salvage operations within 1000 feet of the Somers Bay superfund site, upwards of 500 feet from the low water mark along the north shore of Flathead Lake, and a variable buffer distance (depending on the

location of any legal water intake wells) along the east and west shores. Please see Aerial Photo 1 Proposed Project Area and Aerial Photo 2 Proposed Buffer Zones in the appendix.

PROPOSED ACTIVITIES

If the action alternative is selected and the land use license approved by the Land Board, activities would occur soon after. The initial plan would be to start removing the logs in Somers Bay. These are the approximately 200 logs that were staged for removal under the 2005 permit that was granted to North Shore by the DEQ.

Log recovery operations would be limited to a designated 5-acre section in the license area until recovery is completed in the section, and then continue in the next 5-acre section approved by the DNRC. North Shore would plan to operate generally in a grid pattern, moving from one 5-acre section to an adjacent 5-acre section, unless prior log mapping activities have shown that the number of logs in the adjacent 5-acre section is not sufficient to make recovery efforts worthwhile in the particular section. In an attempt to minimize recreational conflicts North Shore would be willing to conduct salvage operations in a 5-acre section not contiguous with the grid pattern.

The surface area covered by a 5-acre section is an area approximately 466 ft. x 466 ft. North Shore would identify each 5-acre working section with GPS coordinates and report it to the designated contact person at the DNRC when approval is sought to move log recovery activities to another section. Before completing log recovery activities in any section, North Shore would report to the DNRC the next 5-acre section where North Shore plans to continue its log removal activities.

North Shore would complete the extraction and removal of the original 200 logs and then complete the extraction and removal of any logs within the first 5- acre parcel. North Shore would then move to the next adjacent 5-acre parcel.

Operating Season

North Shore would plan on conducting log salvage operations from approximately April thru November. During the summer months North Shore would adopt a flexible schedule of when they are operating and where in an attempt to minimize recreational conflicts.

Log Salvage Rates

North Shore estimates that it would initially salvage 20-30 logs a day. Once log salvage operations are refined and perfected the log salvage rate could peak at 50 logs a day. On average North Shore would salvage 800 logs a month or approximately 5,600 logs during the operating season.

Log Recovery Process

North Shore would plan to use two divers, a dive boat, and a specially designed log hauling pontoon boat. On each boat North Shore plans to use two people assisting the divers and helping secure the logs to the pontoon boats.

The 5-acre section in which log removal activities are being undertaken would be identified using GPS coordinates and marked with buoys and dive flags to show that diving is taking place within the section. Search lanes would be set up in the 5-acre retrieval area. The search lanes would initially be set up by using a floating line with a small weight approximately every 15 feet, allowing the divers to see the line as they perform the search. The search lines would be in a reel, and the boat would lay the line out from the reel for the length of the area to be searched. Several lanes approximately 25 feet apart would be laid out for the divers to search. Divers would start at one end of the search lane and zig-zag back and forth through the lane along the entire length attaching markers with lift lines or lift bags to the logs that are to be removed.

New technologies are expected to be released in the summer of 2010 that would allow the divers to use surface GPS that "ping" each diver's location within 3 meters of the diver. It is hoped that this would allow the search lanes to be established without using lines underwater. Because this technology is new and not tested, North Shore anticipates working with the manufacturer in the testing and is hopeful that the technology would be useful and reliable for finding submerged logs that are to be removed.

North Shore would not expect to have the divers attempt to distinguish between species of logs to determine which logs to raise after they are found, but instead would expect the divers to raise whatever logs are found regardless of their species. Likewise, North Shore would not expect its divers to try to distinguish, while diving and raising logs, cut logs which bear the circled "N" end stamp from other cut logs. North Shore would not raise any logs that are obviously rotted or which, for some other reason, do not appear to be salvageable. Likewise, North Shore would not raise any logs that appear to be naturally occurring or do not have cut ends.

Log Extraction Process

When logs are found, North Shore would expect to raise the logs using several methods. First, a line would be attached to the log by a diver. This would be accomplished by fishing a line under the log by hand and tying it to the log, but if it is not possible to run a line under the log by hand, the line would be attached to a curved firm tube that would slide under the log so that the line can be pulled around the log and then tied. The line may also be attached to a log by using fasteners such as eyebolts, lag screws, or hooks that would first be hammered into or screwed into the log as an attachment point to which the line can be tied. Once a line is secured to a log, the log would be raised to the surface using either lift bags or winches.

Lift bag method. If the lift bag method is used, the diver would carry lift bags that would be attached to the line on the log, and the lift bag (or multiple lift bags, depending on the size of the log) would be filled with air by the diver and would then become buoyant, which would pull the log to the surface. An air supply source would be carried by the diver to fill the lift bags. Once the lift bag reaches the surface, workers on the boat would retrieve the lift bag with the line attached to the log, and secure the log to the pontoon boat to take to the extraction point.

Boat winch method. If winches are used to raise the logs, the diver would secure either a small lift bag or a small surface float/marker to the line attached to the log, which would float up to the surface and carry the line to the surface. Once the line is brought to the surface, workers on the boat would retrieve the lift bag

or surface float/marker with the line attached to it and then attach the line to a winch, which would be used to winch the log to the surface where it would be secured to the pontoon boat to take to the extraction point.

Another possible method of raising logs follows the same general principles, but would use log tongs. The log tongs can either be lowered to a diver using a winch system, or brought down by a diver, with a line attached. The diver would manually attach the log tongs to a log, and once the grip is secure, the log can be raised to the surface using a winch or lift bags as described above.

Surface Operation

When logs are brought to the surface they would either have an eye bolt on the end or a rope secured to the end of the log. When the log is at the surface the end of the log would be secured to the boat using the eyebolt or the rope. A weighted rope would be lowered down the side log or logs and used to winch the lower end of the log to the surface. Several logs could be secured between the pontoons of the boat allowing the boat to securely take the logs to the extraction point. This method would allow the boat to be pulled over the top of the trailer at the extraction point and the logs attached to the trailer and un-attached from the boat. When longer distances are required to take the logs to an extraction point additional logs would be securely attached to the outside of the boat using the same method by attaching them to braces on the boat which would reduce the amount of trips needed to transport logs to the extraction site.

Extraction Points

FWP has given permission to remove the first 200 logs using the Somers Bay boat launch site. North Shore has applied for a restricted commercial use permit to use the boat launch site at different times throughout 2010. Flathead County has given verbal approval to use the Flathead County boat launch in Lakeside and is in the process of preparing a commercial use permit. North Shore is currently in negotiations with the North Flathead Lake Yacht Club, the Oshansey family and several other private landowners to possibly use their private properties as additional extraction points.

Extraction Process

When the logs are brought to either the Somers Bay boat launch site or the Flathead County boat launch site in Lakeside, North Shore anticipates that the logs would be removed using trailers similar to boat trailers. It is anticipated that other methods of extraction besides “trailering” could be used. It could be possible in the future to utilize a small barge to load the logs directly from the lake to the barge’s deck and then transport the logs to a boat launch or dock where they could be loaded with a self loading log truck.

Trailering

The log hauling boat would be driven onto a trailer, where the logs would be secured to the trailer and released from the boat. For example, a line would be attached from the trailer to an eyebolt on the log and the line attaching the log to the boat would be released and clipped back to the boat. The boat would back up from the trailer and the trailer (with the logs secured on it) would pull the logs out of the water and haul the logs to the staging area. The time at the loading ramp is anticipated to be similar to the time it takes to

load a boat onto a trailer, secure it, and pull it out. North Shore divers base their estimates of unloading time on their practicing the loading process in other waters and witnessing a similar submerged log salvage operation that has been active for several years in Lake Pend Oreille, in Northern Idaho.

Staging Area

The staging area would be located on property owned by Montana Log Homes at 3250 U.S. Highway 93 South, approximately 6 miles north of Somers Bay. After the trailers arrive at the staging area the logs would be taken off of the trailers by a track hoe or self-loading logging truck. The logs would then be sorted based on whether the log is branded with a circled "N" stamp or not. Further sorting by species is anticipated. Logs without a circled "N" stamp would be scaled at the staging area. NMI has developed proprietary software that is a modified Excel spreadsheet that accounts for all income generated from the sale of forest products. Money generated from the sale of non-branded logs would be retained in a trust account set up with Sterling Bank. NMI would mail out a bi-monthly project accounting statement to the DNRC that itemizes the trust accounts balance and any activity.

PROJECT DESIGN MEASURES TO REDUCE IMPACTS

Turbidity Minimization

- Salvage operations would be restricted or halted if adverse weather conditions such as storms, freezing weather, or other conditions might cause accelerated water turbidity, erosion, or any other condition which may have an adverse effect on State land or resources.
- Dredging, or use a scraper, bulldozer, front-end loader, backhoe, or hydraulic shovel to remove sediments would be prohibited.
- Divers would brush off sediment when they locate salvageable logs and as the logs are prepared for lifting. Based on observations by divers, there is normally only a thin film of sediment, at most, on the submerged logs on the lake bottom. Brushing off that film of sediment near the lake bottom (within approximately two feet) would allow the sediment to settle quickly and in the same area as the salvaged log.
- Divers would attempt not to stand or walk on the lake bottom to minimize sediment disturbance and restricted sight distance.
- The logs would be lifted straight to the surface to reduce any dispersal of silt during the lifting process.

