Arrow Lakes (Reservoir)
Foreshore Development Guide

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Further, we appreciate the technical improvements to the FIMP process provided by our fellow Foreshore Inventory and Mapping Technical Committee members in 2020/21:

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- Ryan Cloutier, MSc, RPBio, Acting Program Manager, LLC.
- Heather Leschied, BES (Hons), FIMP Program Manager, LLC.
- Teri Ridley, Senior Integrated Planning Biologist, DFO.
- Brad Mason, Geospatial Analyst, BC Community Mapping Network.
- Louise Porto, MSc, RP Bio, WSP (formerly Wood Canada Ltd).
- Peter Holmes, BSc, Wildlife Biologist (retired), BC Ministry of Forests (MoF).
- Kristen Murphy, Habitat Biologist, MoF.
- Andrea Evans (and temporarily Julia Podealuk, RFT), Authorization Specialist, MoF.
- Kenton Andreashuk, Senior Fisheries Guardian, Ktunaxa Nation Council.
- David De Rosa, BSc, PAg, Wildlife Biologist, Okanagan Nation Alliance.
- Sangita Sudan, MCIP, RPP, General Manager, Development and Community Sustainability, Regional District of Central Kootenay.

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1. Introduction

In recent years, environmental impacts to lake shorelines (e.g., degraded habitat, recreational use conflicts, and water quality impacts) have prompted government agencies to initiate projects focused on increasing our understanding of lake shorelines to support evidence-based lake management strategies. For example, Arrow Lakes (Reservoir) is multi-jurisdictional and lake management occurs at all levels (i.e., Local, Regional, Provincial, Federal, and Indigenous Peoples). The guidelines presented in this document are founded on the concept that sustainable management is the shared responsibility of all stakeholders, including proponents, professionals, and all levels of government.

This Foreshore Development Guide (FDG) provides development planning guidelines, aimed at protecting sensitive fish and wildlife species and their habitats. These sensitive values were identified through the Foreshore Inventory and Mapping (FIM) and Foreshore Habitat Sensitivity Index (FHSI) analyses provided in the Foreshore Integrated Management Planning report (FIMP; McPherson and Schleppe 2023). The FDG is an initial tool used when planning for, prescribing, or reviewing riparian and shoreline alterations. Based on the environmental (species and habitat) values, the FDG identifies the levels of risk associated with shoreline alteration from various types of development activities. The risks identify the anticipated regulatory steps required to proceed with the project. The guidelines provide important information to support both the landowner in preparing foreshore work applications, and the government agencies during their review of the applications.

The FDG recommends areas to be conserved, where development may present very high or significant risk to high value species and their habitats that require shoreline areas to carry out their life cycle. These sensitive habitats may be protected by various means, including local government inclusion in local planning processes such as Official Community Plans (OCP) and bylaws. Additionally, the FDG describes how restoration opportunities should be sought to improve habitat previously disturbed, and to potentially aid in obtaining regulatory support for new proposed projects.

The FDG methods were first developed, when the original Windermere Lake study was completed by the East Kootenay Integrated Lake Management Partnership (EKILMP et al. 2009). These original methods used the BC Ministry of Environment (BC MoE) document - High Value Habitat Maps and Associated Protocol for Works along the Foreshore of Large Lakes within the Okanagan (BC MoE 2008), and input from the various EKILMP members including: Fisheries and Oceans Canada (DFO), BC MoE, Regional District of East Kootenay (RDEK) and Wildsight. Following this, similar shoreline studies in the Kootenay Region utilized and expanded on the initial EKILMP FDG. Notable lake projects included: Moyie Lake (Schleppe 2009), Tie Lake (McPherson et al. 2012), Windermere Lake (Schleppe and McPherson 2021) and Kootenay Lake (Schleppe and McPherson 2022). With each iteration of these documents, the general process for developing a FDG were refined. This FDG was developed using the most recent template as a guide (Schleppe et al. 2021), with lake specific modifications made as required.

2. Important Contact Information

Proponents may use the contact information provided below when planning their proposed activities. Even with the use of this document, it is recommended that anyone who is planning work on Crown Land (such as the shoreline), first contact FrontCounterBC or retain the

services of a Qualified Environmental Professional (QEP) who will contact FrontCounterBC on their behalf. Depending on the situation, FrontCounterBC will provide guidance on whether the proposed works are allowed or not allowed under the respective legislation. Similarly, works on private lands must also consider local government's requirements (e.g., permitting or notifications).

FrontCounterBC - *FrontCounterBC* should be contacted for any works planned on Crown Land, including work along the lake shoreline.