Environmental Protection

- No log removal activities would take place within 1,000 feet of Somers Bay EPA Superfund site—twice the buffer recommended by DEQ and EPA.
- Log removal and loading would take place only at developed boat launches so as to minimize disturbance to the lake shoreline.

- No removal activities would take place within approximately 1000 feet of the north end of Flathead Lake, in the Flathead Waterfowl Production Area, or on the shoreline of Flathead Lake. The actual buffer distance would be established based on the location of the low water mark of Flathead Lake. No logs would be removed from the upslope towards the low water mark.

- Any boat or equipment that would be used in the lake would be cleaned in accordance with state law, including the Aquatic Nuisance Plan. FWP has facilitated the development of the Montana Zebra Mussel Working Group to prevent the spread of unwanted organisms.

- Boats would utilize four-stroke motors to prevent ejection of oil into the water.

- Each boat would be equipped with oil absorbent in the unlikely event oil or fuel is accidentally spilled into the water.

- North Shore would not be working above the high water mark of the lake, except at the designated boat launches. If a log was to fall off the trailer and disturb mineral soil, North Shore would reseed with a native grass/forb mix. North Shore would also monitor for noxious weeds and develop a noxious weed mitigation plan.

Reducing Recreation Conflicts

- Active areas would be well marked with buoys and flags and limited in size to one 5-acre parcel (approximately 466 ft. x 466 ft.) at a time. The actual area marked with buoys and flags would between 1 and 2 acres.
- North Shore would create a public information board in coordination with FWP's Jerry Sawyer. The sign would identify the submerged logs retrieval sites with images of the dive boat, log extraction methods, and the highly visible buoys and dive flags that would be used to delineate the active log salvage area. The display board would include the current location of the log removal activities.

- North Shore would not conduct any salvage operations on evenings when the North Flathead Lake Yacht Club holds their sailboat races. North Shore would also not conduct salvage operations during the Montana Cup sail boat races July 30-August 1 2010.

- North Shore would plan to use public boat ramps during off peak hours whenever possible.
- North Shore recognizes that recreation users have the priority and right away in using the public boat ramp and the waters within Somers Bay.
- Submerged logs lying near the surface that pose a hazard to boaters and recreationists would be removed.

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing environment and potential impacts to resources resulting from the salvage of submerged logs presently lying on the State-owned lake bed in the northern portion of Flathead Lake.

LAKE BED SEDIMENTS AND WATER QUALITY

Submerged log salvage would result in temporary disturbance of the lake bed that is comprised primarily of fine-grained sediments within the proposed project area, potentially resulting in temporary direct impacts to water quality. The analysis of lake bed sediments and water quality has been combined because of the interactive relationship between the two resources.

Affected Environment

Lake Bed Sediments

The Flathead River is the major sediment source for the lake. It annually contributes bedload sediment to an active delta proximal to the river's mouth, and the bulk of suspended sediment further into deeper portions of the lake. The active and inactive delta complex covers approximately 20 square kilometers of the lake's north end. Active sediment deposition and suspension occurs primarily during spring runoff in late April to early June.

Prior to 1938 and the construction of Kerr Dam, lake levels responded to yearly runoff, staying low during most of the year and then rising briefly during the spring runoff. The delta plain formed a large vegetated lobe extending into the lake. In 1939 the processes affecting the delta changed drastically. Since that time, artificially high lake levels have allowed storm waves to erode the delta plain, resulting in loss of historic habitat, and increased contributions to suspended sediment.

The particle size of lake bed sediments in the Somers Bay area of Flathead Lake has been characterized by Moore et al. (1982). The mean percent by weight consists of 60.2 percent clay-sized particles and 36.8 percent silt-sized particles. Using the mid point of the particle diameter range for each fraction (2.1 µm for clay and 33 µm for silt), the average particle diameter in surface sediments is estimated to be 14 µm. Recent investigation by North Shore divers has shown that the depth of the sediment layer deposited on the surface of the logs targeted for salvage is approximately 1/8 inch.

Somers Bay BNSF Site

The Burlington Northern Santa Fe Railway Company ("BNSF") operated a railroad tie treating facility in Somers immediately adjacent to Flathead Lake between 1901 and 1986. See Map1 Somers Bay EPA Superfund Site in the appendix. Various preservatives were used at the approximate 80 acre site throughout the history of its operation, including zinc chloride (1901 to 1943), chromated zinc chloride (1940 to 1943), and creosote/petroleum preservative mixtures (1927 to 1986). The Montana Department of Health and Environmental Science ("DHES"; currently DEQ and U.S. Environmental Protection Agency (EPA)) conducted several phases of investigation and remediation at the site beginning in the early 1980's and continuing through the present under the authorities of the Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Both heavy metals and polycyclic aromatic hydrocarbons (PAHs) were identified as the primary contaminants of concern.

Montana DEQ and EPA primarily targeted on-site soil and groundwater impacts for remediation beginning in 1993 through soil removal and a combination of in-situ and groundwater extraction/treatment techniques. Groundwater treatment systems were turned off in 2009 for an agreed-to interim period of two years. The site is currently in its second year of dormancy with on-going monitoring to determine the next phase of remediation, if necessary.

Of relevance to North Shore's proposed submerged log salvage project are the findings of several surface water quality and lake sediment sampling events conducted in areas of Flathead Lake proximal to the former tie-treating facility during the period 1985 through 1988. Review of those studies identified the Remedial Investigation (ERT, 1986) as most pertinent to the proposed project. A summary of data and information reviewed from those documents follows:

- *Surface water quality.* October 1985 sampling indicated that with the exception of zinc, concentrations of heavy metals (arsenic, chromium, copper, lead, and selenium) were all below laboratory method detection limits. Zinc concentrations ranged from 0.014 milligrams per liter (mg/L) to 0.021 mg/L, which is far below the DEQ human health standard of 5.0 mg/L. With the exception of acenaphthylene, fluorene, and benz(a)pyrene, all other polycyclic aromatic hydrocarbon ("PAH") concentrations were below laboratory method detection limits. Concentrations of these three constituents were reported in parts per trillion and fall well below respective DEQ human health standards.

- *Lake bottom sediment quality.* October 1985 sampling indicated that with the exception of zinc, other heavy metal concentrations were near or below background concentrations. Zinc concentrations ranged from 47µg/g to 79µg/g; background is considered to be 50µg/g. PAH concentrations were not found to be above detection limits in any of the sediments sampled.

- *Lake beach sediment quality.* During a beach sediment investigation conducted during April 1986, visual creosote impacts were noted in samples collected from borings along the rip-rap beach wall, and at the western edge of the Waterfowl Production Area – no laboratory analysis data was

available. In addition, approximately 40 cubic yards of visually contaminated beach sediment was removed from this area during April 1988.

Finally, the mobility of the subject contaminants resulting from the tie-treatment with creosote at the former BNSF site was evaluated to determine the potential for migration over the time period since last documented in the mid-1980's. Available research using treated ties indicate that creosote does leach out its constituents (primarily PAHs as discussed above), the leaching process is acute at the start and tapers off with time, and migration is limited to very short distances-maximum up to 10 meters horizontally, and not more than 60 cm vertically. Data on the migration into soils and water are contradictory, but the majority of the data indicate the migration process is limited with biodegradation process under aerobic conditions rapid (Brooks, 2004).

Water Quality

Flathead Lake is classified as an A-1 surface water (ARM 17.30.608). Under this classification, no increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in MCA 75-5-318), settleable solids, oils, or floating solids which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife (ARM 17.30.622). In addition, under Section 303(d) of the Federal Clean Water Act and Montana Water Quality Act (Chapter 75, Part 5) regarding Total Maximum Daily Loads (TMDL) Flathead Lake is listed as impaired for the beneficial use of aquatic life support. Contaminants addressed under the 303(d) listing include the following: mercury, nitrogen (total), phosphorus (total), polychlorinated biphenyls, and sedimentation/siltation.

Within the context of the proposed Project and of relevance to the A-1 classification and 303(d) listing, are potential impacts to water quality from re-suspension of lakebed sediment, and potential release of dissolved concentrations of phosphorus. In addition, public and agency scoping for the proposed Project identified these two contaminants as those of concern with regard to water quality.

The project team evaluated existing yet limited total suspended solids (TSS) information and data that has been collected as part of previous investigations and is directly related to sedimentation/siltation (i.e., turbidity) in Flathead Lake. Ellis et al. (2000) conducted water quality monitoring in Flathead Lake during spring runoff (April through July), collecting TSS data at multiple depths at one mid-lake station. The minimum and maximum TSS concentrations (milligrams per liter – mg/L) at each depth reported by Ellis et al. (2000) are provided below:

- 0 to 30 meters - <0.5 and 0.7;
- 5 meters - <0.5 and 1.5; and
- 90 meters - <0.5 and 0.5.

TSS data (mg/L) collected at this same station by the Flathead Lake Biological Station over a 20-year period extending from 1988 to 2007 are summarized below (FLBS, 2010):

- 0 to 30 meters – 0.5 to 1.5; and
- 5 meters – 0.5 to 14 (The maximum concentration occurred once during the 1988 field season. The majority of TSS concentrations were below 2 mg/L.);

These data indicate that TSS concentrations in Flathead Lake generally range from 0.5 to 1.5 mg/L, and occasional excursions to higher concentrations likely occur during spring runoff when TSS concentrations would be expected to be at their maximum. The Nutrient Management Plan developed for Flathead Lake infers that sedimentation/siltation effects to the lake primarily result from inflowing streams, and effectively serve as a contributor of adsorbed nutrients, primarily phosphorus (DEQ, 2001)

Related to re-suspension of lakebed sediments during log salvage operations is potential effects to dissolved oxygen ("DO") concentrations and a resulting increase in nutrient concentrations (i.e. phosphorus). Reduced DO levels (e.g., anaerobic conditions) can negatively influence the adsorption of phosphorus on sediments and result in release to the water column. DO levels in the near-shore shallow project area are expected to be at or near saturation levels due to shallow water and atmospheric availability.

Studies of similar aquatic environments indicate that an increased release of phosphorus to the water column may occur with sediment disturbance/resuspension (Smokorowski et al., 1999). Increased nutrient availability may further stimulate or increase phytoplankton growth that typically occurs in a temperate lake as the water column stratifies due to increasing surface water temperatures in the spring. Growth typically occurs in the near-surface zone that also receives sufficient light for plant photosynthesis resulting in an initial increase of chlorophyll α. Increased phytoplankton growth with resulting increased concentration of chlorophyll α can potentially result in decreased available light and dissolved oxygen to aquatic organisms.

Environmental Consequences

No-Action Alternative

Under the no-action alternative no salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

Total Suspended Solids (Turbidity)

Log salvage operations would likely cause a temporary increase in TSS (turbidity) levels in the immediate area of the log removal site resulting from disturbance of lake bed sediments. However, the level of increased sedimentation and dispersal would depend on a variety of factors such as the amount of sediment deposited on the logs, the depth in the water column where the logs are removed, and particle size.

To minimize potential for turbidity, North Shore proposes that the salvage divers would remove (sweep) the bulk of sediment from the logs prior to initiating the lifting operation. Divers would also be careful not to disturb the sediments on the lake bed as it could reduce visibility and slow down the salvage operation In addition, video review, and diver observations also indicate that the logs predominately rest on top of the sediments, and any burial in surrounding sediments is negligible. As a result, the bulk of the sediment disturbance would occur within approximately 2 feet of the lake bottom before the logs are raised to the surface. Calculations indicate that the time required for clay and silt particles characteristic of lake bed sediments in the project area to be re-deposited is at most approximately 1.9 hours if removed as proposed.

Salvage operations would transport multiple logs during each boat trip to the boat launch off-loading areas. Although turbidity would likely be cumulative in the immediate area of individual removed logs, the settling time indicated above would allow for re-deposition during the period necessary for transport and off-loading, resulting in very minimal cumulative effects from successive loads.

In addition, North Shore would conduct "real-time" turbidity monitoring during initial active salvage operations using University of Montana Flathead Lake Biological Station staff, students and resources. As TSS data is collected and analyzed during initial salvage efforts, North Shore would consult with the Biological Station, Montana DNRC, and other appropriate agencies to evaluate and implement modifications to its salvage procedures as warranted. These modifications could include frequency of logs salvaged and numbers, actual lifting techniques, transport techniques and numbers, and consideration of any seasonal variations in baseline conditions.

Heavy Metals and PAH Contaminants (Somers Bay BNSF Site)

In consideration of contaminants found in the lake beach sediments resulting from the former Somers Bay BNSF Site, DEQ and EPA personnel have indicated through recent correspondence to NMI that a 500 foot buffer zone extending from the high-water mark along the rip-rapped area of shoreline where beach sediment impacts were identified should become a condition of North Shore's Land Use Permit. In response, North Shore has proposed a buffer zone of 1,000 feet in that area that combined with its evaluation of contaminant occurrence and mobility (see Chapter 3, Somers Bay BNSF) eliminates any associated risk to water quality. Map 1, Somers Bay BNSF Site found in the appendix depicts the proposed 1000-foot buffer.

Dissolved Oxygen and Nutrients

As previously discussed, North Shore's log salvage operation, with its anticipated yet very localized disturbance of lake bed sediments, has potential to increase nutrient loads, primarily phosphorus, to the water column. Impacts (*i.e.*, increased phytoplankton growth and biomass) from any increase in nutrient loads would depend on several factors, including available phosphorus in sediment porewater, the time of year, and corresponding water column stratification, DO saturation, and light levels as affected by turbidity.

In response to these unknowns, North Shore proposes a cooperative effort with the University of Montana Flathead Lake Biological Station to conduct monitoring and sampling of nutrient levels and associated phytoplankton growth during initial salvage operations. If a marked increase in selected monitoring and sampling parameters occurs above baseline conditions, North Shore would consult with the Biological Station, Montana DNRC and other appropriate agencies to make appropriate modifications to its salvage procedures, and/or implement appropriate mitigations.

It is anticipated that the impact on water quality due to the project would be temporary, geographically limited to the location of log removal, and mitigated by removing the sediment near the lake bottom. Given the naturally occurring fluctuations in suspended sediments resulting from spring runoff, the log removal process used for the proposed project would have a minimal impact on water quality.

AIR

Affected Environment

The airshed in the Flathead Lake/Somers Bay area is of excellent quality. It is not included in the Kalispell air quality non-attainment area for PM-10 (particulates 10 micrometers or less).

Environmental Consequences

No-Action Alternative

Under the no-action alternative no salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

The boat engines and other vehicles used in the raising and transporting of the logs may create minor and temporary emissions within lawful levels. Road dust and other air-borne particulates would not be produced as the removal would occur over water and the hauling would occur on paved surfaces. Four-stroke engines would be used by the dive boat and pontoon boat to prevent additional smoke when starting or idling the boats engine. The proposed action would not create any additional objectionable odors, or alter air movement, moisture or temperature patterns, either locally or regionally. Thus, direct, indirect, and cumulative impacts to air quality as a result of the proposed action are expected to be minimal.

VEGETATION/WETLANDS

Affected Environment

The shallows, wetlands and sloughs found along the north shore of Flathead Lake, between Somers and the Flathead River, are maintained as a Waterfowl Production Area administered by the U.S. Fish and Wildlife Service. The existing native vegetation along the North Shore includes cottonwood, ponderosa pine, birch, willow, and red-osier dogwood mixed with cattail/reed canary grass marshes, temporary wetlands, and

small emergent pools. Along the east and west shores ponderosa pine and Douglas-fir grow in close proximity to the water along with willows and dogwoods.

Environmental Consequences

No-Action Alternative

Under the no-action alternative no log salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

Log salvage operations would not take place adjacent to any existing vegetation. Anticipated extraction points are either paved boat ramps or graveled ramps. North Shore would follow all guidelines for preventing the spread of aquatic nuisance plants. All boating and diving equipment would be washed and dried prior to entering the project area. Thus, direct, indirect, and cumulative impacts to vegetation and wetlands as a result of the proposed action are expected to be minimal.

FISHERIES/AQUATIC RESOURCES

Affected Environment

Flathead Lake is the largest natural freshwater lake in the United States west of the Mississippi River. Flathead Lake has a surface area of 122,885 acres and measures 27 miles long and 8 to 15 miles wide, with 160 miles of shoreline. The lake averages 153 feet deep, and is 371 feet deep at its deepest point. The lake's major tributaries are the Flathead and Swan Rivers, which provide 85 and 10 percent of the annual water to Flathead Lake, respectively. Approximately 65 percent of the annual inflows to Flathead Lake occur between May 15 and June 10 as a result of snowmelt from the surrounding mountains. Flathead Lake is considered oligotrophic (*i.e.,* oligotrophic means being deficient in plant life or algae) and monomictic (*i.e.,* one mixing period). Flathead Lake is listed on the 1996 and 2000 Montana 303(d) lists as impaired for the beneficial use of aquatic life support, with probable causes being related to nutrients (i.e., nutrients, noxious aquatic plants, organic enrichment/low DO, and algal growth/chlorophyll) (Montana DEQ 2001).

Eighteen fish species are known to occur in Flathead Lake including the following: bull trout (*Salvelinus confluentus*), lake trout (*Salvelinus namaycush*), westslope cutthroat trout (*Oncorhynchus clarki lewisi*), rainbow trout (*Oncorhynchus mykiss*), lake whitefish (*Coregonus clupeaformis*), mountain whitefish (*Prosopium williamsoni*), pygmy whitefish (*Prosopium coulterii*), largemouth bass (*Micropterus salmoides*), longnose sucker (*Catostomus catostomus*), largescale sucker (*Catostomus macrocheilus*), northern pike (*Esox lucius*), northern pikeminnow (*Ptychocheilus oregonensis*), black bullhead (*Ameiurus melas*), brook stickleback (*Culaea inconstans*), yellow perch (*Perca flavescens*), redside shiner (*Richardsonius balteatus*), pumpkinseed (*Lepomis gibbosus*), and peamouth (*Mylocheilus caurinus*) (Montana Fisheries Information System [MFISH] 2010). Nine of the eighteen fish species have been introduced to Flathead Lake including lake trout, rainbow trout, lake whitefish, largemouth bass, northern pike, yellow perch, pumpkinseed, brook stickleback and black bullhead.