Castlegar Office
Phone: (250) 365-8600
Email: Forests.ArrowBoundaryDistrictOffice@gov.bc.ca
Website: FrontCounter BC – Forests, Lands and Natural Resource Operations – Province of British Columbia (gov.bc.ca)

Revelstoke Office
Phone: (250) 837-7611
Email: Forests.ColumbiaForestDistrict@gov.bc.ca
Website: FrontCounter BC – Forests, Lands and Natural Resource Operations – Province of British Columbia (gov.bc.ca)

Regional Districts – There are two regional districts in the project area. The Land Use Planning Department of the applicable regional district is to be contacted for any works planned on private land within their jurisdiction.

Regional District of Central Kootenay
Phone: (250) 352-1536
Email: plandept@rdck.bc.ca
Website: Welcome | Regional District of Central Kootenay (rdck.ca)

Columbia-Shuswap Regional District
Phone: (250) 833-5904
Email: plan@csrd.bc.ca
Website: CSRD, BC | Official Website

Local Municipality – The Village of Nakusp is to be contacted for any works planned on private land within the city's jurisdiction.

Phone: (250) 265-3689
Email: reception@nakusp.com
Website: Village of Nakusp Official Site | Tourism & Municipal Services | Village of Nakusp Municipal Site

Indigenous Peoples – The Crown (federal and provincial governments) are legally obligated to consult and accommodate Indigenous Peoples, where required, on land and resource decisions that could impact their Indigenous Interests (Province of BC 2023a). However, "*proponents are generally encouraged to engage with First Nations as early as possible in the planning stages to build relationships and for information sharing purposes that may support consultation processes" (Province of BC 2023a). There are three Nations with traditional territories on Arrow Lakes.* The interactive webmap available at: Contacts for First Nation Consultation Areas - Province of British Columbia (gov.bc.ca) (Province of BC 2023b) is to be used to confirm which traditional territory the subject property overlaps with:

Ktunaxa Nation Council
Phone: (250) 489-2464
Email: info@ktunaxa.org
Website: Ktunaxa Nation

Secwepemc / Shuswap Nation Tribal Council
Phone: (778) 471-8200
Email: sntcadmn@shuswapnation.org
Website: Home - Shuswap Nation Tribal Council (SNTC)

Syilx / Okanagan Nation Alliance
Phone: (250) 707-0095
Email: -
Website: Syilx Okanagan Nation – Okanagan Nation Alliance

Lake Partnership Group – Arrow Lakes Environmental Stewardship Society (ALESS)
Phone: Richard Johnson, ALESS President (250) 358-2590
Email: alessbc1@gmail.com
Website: Arrow Lakes Environment Stewardship Society – ArrowLESS (wordpress.com)

2.1. Indigenous Peoples Traditional Ecological Knowledge

Indigenous Peoples Traditional Ecological Knowledge (TEK) can contribute to a broader understanding of existing ecological values. The FIMP framework was updated with a proposed process for meaningfully including Indigenous Peoples and TEK into FIMP Projects (Schleppe et al. 2021). The FIMP project team reached out to local First Nations and requested participation in field data collection and/or inclusion of First Nations TEK data. The Ktunaxa Nation, Okanagan Nation Alliance, Splatsin te Secwépmec, and Colville Tribes were contacted in the spring and summer of 2022. Splatsin te Secwépmec expressed interest in participating, so the Arrow Lakes field survey was designed to incorporate First Nations TEK through engagement and involvement of Shanon Basil, Fisheries Technician, Yucwmenlúcwu (Caretakers of the Land) LLP, who provided field support for a week on Arrow Lakes.

Shanon was a valuable member of the field team; he assisted with wildlife observations and counts of shoreline modifications observed. He also recounted cultural and archaeological

significance of certain areas of the lake and shared these meaningful observations with the field team.

Due to timing constraints, there was no further TEK or engagement with other Nations by the report publication deadline.

3. FDG Process Overview

The FDG provides a stepwise process to help direct applicants through the initial planning stages for their proposed shoreline development, project or activity (Figure 1).

Step 1: Identify the fish and wildlife habitat values where the project is situated using the FDG map. The FDG map was prepared using the FHSI outputs (McPherson and Schleppe 2023), and depicts: a) values by segment, with different colours representing high to low values; and b) where Zones of Sensitivity (ZOS) may be present. ZOS are areas with exceptionally high value, which should if at all possible, be conserved according to local, provincial or federal plans or through private land agreements.

Step 2: Review the general recommendations for the applicable colour zone and ZOS to understand associated habitat sensitivity of the area, and risk anthropogenic disturbances pose.

For areas of greater risk, a very high level of detail is needed in order to submit an application that can be considered for regulatory review. In these cases, it should not be expected that because information is submitted that approvals will be forthcoming.