Gill netting efforts conducted on Flathead Lake by MFWP between 1996 and 2005 show that the fish population is dominated by lake whitefish, northern pikeminnow, and peamouth. Yellow perch, lake trout and westslope cutthroat trout made up the majority of the remaining fish netted (Weaver et al. 2006).

The bull trout and westslope cutthroat trout populations in Flathead Lake have an adfluvial life history, meaning that they reside in the lake most of the year but migrate up the Flathead River, Swan River and their tributaries to spawn. The remaining 15 fish species are considered resident fish that spend their entire life in Flathead Lake.

Bull trout and westslope cutthroat trout are considered species of concern by the State of Montana, and the bull trout is listed as a threatened species by the U.S. Fish & Wildlife Service (USFWS) under the federal Endangered Species Act (ESA). Section 9 of the ESA prohibits take (*i.e.,* harm, harass, kill) of threatened or endangered species such as the bull trout, and prohibits adverse modification of designated critical habitat. On January 14, 2010, the USFWS proposed to revise the designation of critical habitat for bull trout under the Endangered Species Act of 1973, to include Flathead Lake as well as numerous other bull trout waters in Montana (Federal Register 2010). This is a proposed revision to the September 2005 bull trout critical habitat designation that did not include Flathead Lake. Further discussion relative to bull and cutthroat trout follows.

Bull Trout

The bull trout is ranked globally as G3 (globally the species is considered potentially at risk because of limited and/or declining numbers, range, and/or habitat, even though it may be abundant in some areas), and is ranked by the state of Montana as S2 (at risk because of very limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state) (MNHP 2010).

In June 2000, the State of Montana released the *Restoration Plan for Bull Trout in the Clark Fork River Basin and Kootenai River Basin*, Montana (Montana Bull Trout Restoration Team (MBTRT) 2000). The purpose of the restoration plan is to provide the framework for a strategy to reverse or halt the decline of bull trout populations in western Montana, and restore populations in areas where they have declined. The plan provides general guidance for conservation and protection of those populations that are stable or increasing, as well as recommendations to restore populations that have declined. Within the plan are designated "restoration/conservation areas" (RCAs), one of which includes much of the Flathead system (Flathead Lake, Middle and North Forks Flathead River, South Fork Flathead River above Hungry Horse Dam).

Additionally, within each RCA, core areas have been identified for bull trout. Core areas are watersheds, including tributary drainages and adjoining uplands, used by migratory bull trout for spawning and early rearing, and by resident bull trout for all life history requirements. Core areas typically support the strongest remaining populations of spawning and early rearing bull trout in a restoration/conservation area, and are usually in relatively undisturbed habitat. Nodal habitats are those used by sub-adult and adult bull trout as migratory corridors, rearing areas, overwintering areas, and for other critical life history requirements. Flathead Lake is classified as such a nodal area (MBTST 2000).

Within the Flathead Lake, North, and Middle Fork RCA, risk factors to bull trout have been identified and include: illegal introductions, fisheries management, upland forestry practices, population trend, and abundance. Restoration goals identified for the Flathead RCA include:

- Maintain or restore self-sustaining populations in the core areas;
- Protect the integrity of the population genetic structure; and,
- Enhance the migratory component of the population.

Lakes and reservoirs are important to adfluvial bull trout populations. In six of the 12 bull trout restoration/conservation areas (Flathead, Swan, South Fork Flathead, Upper Kootenai, Lower Kootenai, and Lower Clark Fork), large bodies of standing water form the primary habitat for rearing of subadult migratory bull trout and provide food and cover for fish to achieve rapid growth and maturation. Despite the importance of lakes and reservoirs, very limited information is available range-wide on habitat use by bull trout in these waters. In general, bull trout appear to be bottom oriented in lakes, but use relatively shallow zones (less than 40 m; 130 ft), provided water temperatures there are less than 15 degrees C (59 degrees F). During summer, bull trout appear to primarily occupy the upper hypolimnion of deep lakes, but forage opportunistically in shallower waters. River/lake transition zones appear to be particularly important habitats. Introduced species, especially lake trout and mysis shrimp (*Mysis relicta*) in combination, have been implicated in drastically altering the food web where they occur, which has led to declines or extinction of bull trout in many lakes. Although poorly understood at this time, habitat conditions in lakes and reservoirs are potentially critical to persistence of migratory bull trout populations and require additional investigation (Montana AFS 2008).

Declines in bull trout abundance and distribution have been caused by habitat loss and degradation from land and water management practices; population isolation and fragmentation from dams and other barriers; competition, predation and hybridization with introduced non-native fish species (lake trout, northern pike, brook trout, and others); historical overharvest; and poaching. Although their numbers and distribution have declined from historical levels, bull trout populations exhibiting resident and migratory life histories can be found throughout their historic range in Montana (MFWP 2010b).

Bull Trout Status in Project Area

Gill netting data collected at various locations throughout Flathead Lake show an overall decreasing trend in bull trout numbers over time. In 1981 and 1983, bull trout comprised 10 and 13 percent of fish caught; however, since 1999, bull trout comprised only 0.4 to 2.5 percent of fish caught. The number of bull trout caught per net has dropped from 2.6 and 1.6 fish per net in 1981 and 1983 to a range of 0.1 to 0.5 fish per net since 2000 (Weaver et al. 2006).

Three long-term spring gill netting locations are within the proposed project area. The survey locations are Point Caroline, immediately east and outside of Somers Bay, and in the bay just south of Wayfarers State Park in Bigfork. Between 1995 and 2009, the spring gill net surveys conducted for bull trout in the project

area show a range of 0.17 to 1.33 fish per sinking net and from 0 to 1.17 fish per floating net at the three locations combined (pers.comm Deleray 2010).

The MFWP fisheries biologist considers Somers Bay to be one of the most important areas for bull trout in Flathead Lake with extensive use by both sub-adult and adult fish. Bull trout reside in the proposed project area year round and are known to stage in large numbers in the proposed project area prior to their spawning runs to upstream habitats in the Flathead drainage. Pre-spawning adult bull trout congregate in between April and July and begin to run upstream to the mouths of spawning streams as early as April. Based on spring gill netting data from 2000-2009, of the 154 total bull trout caught in gill nets on Flathead Lake 82 (53%) were caught in Somers Bay. Somers Bay provides suitable shallow shoreline habitat for many of the forage fish (minnows, suckers, mountain whitefish, etc.) that sub-adult and adult bull trout are dependent on for food. The MFWP fisheries biologist did not speculate on the significance or value of the logs as habitat for bull trout or their prey base as no studies have been conducted, but the likelihood that some of the logs provide value as habitat in the area certainly exists. The eastern shoreline of the lake is not as valuable habitat as the northern and northwestern shorelines due to the steep topography and deeper water depths which limits foraging by fish (pers. Comm. Deleray).

Westslope Cutthroat Trout

Westslope cutthroat trout are ranked globally as G4T3 (globally the species is considered uncommon but not rare [although it may be rare in parts of its range], and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern) (T3 means the subspecies or population is considered potentially at risk because of limited and/or declining numbers, range, and/or habitat, even though it may be abundant in some areas), and is ranked by the state of Montana as S2 (MNHP 2010). The westslope cutthroat trout is one of two subspecies of native cutthroat found in the state. Together, they have been designated Montana's state fish. The westslope cutthroat's historic range included all of Montana west of the Continental Divide as well as portions of the upper Missouri River drainage (MFWP 2010b).

Westslope cutthroat trout have three possible life forms, adfluvial (migrates to lakes), fluvial (migrates to rivers) or resident (stays in streams). All three life forms spawn in tributary streams in the springtime when water temperature is about 10 degrees Celsius and flows are high. While resident fish spend their entire life in tributary streams, migratory life forms can travel several hundred kilometers as they move between adult and spawning habitat (MFWP 2010b).

Westslope cutthroat are common in both headwaters lake and stream environments. Cutthroat trout spawn between March and July depending on elevation, with the first year of spawning occurring at 4 to 5 years of age (Natureserve 2010). The eggs hatch in a few weeks to a couple of months. The newborn fry frequently migrate back to lakes to rear after 1 to 4 years in their native stream (MFWP 2010b). The average size of these fish is 6 to 16 inches, depending on habitat, but they rarely exceed 18 inches in length. The diet of cutthroat trout consists mainly of aquatic and terrestrial insects and zooplankton, they consume very few fish (Natureserve 2010).

This fish has been seriously reduced in its range by two primary factors: hybridization with rainbow and/or Yellowstone cutthroat, and habitat loss and degradation (MFWP 2010b). In addition, lake trout are known to be effective predators on cutthroat trout, and lake whitefish have also caused cutthroat trout declines through competitive interactions (Natureserve 2010).

In 2007, MFWP facilitated preparation of the *Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana* (MFWP 2007). Many state, local, and federal agencies; non-governmental organizations, and Montana tribes are signatories to the Memorandum/Agreement, including Montana DNRC. The Memorandum/Agreement's overarching goals for cutthroat trout in Montana are to: 1) ensure the long-term, self-sustaining persistence of each subspecies distributed across their historical ranges as identified in recent status reviews, 2) maintain the genetic integrity and diversity of non-introgressed populations, as well as the diversity of life histories, represented by remaining cutthroat trout populations, and 3) protect the ecological, recreational, and economic values associated with each subspecies (MFWP 2007). As the Agreement puts in place a primarily conservation-based program, its applicability to actions such as that being analyzed in this document are focused on any opportunities to conserve and/or maintain cutthroat trout in the vicinity of the project area.

Westslope Cutthroat Status in Project Area

Gill netting data collected at various locations throughout Flathead Lake show an overall decreasing trend over time. In the early 1980s, westslope cutthroat trout made up 20 to 40 percent of the catch while in recent years less than 20 percent. Compared to the early 1980's with a catch per unit effort of two to three fish per net, in recent years the catch has ranged from 0.5 to 1.6 fish per net. From the 1990's to the 2000's there has been a slight increasing trend for westslope cutthroat trout with four of the six years between 2000 to 2005 showing a catch rate of 1.0 fish per net or greater (Weaver et al. 2006).

Three long-term spring gill netting locations are within the proposed project area. The survey locations are Point Caroline, immediately east and outside of Somers Bay, and in the bay just south of Wayfarers State Park in Bigfork. Between 1995 and 2009, the spring gill net surveys conducted for westslope cutthroat trout in the proposed project area show a range of 0 to 2.2 fish per floating net at the three locations combined (Deleray 2010).

Westslope cutthroat trout reside in the proposed project area year round and are known to stage in large numbers at the mouth of Flathead River prior to their spring spawning runs to upstream habitats. Westslope cutthroat also use the east side of the lake near Bigfork (Deleray 2010).

Fisheries and Aquatic Habitat

Water depths in the Somers and Kalispell bay areas are fairly shallow with the majority ranging from 20 to 60 feet with one deep pocket just west of the mouth of the Flathead River that is approximately 100 feet deep. On the east side of the proposed project area near Bigfork water depths range from 20 to 160 feet with tight contours indicating steep drops in elevation over short distances. From the available information (e.g., diver observation, underwater video) on the substrate in the proposed project area it appears that the majority is composed of fine sediment (silt/sand) with little vegetation. Underwater images of the

proposed project area showed primarily individual logs covered in fine silt and scattered over the flat lake bottom. Estimated density of these logs is approximately 30-50 logs per acre. Structure provided by the logs likely adds some local diversity to fisheries and aquatic habitat, though the actual value of this structure habitat is difficult to ascertain. Several studies have been completed that document the importance of woody debris in aquatic systems including its value as cover/shelter for aquatic species and bank/shoreline stabilizing material, etc. The bulk of these studies however, were focused on riverine and stream habitat provided by woody debris (Fausch and Northcote 1991, Beechie and Sibley 1997, Christensen et. Al. 1996) In these studies, it was found that pool formation, bank stability, and hiding cover were the most important attributes in providing habitat for certain fish species. The primary value of woody debris in lake environments were related to near shore (littoral zone) habitat that can provide shoreline erosion protection and clusters of wood as well as complex branching that provides horizontal and vertical structure for hiding, sheltering, and additionally, substrate for zooplankton growth. In comparison to natural recruitment trees (which would not be disturbed) that have branches and/or root wads which increase their structural diversity and provide cover habitat, these pre-cut logs are linear and most lie directly on the lake bed.

Other Aquatic Species

The zooplankton community in Flathead Lake is comprised of two cladocerans, *Daphnia longiremis* and *Leptodora kindtii*. A study from the late 1990's, showed the zooplankton community had stabilized with a shift from dominance by large cladocerans to small cladocerans, copepods, and rotifers (Stanford et al. 1997). Aquatic invertebrates known to occur in the lake and potentially in the project area include mayflies, midges, crayfish, snails, and mussels.

Environmental Consequences

No Action

Under the No Action Alternative, Project activities would not occur. Fisheries and aquatic habitat in the Project Area would remain unchanged from what is currently present. No Project-associated impacts to aquatic resources would occur.

Action Alternative

Potential environmental impacts associated with the action alternative would include minor habitat modification in those portions of the project area where salvage occurs, short-term displacement of fish in the immediate vicinity of ongoing salvage operations, and short-term sediment suspension in the immediate vicinity (and dispersal envelope) of ongoing and recent salvage operations. The majority of the submerged logs are lying directly on the lakebed. A more in-depth discussion of these potential impacts to fisheries and water quality is provided below.

Habitat Modification

Habitat impacts associated with the project would include a reduction in log density in areas selected for salvage, with a corresponding reduction in available "structure" habitat. As stated earlier, it is understood

that most of the merchantable logs that would be salvaged are lying individually scattered on the bed of the lake, and therefore providing only horizontal "structure" as potential habitat. While these logs may likely provide some habitat for aquatic species, the diversity provided by the logs is considered relatively low, and the impact associated with the removal of the logs is considered minor. Likewise, North Shore would not remove any logs within 1,000 feet of the north shore and on the upslope of the low water mark on Flathead Lake. These logs would continue to contribute to near shore habitat for fisheries and aquatic organisms within the project area.

Throughout the license period, we expect a maximum of approximately 5,000 logs per year would be removed over the entire project area, resulting in a corresponding reduction of potential habitat in the project area. As stated earlier, no "natural" recruitment logs would be removed during salvage operations, and these logs would remain and serve to provide habitat in the future.

Fish Displacement

Salvage operations would include surface and sub-surface activity in the immediate vicinity of salvaged logs. Surface activity would include operation of the dive boat and the pontoon boat. Subsurface activity would consist of two divers swimming along the bottom and conducting associated salvage activities as described in Chapter 2. Because of the nature of the operation, the potential disturbance to and/or displacement of individual fish, would be limited to the general area in the vicinity of the pontoon boat. As logs are salvaged in one location, activities would progress along search lines to the next log or group of logs. Thus, the associated disturbance would progress with the search and salvage operation. It must be noted, as described in the *Proposed Action* section, that salvage operations would take place in specific 5-acre plots or sections of the project area, so the maximum extent of potential disturbance at any one time would be each 5-acre section, though in reality the extent of potential disturbance would be limited to the immediate vicinity of the active salvage operations. No salvage operations would occur at the mouth of the Flathead River.

Additional surface activity associated with the project would be the travel of the pontoon boat from a search section to the unloading area. This activity would be generally comparable to existing recreational boat traffic relative to its potential to displace or otherwise impact fish inhabiting the immediate area (see *Recreation*). North Shore anticipates salvaging 20-50 logs a day and averaging 400- 800 logs per month.

Suspended Sediments

This section describes potential effects of resuspended sediments on fish. Resuspension of bed sediments can result in physical impairment (*e.g.*, gill abrasion, reduced ability to locate prey and avoid predators); elevated nutrient concentrations; and toxicity due to sediment-associated contaminants. See also Lake Bed Sediments and Water Quality above for a discussion of water quality in Flathead Lake.

No sediment quality information was located for the proposed project area. Therefore this analysis will not address potential toxicity associated with sediment resuspension.

A range of studies have illustrated the effects of turbidity levels beyond natural background on the physiology and behavior of salmonids. High concentrations of suspended solids may be fatal to salmonids, while lower concentrations of suspended solids and turbidity may cause chronic sublethal effects such as loss or reduction of foraging capability, reduced growth, reduced resistance to disease, increased stress, and interference with cues necessary for orientation in homing and migration (Bash et al., 2001). Salmonid populations not normally exposed to high concentrations of natural turbidity or exposed to anthropogenic sediment sources may be adversely affected by levels of turbidity considered to be relatively low. Low levels of turbidity appear to correspond to suspended sediment concentrations that may adversely affect coldwater salmonids (Bash et al., 2001).

Suspended sediment effects on salmonids can be grouped into three categories: lethal, sublethal and behavioral (Bash et al., 2001). Lethal effects kill individual fish, cause overall population reductions, and damage the capacity of the system to produce future populations. This category includes reductions caused by sublethal or behavioral effects. Sublethal effects relate to tissue injury or alteration of the physiology of an organism. Effects are chronic in nature and while not leading to immediate death, may produce mortalities and population decline over time. Behavioral effects are described as any effect that results in a change of activity usually associated with an organism in an undisturbed environment. These changes may lead to immediate death or population decline or mortality over time.

While many laboratory studies have demonstrated the effects of suspended sediments on salmonids, the cumulative impact is difficult to capture. Many of the impacts may be synergistic in nature; such that one impact can lead to a host of other impacts that may affect the growth, reproduction, and survival of fish. The following factors mediate effects of suspended sediment on salmonids (Bash et al., 2001):

- Duration of exposure;
- Frequency of exposure;
- Toxicity;
- Temperature;
- Life stage of fish;
- Angularity of particle;
- Size of particle;
- Type of particle;
- Severity/magnitude of pulse;
- Natural background turbidity of area (*e.g.* watershed position, legacy);
- Time of occurrence;
- Other stressors and general condition of biota; and
- Availability of and access to refugia.