Step 3: Use the Activity Risk Matrix (ARM) to identify the level of risk of the proposed project on the habitat. The risk is indicative of the acceptability of a project to regulators.

Step 4: Determine the necessary regulatory approvals/permits/authorizations (collectively 'approvals') that must be obtained. This final step is project dependent and depends on many factors and is subject to change based on government policy. Hence, only an overview is provided here, along with logistical considerations.

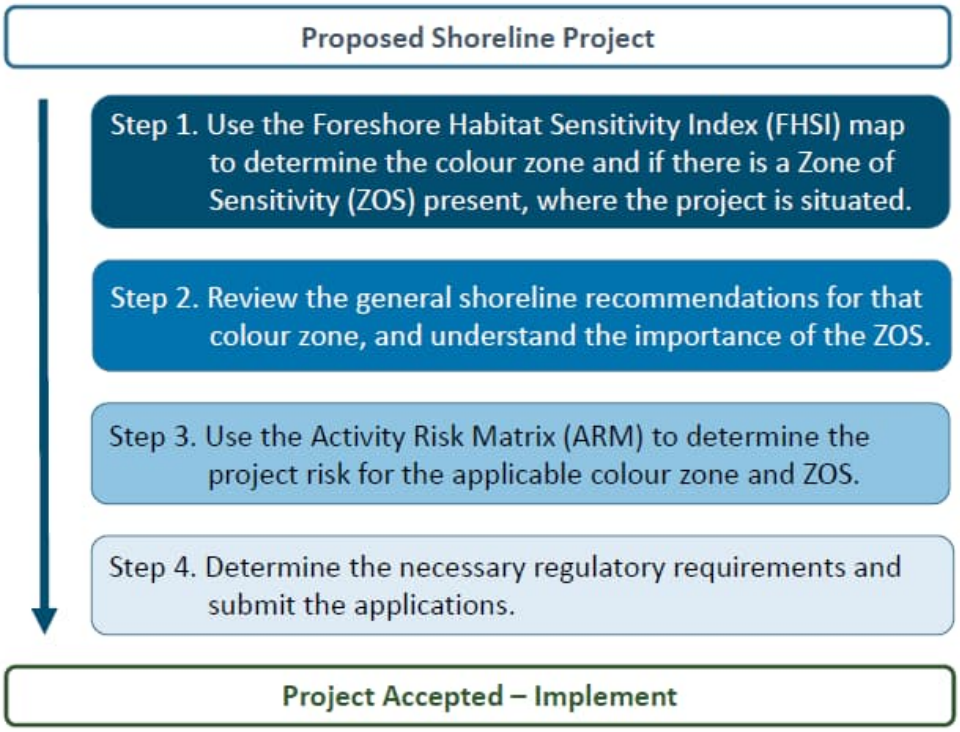

Figure 1. Four steps when planning to develop or modify foreshore habitat.

3.1. Interpret the FDG Map

The key results of the FIM and FHSI are presented in tables and maps in the FIMP (Schleppe and McPherson 2021). When planning foreshore development, the FDG map is the primary reference tool because it synthesizes the pertinent fish and wildlife information into an easy to understand map (Appendix A). In the FDG map, the FHSI ecological rankings for each segment are depicted as one of five colours zones, ranging from very high to very low value (Table 1).

Table 1. FHSI ecological rank and ZOS colour scheme applied to the FDG map.

Value type	Rank/Sensitivity	Map Colour
Ecological Rank	Very High	Red
	High	Orange
	Moderate	Yellow
	Low & Very Low	Grey
Zones of Sensitivity	Fisheries	Blue
	Wildlife	Brown
	Waterfowl	Teal
	Ecosystem/Habitat Feature	Green

The FDG map also depicts each ZOS in a specific colour scheme. Each ZOS is presented as either a polygon, line, or point, and includes appropriate buffers. This buffer accounts for unknowns of the ZOS full extent, and protects the core ZOS from potential impacts from adjacent activities (Figure 2). Details on each ZOS, including how each was defined, and how the buffers were determined are presented in Section 5.2.

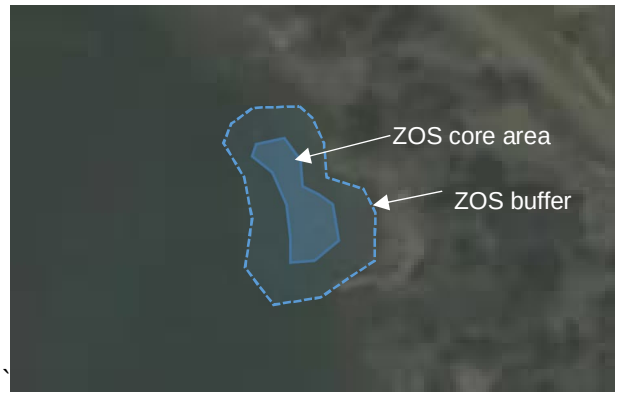

Figure 2. Zone of Sensitivity with an appropriate buffer.

4. Step 1. Locate Project Relative to Shoreline Colour Zones and Zones of Sensitivity

Use the FDG map to identify the values present along or within their proposed development area. Together, the FHSI colour zone and the ZOS mapped features provide a science-based tool to guide development planning. The fish and wildlife value/risk and subsequent regulatory review process are highest in red zones and areas with ZOS. Since these areas have the highest natural value and are at greatest risk to shoreline alteration, they require the highest level of on-going protection. The values/risk in the grey zones are lowest. Since there is already likely significant impact from development in grey zones, future development is less likely to cause negative impacts. The specific recommendations for each colour zone and ZOS are provided in the next section.

5. Step 2 – Review Colour Zone, ZOS and Conservation Recommendations

For this step, review the recommendations for the respective colour zone and ZOS that aligns with the proposed development. The summary tables below provide detail on the values present and identify how to potentially minimize impacts. Also, refer to the conservation recommendations to see how your project may align with an area that has been identified as a candidate for protection. Proposed development should adhere to these recommendations to reduce impacts on sensitive fish and wildlife values. Opportunities for restoration or re-development should be explored in any zone where work is proposed. See the complete FIMP report for a full presentation of details on these topics (McPherson and Schleppe 2023).

5.1. Shoreline Colour Zone Recommendations

Red Shoreline	
Defined by:	Very High FHSI ecological rank.
FHSI summary:	Red zones account for 15% of the total shoreline length of 78,225 m.
Sensitivity Summary:	Red shoreline areas have been identified as essential for the long-term maintenance of fish and/or wildlife values through the FHSI analysis. These areas are essential for fish and/or wildlife populations.
Recommen-dations:	Due to their high value (e.g., sensitive communities present), Red shoreline areas are recommended to have limited development to promote conservation use (Section 5.3). Low impact water access recreation and First Nation uses are examples of acceptable activities in these areas, while permanent structures or alteration of habitats are not. Invasive aquatic plant removal is often acceptable, provided there is an approved aquatic plant removal program, including trained personnel, and appropriate permitting in place. Habitat restoration may be appropriate in these areas, where applicable.

Orange Shoreline	
Defined by:	High FHSI ecological rank.
FHSI summary:	Orange zones account for 28% or 143,686 m of the total shoreline length.
Sensitivity Summary:	Orange shoreline segments have been identified as high value habitat areas for fish and/or wildlife. These areas are comprised of relatively natural undisturbed habitats and likely have ZOS present. These areas are sensitive to development, continue to provide important habitat functions, but may be at risk from adjacent development pressures.
Recommen-dations:	Proponents should consider moving high risk activities to other areas if possible, or pursuing activities that have lower associated risks. The lake environment can benefit from having orange shoreline areas set aside to contribute to the overall lake conservation area. The conservation options identified in Section 5.3 would likely apply through most of the orange areas, benefitting the lake. Restoration opportunities potentially exist in these areas (see FIMP report recommendations).

Yellow Shoreline	
Defined by:	Moderate FHSI ecological rank.
Lake summary:	Yellow zones account for 42% or 212,872 m of the total shoreline length.
Sensitivity summary:	These areas have experienced a moderate amount of development disturbance and pressures. Although these areas have been impacted to some degree, they still are largely intact and habitat values remain important.
Recommen-dations:	Development along Yellow shoreline areas would likely result in less of an impact than along Red or Orange areas. However, activities should incorporate measures to protect the habitat features that remain, be well above the high water mark, and and/or be situated outside of the riparian area. Restoration may be an option in some areas that have experienced past developments. Development may proceed for low risk activities provided a Best Management Practice (BMP) or Regional Operating Statement (ROS) is available and followed (Appendix D). High risk activities without a BMP or ROS will require an environmental assessment from a QEP.

Grey Shoreline	
Defined by:	Low and Very Low FHSI Ecological Rank.
Lake summary:	Grey zones account for 14% or 72,700 m of the total shoreline length.
Sensitivity summary:	Grey shorelines have a lower ecological ranking. However, they still may contain valuable habitats requiring some protection, such as aquatic or riparian vegetation. Their importance as corridors to neighboring high value areas should also be considered during development.
Recommen-dations:	Human development has been concentrated in these areas and has resulted in disturbances to the natural fish and wildlife habitats present. Important habitats do exist in degraded and developed areas, and at least minimal standards are required to protect fish and wildlife habitat in the grey zone areas. In keeping with the objective of concentrating development in areas that are already disturbed or of low value, new developments may be considered in these areas. Re-development will also be considered. Proposals should incorporate fish and wildlife habitat restoration or improvement features, where feasible and practicable. For example, a retaining wall redevelopment may be moved back from the HWM and/or incorporate re-vegetation or other fish and wildlife features in the design. Obtain advice from a QEP for habitat restoration techniques.