Table RES-1 in the appendix summarizes the results of various studies assessing the impacts of suspended sediments on those salmonid species that occur in Flathead Lake. Reduced survival in juvenile rainbow trout has been reported at suspended sediment concentrations as low as 90 mg/L while reduced growth has been reported in the same species at 50 mg/L (Bash et al., 2001). The 96-hour LC_{50} (concentration

resulting in mortality in 50 percent of the test population) in juvenile whitefish was reported to be 16,613 mg/L, while that in juvenile rainbow trout was reported to be 19,364 mg/L (Bash et al., 2001).

It is difficult to determine the effect of sediments of various sizes and shapes based on laboratory experimentation owing to the complexity of natural systems. In addition to the character of the material, a number of other factors must be considered in evaluating salmonid response to suspended sediments. These factors include the life history stage, presence of cumulative stressors, availability of refugia that are well distributed, connected, and accessible, condition of biotic community, frequency and magnitude of exposure to suspended sediments, and the physical processes associated with hydrology, sediment input, transport, and storage present in a particular watershed. Past land use practices within a watershed are also of import (Bash et al., 2001).

The log removal activities in connection with the proposed project are likely to result in short-term local turbidity increases in the immediate vicinity of active salvage operations. The elevated turbidity has potential to impact fisheries and aquatic resources through direct exposure, though we anticipate that the level of the actual impact would be minimal for several reasons including:

- the proximity of divers would likely displace any fish in the active salvage area, and thus minimize risk of exposure to the temporarily disturbed sediment;

- the resuspension of sediment is expected to be limited in time and scope (and thus exposure risk), since sediment that is disturbed during salvage operations is expected to return to the lake bed within at most 1.9 hours; and

As discussed in the Lakebed Sediments and Water Quality section above, North Shore would work with the Flathead Lake Biological Station to develop a monitoring program and, if needed, additional sediment mitigation strategies, which could include modifying: frequency of logs salvaged and numbers, actual lifting techniques, transport techniques and numbers, and consideration of any seasonal variations in baseline conditions.

WILDLIFE/ THREATENED, ENDANGERED AND SPECIAL STATUS SPECIES

Affected Environment

The shallows, wetlands and seasonal mudflats found along the north shore of Flathead Lake and adjoining uplands support a wide diversity of birds during all seasons, particularly during migration, when the area is heavily used by flocks of waterfowl, waterbirds and shorebirds. Overall a minimum of 229 bird species are known to occur here, and 172 of these are regular, common or abundant seasonally. There are four bald eagle nesting territories within the Flathead Waterfowl Production Area.

Shoreline and offshore habitats are important to overwintering waterfowl and gulls, along with small concentrations of bald eagles. The north shore regularly supports flocks of tens of thousands of mixed waterfowl species during spring migration. Offshore habitats are important during winter when up to 2000 mixed diving ducks and 100-200 tundra swans overwinter there.

There are a variety of shorebirds known to use the area primarily during spring migration. The north shore is also a major staging and roosting area for gulls during spring and fall migration, with upwards of 5,000 gulls a day.

Environmental Consequences

No-Action Alternative

Under the no-action alternative no log salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

Potential environmental impacts with the project in regards to wildlife could be temporary displacement of waterfowl as the dive boat moves across the water within the project area. Foraging and feeding osprey and bald eagles could also be temporarily displaced. Overall the log removal activities are expected to have minimal impact on the above mentioned species. The surface activities of the log removal boats have a comparable impact as a recreational motorized boat. Because the salvage operation is occurring on average 500 -1000 feet from the shoreline it is anticipated that there would be little or no disturbance to shorebirds and gulls. North Shore also does not anticipate salvaging logs from late November to early April so there should be no impact to overwintering birds.

NOISE

Affected Environment

Recreational and commercial boat use, Montana Highway 95 and other commercial projects around the north end of Flathead Lake all contribute noise to the project area.

Environmental Consequences

No-Action Alternative

Under the no-action alternative no log salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

Boats and trucks used in the log retrieval operation would create minor temporary engine noise. This noise is not expected to cause an impact as it would not measurably increase existing noise from recreational and commercial uses on the lake. Furthermore, the noise would be temporary, periodic and would occur mostly during daylight hours.

RISK/HEALTH HAZARDS/SAFETY

Affected Environment

Flathead Lake is used by several recreationists and commercial fishing operators all of whom are required to abide by Montana State Boating Laws. These laws contain specific information on the harassment of wildlife, diver down flag warning, required boating equipment and safety tips.

Environmental Consequences

No-Action Alternative

Under the no-action alternative no log salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

Recreational boaters, sailors and anglers would continue to be travel through the project area throughout the operating season. North Shore would conduct salvage operations in 5-acre sections. To minimize safety risks potentially posed by the operations within the active sections, the divers would place fluorescent buoys and dive flags delineating the working perimeter of approximately 1-2 acres in size. Likewise, North Shore would yield to recreational boaters when transporting logs to landing sites. North Shore would adopt a flexible work schedule to minimize conflicts with other users on the lake.

Divers performing the log extraction would be certified at a minimum as a Rescue Diver with specialty training in Search and Recovery, Underwater Navigation, Project Aware, First aid/CPR. It is also expected that all other employees would be first aid/ CPR trained and trained as DAN Oxygen providers. Each transport boat would have a first aid kit on board, marine radios with emergency channel, and a cellular phone. The dive boat would have an oxygen kit with ample O2 to transport the diver to the closest medical facility in the case of a dive emergency, and an emergency plan form would be on board that would have all contact information for local medical facilities as well as emergency contact information for the closest re-compression chambers. Divers would have communication devices that would allow communication with the boat while underwater. Each diver would carry an alternate air source as well as a dive knife capable of cutting any line that they may become tangled in. Each person on board boats would have a personal flotation device.

Due to safety and operational precautions, direct, indirect, and cumulative impacts to health and safety are expected to be minimal.

COMMUNITY DRINKING WATER

Affected Environment

There are approximately 202 surface water rights within the project area boundaries; however, to the extent that those rights are used for domestic or irrigation purposes, the point of diversion is most likely

located within 100-150 feet of the shoreline, with most pumps located even closer (pers. Comm. DNRC Water Resources, Kalispell). Aerial photo # 3 Water Rights is located in the appendix.

Environmental Consequences

No-Action Alternative

Under the no-action alternative no log salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

This project may have a temporary, geographically limited impact on water directly within the project area when and in proximity to where the log removal activities are occurring. The removal activities would take place in a defined area away from surface water intakes. According to the Lake Bed Sediments and Water Quality Analysis, the bulk of the sediment disturbance would occur within approximately 2 feet of the lake bottom before the logs are raised to the surface. Calculations indicate that the time required for clay and silt particles characteristic of lake bed sediments in the project area to be re-deposited is at most approximately 1.9 hours if removed as proposed.

Salvage operations would transport multiple logs during each boat trip to the boat launch off-loading areas. Although turbidity would likely be cumulative in the immediate area of individual removed logs, the settling time indicated above would allow for re-deposition during the period necessary for transport and off-loading, resulting in no cumulative effects from successive loads. Thus direct, indirect, and cumulative impacts to community drinking water as a result of the proposed action are expected to be minimal.

PUBLIC SERVICES/TAXES/UTILITIES/ECONOMICS

Affected Environment

Employment in the wood products industry constitutes around 22% of labor income in the Flathead Valley (Bureau of Business and Economic Research, University of Montana 2009). Basic industries like forest products also generate wealth both directly and indirectly by "multiplying" economic benefit. In the US, every one forestry job generates 1.5 other jobs in the economy, and lumber and wood products manufacturing creates 2.3 jobs for each additional job created (US Bureau of Economic Analysis).

Environmental Consequences

No-Action Alternative

Under the no-action alternative no log salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

The proposed action would not have an effect upon or result in a need for new or altered governmental services. The proposed action would have a positive effect upon the local and state tax base and revenue by creating jobs in the removal and transport of the submerged logs, and by providing an increased supply of high quality wood to local mills. If the action alternative is chosen, North Shore would be paying the Licensor (State of Montana) rent at the annual rate of $21,000. In addition, if the action alternative is adopted, North Shore would pay the State additional rent under the land use license based on 5% of the total amount received in connection with the sale of any unstamped logs that are recovered and sold at a price of $1,000/mbf or less, and 10% of the total amount received in connection with the sale of any unstamped logs that are recovered and sold at a price of $1,001/mbf or more.

The proposed action would not result in a need for new facilities or substantial alterations of any of the following utilities: electrical power, natural gas, other fuel supply or distribution systems, or communications.

AESTHETICS/RECREATION

Affected Environment

Somers Bay boat launch receives extensive public use, averaging over 50,000 boat launches per year. Recreational motor boating, sailing and fishing excursions all launch from Somers Bay. “Mack Days” sponsored by The Confederated Salish and Kootenai Tribes in an attempt to reduce the number of non-native lake trout is held from March 12- May 23, 2010, Friday thru Sunday. Pick up times are from 2:00pm to 5:00pm Friday thru Sunday at the Somers Bay boat launch. The North Flathead Yacht Club is located in Somers Bay. Races and sailing clinics are scheduled throughout the summer months. Evening sail boat races originate from the Yacht Club during summer evenings. The 2010 Montana Cup is held July 30-August 1. Commercial fishing charters utilize the project area for commercial fishing trips as there is no commercial fishing on the Confederated Salish and Kootenai owned portion of the lake.