5.2. Zones of Sensitivity Recommendations

Sixteen types of ZOS were identified through the FHSI analysis. The ZOS with their corresponding buffers are identified on the FDG map. For this step, use the map and identify if the proposed development aligns with any of the mapped ZOS (use outer edge of buffer). Then refer to the corresponding ZOS summary table(s) below for general information on the values present and recommendations to reduce impacts.

A few items to be aware of regarding ZOS are as follows:

- A summary of the respective ZOS values is provided here, with greater detail provided in the FIMP report (McPherson and Schleppe 2023).

- Some of the ZOS are attributed to the FIM line segment data as Presence / Absence or Yes / No flags. These ZOS are expected to occur along the entire FIM segment, but do not have a spatially explicated ZOS polygon or buffer presented. These data have been presented in this fashion due to the number of Presence / Absence ZOS data until such a time as higher resolution data is available. All users of these data *must* look for the Presence / Absence or Yes / No ZOS attributed to the line data as they develop plans for their property to avoid impacting important habitat feature through design. The ZOSs, which this applies to are identified in the tables below.

Fisheries – Critical Habitat White Sturgeon	
Sensitivity summary:	The Arrow Lake Reservoir White Sturgeon population is an endangered species both federally (SARA Schedule 1) and provincially (red-listed; BC CDC 2022). The White Sturgeon Recovery Strategy identifies Critical Habitat areas, which are the geospatial areas that contain the biophysical functions, features, and attributes necessary for survival or recovery (DFO 2014). The two Critical Habitat areas outlined in the Recovery Strategy defined the White Sturgeon ZOS. These areas were the Beaton Reach and Narrow Burton Reach.
Lake summary:	A summary of the attributes of the two White Sturgeon Critical Habitat areas in Arrow Reservoir is as follows (DFO 2014): **Beaton Reach**: Provides late juvenile and adult feeding and overwintering habitat. The depositional areas, where depths are greater than 10 m are important for both functions. Other attributes are as follows: • Feeding occurs in lower velocity holding areas, where fish (salmonids) and invertebrates are available. Feeding areas are used all year. • Overwintering occurs in areas where the velocity is greater than 0.5 m/sec. Overwintering areas are used from November to March. **Narrow Burton Reach**: Provides early and late juvenile habitat, for rearing (potential) and adult feeding. The areas are used year-round. Other attributes are as follows: • Juvenile use is only suspected but may increase as hatchery juveniles continue to be released upstream. • The feeding areas are often associated with depositional areas, and confluences with tributaries that provide spawning habitat for salmonids in the spring and fall. They are in lower velocity holding areas where fish and invertebrates are available.
Recommen-dations:	Development in White Sturgeon Critical Habitat is to be avoided or planned to prevent harm to the fish and sensitive habitat present. It is recommended that avoidance measures be considered first, with no development in the Critical Habitat area as represented by the ZOS polygon. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations and identify risks and suitable mitigation measures to reduce risks, etc). Applicable federal, provincial and municipal legislation and processes are to be adhered to. Development proposed in this sensitive habitat will likely require a Fisheries and Oceans Canada (DFO) *Fisheries Act* Authorization.

Fisheries – High Value Burbot Area (Spawning)	
Sensitivity summary:	Burbot are a species of regional concern in the Columbia River System due to declines in numbers (McPhail 2007). Compared to the early 2000's, Burbot harvest estimates have been generally lower in recent years (Arndt 2022). However, this general decrease is likely related to reduced phosphorus inputs (Arndt 2022). Although the population is not believed to be at risk (Arndt pers comm. 2022), any viable Burbot population is significant to maintain in the Kootenays (Burrows pers comm. 2022
Lake summary:	BC Hydro commissioned a five-year study of the Burbot life history and habitat use in the Arrow Lakes (2009 – 2014 CLBMON-31). Overall, spawning location findings from this study as summarized in the Year 5 report were as follows (Robichaud et al. 2014): • *Winter tracking (February/March) found consistent locations of elevated Burbot concentrations. The highest concentrations of fish were in the Beaton Arm/Shelter Bay area during the presumed spawning period and, to a lesser extent, in the McDonald Creek area in The Narrows.* • *Spawning timing in Beaton Arm area was from mid-March onward and spawning probably occurred mainly in deep water areas (>20 m) near the bottom.* Burbot spawning (and associated nearby rearing habitat) is important to the long-term viability of this species. The presumed Burbot spawning locations were interpreted from the reports and mapped as a ZOS. The spatial accuracy of this ZOS can be improved if more data is collected.
Recommen-dations:	Development in High Value Burbot areas is to be avoided or planned to prevent harm to the fish and sensitive habitat present. It is recommended that avoidance measures be considered first, with no development in the ZOS polygon. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations and identify risks and suitable mitigation measures to reduce risks, etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to. Development proposed in this sensitive habitat may require a DFO *Fisheries Act* Authorization.

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Fisheries – Salmonid Stream	
Sensitivity summary:	The results of Arrow Lakes Tributary Fish Migration Access study (Hawes et al. 2014) and the Provincial database were the resources used to identify streams used by salmonids for spawning. The key native salmonids that are currently in the reservoir that rely on these streams for spawning are Rainbow Trout, Bull Trout and Kokanee (Hawes et al. 2014). Other salmonids potential to use these streams include Westslope Cutthroat Trout and Chinook Salmon (once re-introduced to the Upper Columbia River Basin). In terms of the foreshore, the outlet and associated alluvial fan areas of these streams are important habitats not only for spawning, but also for rearing. However, these habitats in the Arrow Reservoir have been impacted by the dam operations. Hawes et al. (2014) summarizes this as follows: *Upstream migration of fish populations in tributary streams can be blocked or reduced as a result of low stream flows being conveyed through wider, aggraded, more poorly defined, and braided channels over the drawdown zone. The dynamic channel form exhibited over the drawdown zone of many tributaries is the result of the high vertical fluctuation of the reservoir.* Maintaining natural shoreline habitat in these areas that already experience challenges from reservoir operations is important for various reasons, including for: maintaining channel stability, maintaining spawning substrates, and providing cover elements.
Lake summary:	Because of these high fisheries values, all salmonid stream mouths were mapped as independent segments, with the segment start and end points defined as the outer edge of the most active areas of the alluvial fan. These areas were mapped as a ZOS. As well, all other (non-salmonid) streams were mapped as a ZOS point.
Recommen-dations:	Development in areas designated as Salmonid (and Non-Salmonid) Streams is to be avoided or planned to prevent harm to the fish and sensitive habitat present. It is recommended that avoidance measures be considered first, with no development in the ZOS, which includes 100 m and 50 m buffers for the salmonid and non-salmonid streams, respectively). If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations and identify risks and suitable mitigation measures to reduce risks). Applicable federal, provincial and municipal legislation and processes are to be adhered to. Development proposed in this sensitive habitat will likely require a DFO *Fisheries Act* Authorization.

Fisheries – Juvenile Rearing	
Sensitivity summary:	The foreshore provides important juvenile rearing habitat. The foreshore habitats around stream mouths are particularly important for salmonid rearing, as the fish migrate out from their natal streams into the larger lake or reservoir environment. These lake shallows at and near the mouths of tributaries are very productive areas, providing good forage opportunities. These areas also provide cover elements (terrestrial and aquatic vegetation, large woody debris etc) to allow the small young fish to safely grow.
Lake summary:	Juvenile rearing shoreline habitat value was determined by manually assigning a value of High or Low rearing potential based on the following review: 1. Segments with salmonid spawning stream - high. 2. Segments adjacent to salmonid spawning stream - physical characteristics were evaluated, with the following features contributing to high rearing value: wetland, gravel or sand beach shore type; wide littoral zone, high overhanging vegetation. Segments evaluated to have a high salmonid rearing potential were designated as a ZOS. The complex littoral zone made determining important fish rearing areas challenging because they were likely to vary over time dependent upon the elevation of the reservoir. This ZOS generally occurred along the entire FIM segment, and thus did not have a spatially explicated ZOS polygon. Thus, all users of these data must look for the Presence / Absence or Yes / No ZOS attributed to the line data.
Recommen-dations:	Development in areas designated as Juvenile Rearing Habitat is to be avoided or planned to prevent harm to the fish and sensitive habitat present. It is recommended that avoidance measures be considered first, with no development in the ZOS. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations, and identify risks and suitable mitigation measures to reduce risks etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to. Development proposed in this sensitive habitat may require a DFO *Fisheries Act* Authorization.