Environmental Consequences

No-Action Alternative

Under the no-action alternative no log salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

The proposed action would not result in any alteration of any scenic vista, or creation of an aesthetically offensive site or effect that is open to public view. There would be no alteration of the aesthetic character of a community or neighborhood. As the salvaged logs are sold and used locally, the unique character of the logs would enhance the aesthetics of local towns and neighborhoods.

Past and present use of the project area has been for recreation. Motor boating, sailing, sea-kayaking, fishing and wildlife viewing all would continue to occur in the proposed project area. However, except for the active 1-2 acre portion of the 5-acre section (an area approximately 466 ft. x 466 ft) where the divers would be working, the remaining project area would have no restrictions on recreational use. The 1-2 acre work zone would be marked with highly visible buoys and dive flags. The vast majority of commercial fishing activity takes place within the deeper waters of Flathead Lake where log salvation operations would not be occurring. North Shore would alter the schedule of operations so as not to conflict with existing recreational sporting activities including Mack Days and yacht races held by the North Flathead Yacht Club. User conflicts at loading and unloading areas would be avoided or minimized by yielding to recreational traffic on the lake and at the loading and unloading sites, and by conducting activities to the extent possible during off peak hours.

CULTURAL/ HISTORICAL RESOURCES

Affected Environment

The proposed project area includes State-owned lake bed below the low watermark north of Pt. Caroline on the west shore and Long Beach on the east shore of Flathead Lake. According to DNRC archaeologist Patrick Rennie, no cultural resources have been identified in the project area.

Environmental Consequences

No-Action Alternative

Under the no-action alternative no log salvage operations would take place. Environmental conditions, as described in the affected environment, would be expected to persist in the existing dynamic state.

Action Alternative

The proposed action would not destroy or alter any site, structure, or object of pre-historic, historic or paleontological importance. The proposed action would not cause any physical changes that would affect any unique cultural values or have any effect on existing religious or sacred uses of any sites or areas.

The proposed land use license states that representatives of the State Historical Society of the State of Montana shall at all reasonable times, upon written notification of the DNRC prior to entry, have the right to enter into the premises for the purpose of carrying out the duties assigned the Historical Society by the State Antiquities Act, Section 22-3-421, et seq., MCA.

If North Shore divers locate any submerged watercraft or any other cultural resources they would cease any operations that might endanger the resource and they would contact the DNRC archaeologist.

CHAPTER 4 - CONSULTATION, COORDINATION, AND PREPARATION

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Flathead Lake Biological Station

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APPENDIX

Calculations for Estimating the Amount of Sediment on the Surface of Salvage Logs

Reported Effects of Turbidity and Suspended Sediment Concentrations on Salmonids[1]

Location Maps and Aerial Photos

ESTIMATING THE AMOUNT OF SEDIMENT ON THE SURFACE OF SALVAGE LOGS

This Section describes the calculations used to determine the amount of sediment that could be present on logs to be salvaged in Flathead Lake, and the equations used to estimate the time that sediment particles would remain suspended in the water column after being washed off the logs.

The proposed salvage logs on the bottom of Flathead Lake will have accumulated a surface coating of sediment from the deposition of suspended particles over the period of time when the log reached the lake sediment to the present. Quantitative information on the amount of accumulated sediment on salvage logs in Flathead Lake is not available. An estimate of the maximum amount of sediment that could have accumulated on a log was obtained using the typical diameter of the logs (18 in) and an estimated angle of repose for accumulated sediments.

The angle of repose is the maximum slope angle that unconsolidated particles can maintain; at higher angles friction is not sufficient to counter the force of gravity and a particle will be transported down the slope (i.e., off the surface of a salvage log). A considerable body of scientific literature exists on the calculation of the angle of repose of submerged particles (e.g., Sleath, 1984; Miller and Byrne, 1966; Kleinhans and van Asch, 2005, and cited references). The angle of repose increases with decreasing particle size, increasing cohesiveness of the particles, increasing particle angularity, and decreasing uniformity of the particles; values can range from nearly 90 degrees to less than 20 degrees, depending on the values of these parameters (Miller and Byrne, 1966). An angle of repose equal to 33 degrees was selected to estimate the maximum accumulation of sediment on salvage logs; this value is within the range of average values reported for well rounded sand (32.2 – 33.5) by Miller and Byrne (1966).

Figure 1 shows a cross section of a salvage log with a 9 inch radius. The shaded area represents the theoretical maximum sediment that would accumulate at a given position along the log, assuming an angle of repose equal to θ_3. The amount of sediment on the log is calculated by first determining the area of the circle segment between Line c and Arc s (Equation 0.1). The segment area is then subtracted from the area of triangle ABC (Equation 0.2) to obtain the cross-section area of accumulated bulk sediment (Equation 0.3). The total mass of sediment on a single log (Equation 0.4) is calculated by multiplying the cross-section area of bulk sediment (sediment and pore water) by the length of the log (assumed to be 204 in.), (1 – sediment porosity), and the density of accumulated sediment particles (assumed to be 2.65 kg/L). Porosity data is not available for Flathead Lake sediments; the value of 0.45 is a typical value for sediments consisting primarily of silt and clay sized particles (http://www.geology.sdsu.edu/clases/geol1351/porosity.htm). The accumulated sediment is assumed to consist primarily of inorganic particles, therefore, a density of 2.65 kg/L (the density of quartz sand particles) was assumed for TSS calculations (Elert, 2009). The angles and line segment lengths used to determine the circle segment and triangle areas are shown below (all angles are measured in radians):

$$\text{Segment Area} = 0.5 * \left\lfloor (r * s) - (c * d) \right\rfloor = 9.654\ in^2 \qquad (0.1)$$

$$\text{Triangle ABC Area} = (0.5 * h * c) = 15.603\ in^2 \qquad (0.2)$$

$$\text{Cross Section Accumulated Sediment Area} = 15.603 - 9.654 = 5.949\ in^2 \quad (0.3)$$

$$\text{Sediment Mass} = \left[5.949\ in^2 * 204\ in * 0.0164 \left(\frac{L}{in^3} \right) * (1 - 0.45) * 2.65 \left(\frac{kg}{L} \right) \right] = 29\ kg \quad (0.4)$$

Where:

r = log radius	=	9.0 in.;
s = [r * (angle of θ)]	=	10.367 in.;
c = [2 * r * Sin(θ/2)]	=	9.803 in.;
d = [2 * r * Cos(θ/2)]	=	7.548 in.;
a = [(c/2) * Sin(θ_3/2)]	=	5.845 in.;
h = [a* Sin(θ_3]	=	3.183 in.;
θ = [180 – 2*θ_2], (66º)	=	1.152 radians;
θ_2 = [90 – θ_3], (57º)	=	0.995 radians; and
θ_3 = angle of repose, (33º)	=	0.401 radians.

The theoretical maximum depth of sediment on top of a 9-in. diameter log, assuming an angle of repose of 33°, is 1.4 in. Underwater observations of the amount of sediment on the proposed salvage logs indicates that sediment accumulations are substantially less than this depth, and are estimated to be approximately 1/8 in. or less (Jody Bakker, personal communication). Estimates of TSS were calculated by assuming a 1/8 in. accumulation of sediment along the Arc s shown in Figure 1.

ESTIMATING TOTAL SUSPENDED SOLIDS (TSS) FROM SALVAGE OPERATIONS

To estimate increases in TSS from log salvage operations, it is assumed that divers will brush accumulated sediment off the surface of a log before raising the log up through the water column. It is assumed that the initial increase in turbidity from this action would occur within a depth of 3 ft from the lake bottom and extend within a right cylinder equal to the length of the salvage log (17 ft). This assumption results in an initial TSS impact volume of 21,617 liters. Assuming that the sediment suspended in this volume is distributed equally within this volume, the increase in TSS from the salvage of one log is estimated to be 2,921 mg/L.