Fisheries – Staging Area	
Sensitivity summary:	Adfluvial fish have a life history strategy in which adult fish spawn and juvenile fish rear in streams but migrate to lakes to feed as subadults and adults. This is vital survival strategy in reservoirs like Arrow Lakes since the drawdown zone with its varying water levels does not offer stable habitat for shore spawning (Arndt pers comm. 2022). In the Arrow Reservoir this strategy is utilized by the following salmonids: Rainbow, Kokanee, and Bull Trout species. This Staging ZOS is where adults must hold or stage until environmental conditions are adequate to migrate upstream into and out from the streams before and after spawning. It is also where the juveniles migrate out into the lake. Fish migration areas are generally encapsulated by the Staging ZOS or the Juvenile Rearing ZOS and were thus not differentiated.
Lake summary	In Arrow Reservoir, salmonids staging to move into or out of their natal streams are vulnerable and this is considered a sensitive life-stage. Habitat rich with cover is thus important. However, development intensity around streams is often high, with an elevated importance of this habitat requisite. This ZOS was determined based on adjacency to spawning streams. The primary resource used to determine the ZOS was the Arrow Lakes Tributary Fish Migration Passage Monitoring study completed by Hawes et al. (2014). This ZOS generally occurred along the entire FIM segment, and thus did not have a spatially explicated ZOS polygon. Thus, all users of these data must look for the Presence / Absence or Yes / No ZOS attributed to the line data.
Recommen-dations:	Development in the Staging Area ZOS is to be avoided or planned to prevent harm to the fish and sensitive habitat present. It is recommended that avoidance measures be considered first, with no development in the ZOS. A QEP is recommended to be retained to help guide proposed development if avoidance is not possible (field confirm sensitive habitat locations, and identify risks and suitable mitigation measures to reduce risks etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to. Development proposed in this sensitive habitat may require a DFO *Fisheries Act* Authorization.

Fisheries – Native Mussel Beds	
Sensitivity summary:	Mussels are considered a fish under the Federal *Fisheries Act*, and native mussels hold Indigenous Peoples ecological value. Notes on the sensitivity of native freshwater mussels are as follows (BC Ministry of Environment, Lands and Parks 2000): *Freshwater mussels are the most endangered animal group in North America and are disappearing at the fastest rate of any known group of organisms. Mussel habitat is disappearing, as aquatic habitats are degraded or become altered for other uses. Most species have a complex life cycle involving a fish host, free living form, and the commonly observed mussel. Thus, even where conditions allow for continued mussel existence, if the habitat can no longer support the required fish host or if access to the fish host is eliminated the mussels cannot reproduce.* Mussels move both horizontally (e.g., due to drawdown), and vertically (may bury themselves seasonally or during environmental stress). However, the movements are slow. For this reason, they are very susceptible to lakebed disturbance.
Lake summary:	Mussels were not evident during the 2022 Arrow Lakes FIM due to the field work being conducted during high/full pool water levels. However, mussels are known to be present, with rehabilitation measures undertaken at Syringa Provincial Park in 2015 for native 'floater mussels' (Heagy pers. comm. 2023). This location was identified as a ZOS. Inventory work is recommended to identify other mussel habitats in Arrow Reservoir. For any mussels found in Arrow Reservoir, the species is to be confirmed. Recent sampling in Kootenay Lake found Western Floater (*Anodonta kennerlyi*), Oregon Floater (*A oregonensis*), and Western Pearlshell (*Margaritifera falcata*) (Andreashuk pers. comm. 2021). If found, Rocky Mountain Ridged Mussel (*Gonidea angulate*) is at-risk both federally under the Species at Risk Act (SARA; special concern, Schedule 1), and provincially (red-listed/endangered). This species has specific guidelines for surveys and relocation (Forests, Lands, Natural Resource Operations and Rural Development [FLNRORD] 2018).
Recommen-dations:	Development in areas with native mussel beds is to be avoided or planned to prevent harm to the mussels and sensitive habitat present. It is recommended that avoidance measures be considered first, with no development where mussels are present. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations, and identify risks and suitable mitigation measures to reduce risks, etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to. Development proposed in this sensitive habitat may require a DFO *Fisheries Act* Authorization.