ESTIMATING THE DEPOSITION TIME FOR SUSPENDED PARTICLES

An estimate of the time required for particles suspended during log salvage operations to resettle to the lake bed was obtained by calculating the equilibrium fall velocity (W) for the estimated median grain size of particles that have accumulated on salvage logs. The equation used is shown below (Sleath, 1984):

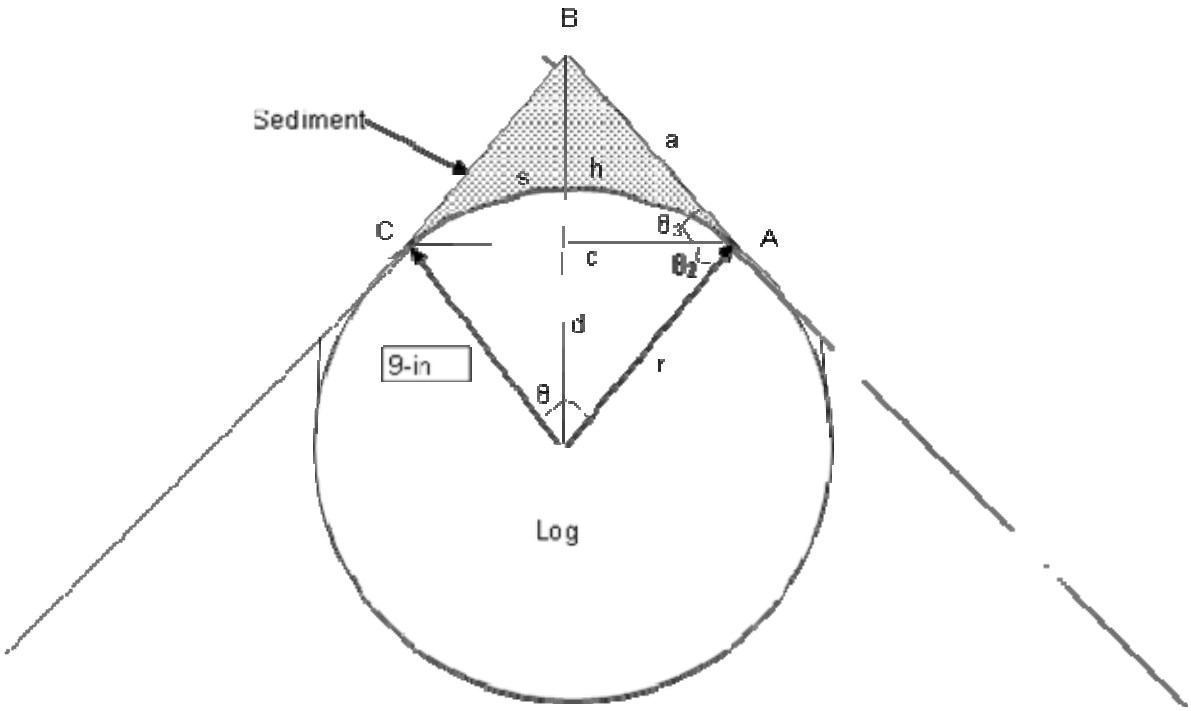
$$W = \left[\frac{g * D^2}{18 * \nu} \left(\frac{\rho_s - \rho_w}{\rho_w} \right) * CF \right] \qquad (0.5)$$

Where:

W = particle equilibrium fall velocity	=	0.000431 ft/s
g = acceleration of gravity	=	9.81 m/s^2;
D = median grain size	=	1.38E-05 m;
v = kinematic viscosity of water at 50° F =		1.31E-06 m^2/s;
ρ_s = particle density	=	2.65 kg/L; and
ρ_w = water density	=	1.0 kg/L.
CF = conversion factor from m/s to ft/sec	=	3.280833

The mean grain size (percent weight basis) of surficial sediments in Flathead Lake consists of 36.8 percent silt-sized particles and 60.2 percent clay-sized particles (Moore et al., 1982). A weighted average using these fractions and a mean particle diameter for silt (33 µm) and clay (2.1 µm) sized particles was used to estimate the particle diameter used in Equation (0.5).

Using equation (0.5), if sediment particles are suspended 3 ft above the lake bottom during salvage operations, it is estimated that it would take 1.9 hrs for the particles to resettle to the lake sediments.



GEOMETRY FOR CALCULATING LOG SEDIMENT AREA

Flathead Lake Log Salvage
Flathead Lake, Montana

By: KAM Date: 03/01/10 Project No. A00249.000

AMEC Geomatrix

TABLE RES-1

REPORTED EFFECTS OF TURBIDITY AND SUSPENDED SEDIMENT CONCENTRATIONS ON SALMONIDS[1]

Flathead Lake Log Retrieval Environmental Assessment

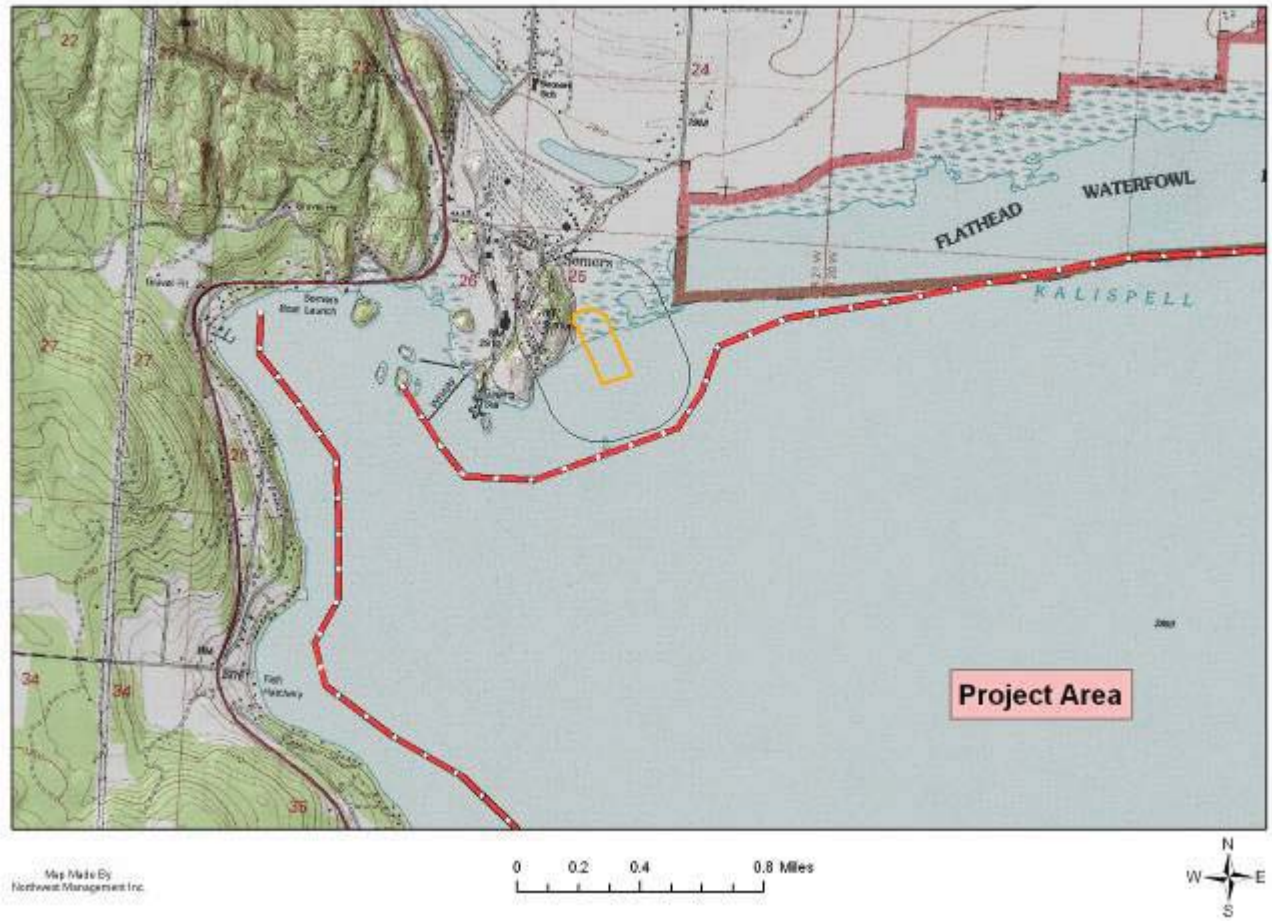
Flathead Lake, Montana

Effect	Species Life Stage	Concentration (mg/L)	Reference[2]
Reduced survival	Rainbow trout juvenile (*Oncorhynchus mykiss)*	270	Herbert & Merkens, 1961
	Rainbow trout juvenile	200	Herbert & Richards, 1963
	Rainbow trout juvenile	1,000 – 2,500	Campbell, 1954
	Rainbow trout juvenile	90	Herbert & Merkens, 1961
Mortality (96-hr LC_{50})	Whitefish juvenile (*Prosopium williamsoni*)	16,613	Newcombe & Mcdonald, 1991
	Rainbow trout juvenile	19,364	Newcombe & Mcdonald, 1991
Reduced growth (1,848-hr exposure)	Rainbow trout juvenile	50	Herbert & Richards 1963
Reduced feeding	Cutthroat trout (*O. clarkii*)	35	Bachman, 1958

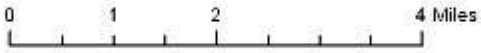
Reduced condition factor	Rainbow trout juvenile	110	Scullion & Edwards, 1980
Altered diet	Rainbow trout juvenile	110	Scullion & Edwards, 1980
Disease (fin rot)	Rainbow trout juvenile	100 – 270	Herbert & Merkens, 1961
Displacement	Rainbow trout juvenile	110	Scullion & Edwards, 1980
Histological damage (96-hr exposure)	Rainbow trout juvenile	171	Newcombe & McDonald, 1991
Gill trauma (96-hr exposure)	Sockeye underyearling (*O. nerka*)	3,148	Servizi & Martens, 1987
Stress (increased plasma cortisol when exposed for 7 – 8 days)	Rainbow trout yearling	2,000 to 3,000 mg/L (topsoil)	Redding et al., 1987

LOCATION MAPS

Map # 1 - Summers Bay BNSF Site



Map #2 - Location Map



Aerial Photo #1 - Proposed Project Area

Aerial Photo #2 - Proposed Buffer

Aerial Photo #3 - Water Rights