Wildlife – Critical Habitat, Bank Swallows	
Sensitivity summary:	The Bank Swallow (*Riparia riparia*) is a threatened species under SARA. The Recovery Strategy identified Critical nesting habitat for this species in the Arrow Lakes Narrows (Environment and Climate Change Canada [ECCC] 2022). Pertinent life history and habitat use information are as follows (ECCC 2022 unless otherwise noted): • An aerial insectivorous bird that nests in colonies on steep bank faces along waterbodies and human-made habitats. Forages over open country and aquatic habitats. • Nests are present in erodible material (comprised of sand, silt, loose clay, fine gravel, and/or organic soils), vertical or near-vertical structure, and minimum bank face height of 0.5 m. • Migratory birds generally arrive at their breeding grounds in North America during early spring and depart late summer to midfall. • Have high site fidelity if nests were successful the previous year (Darvill pers. comm. 2021). • Primary threats are broad-scale ecosystem modifications, including less abundant prey from pesticide use (and climate change), and loss of nesting sites from erosion control measures. Disturbance to nest sites can possibly cause direct harm to the birds if actively nesting, or impact habitats if they are altered due to the site fidelity. Nesting birds are protected under a variety of different pieces of legislation, with Critical Habitat further protected under SARA.
Lake summary:	This ZOS includes the Critical Habitat for nesting in the Narrows (ECCC 2022), as well as other confirmed nesting locations that were active between 2015 and 2021 (J. Arndt, pers. comm. 2022). Unconfirmed/historic nesting sites evident during the 2022 FIM field survey were also mapped, but only as “Bank Nesting” ZOS.
Recommen-dations:	Development in Bank Swallow Critical Habitat and other confirmed Bank Swallow (and other species) nesting areas is to be avoided or planned to prevent harm to the species and sensitive habitat present. It is recommended that avoidance measures be considered first, with no development in the ZOS. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations, and identify risks and suitable mitigation measures to reduce risks, etc.). Note, that the Critical Habitat polygons as provided by ECCC (2022) include a 500 m buffer, and a 300 m buffer has been applied to the other confirmed and unconfirmed nesting sites in the FHSI maps. Applicable federal, provincial and municipal legislation and processes are to be adhered to.

Critical Habitat – Caribou (Southern Mountain Population)	
Sensitivity summary:	Approved Critical Habitat for the Southern Mountain Population of Caribou (Central Kootenay local population unit) is present throughout a 271,400 ha area along the Arrow Reservoir. However, only a small area north of Nakusp is within 50 m of the shoreline (BC Ministry of Environment [BC MoE] 2022). This specific population is listed as being endangered both federally and provincially. The following summary of the species habitat requirements was obtained from the Federal Recovery Strategy (Environment Canada 2014): *Southern Mountain Caribou require large ranges of relatively undisturbed, interconnected habitat where they can separate themselves (horizontally and by elevation) from predators; modify their use of habitat in response to various natural and human-caused habitat disturbances and human activities; and can access their preferred food sources. In the Southern Group, where the snowpack is deep, caribou predominantly use high elevation mature and old subalpine forests in mid and late winter where they forage on arboreal lichens. During early winter before snow has consolidated, and during spring, they use lower elevation mature and old forests (with some subpopulations moving down into cedar/hemlock forests in valley bottoms). Due to their specific life history characteristics, southern mountain caribou are limited in their potential to recover from rapid, severe population declines. Habitat alteration (i.e., habitat loss, degradation, and fragmentation) from both human-caused and natural sources, and increased predation as a result of habitat alteration, have led to declining numbers. The Nakusp population had 64 Caribou in 2014 and was said to be decreasing*.
Lake summary:	The Recovery Strategy (Environment Canada 2014) identifies that landscape level plans should prepared and used to address the cumulative effects of habitat alteration and for managing habitat and sensory disturbance. When development (particularly large scale) is proposed in mature forest habitats, Ministry of Forests (MoF) or other wildlife specialist input is to be sought, to ensure the development minimizes impacts on this species.
Recommen-dations:	Development in Critical Habitat for Caribou is to be avoided or planned to prevent harm to the species and sensitive habitat. It is recommended that avoidance measures be considered first, with no development in the ZOS.. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations, and identify risks and suitable mitigation measures to reduce risks etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to.

Wildlife – Critical Habitat (Proposed), Whitebark Pine	
Sensitivity summary:	Whitebark Pine is listed as endangered federally (SARA Schedule 1) and is blue listed provincially. Proposed Critical Habitat for Whitebark Pine is present throughout a 62,804 ha area along the Arrow Reservoir that includes a considerable section of shoreline north of Nakusp (BC MoE 2022). It is noted that the Recovery Strategy had all mapped plants well away from the shoreline at higher elevations (ECCC 2017). The following is a general description of this species (ECCC 2017): *"Whitebark Pine is a high elevation conifer characterized by needles that occur in bundles of five, and closed cones that generally remain on the tree unless removed by animals. The tree may be single-stemmed, but it often is multi-stemmed. Upper branches are typically in an upright growth form, with cones held high on the outer branches. Whitebark Pine is a keystone species, essential to ecosystem function on many alpine and subalpine sites.* It performs a number of ecosystem services (particularly *where it is the dominant tree species), including: moderating snowmelt and run-off, initiating tree islands and facilitating recruitment of more shade tolerant species, pioneering harsh sites, and providing food for wildlife (Tomback and Kendall 2001). The seeds are an important food source for Clark's Nutcrackers, Red Squirrels, Grizzly Bears and other high elevation, mountain-dwelling wildlife (Felicetti et al. 2003). Of note, the tree has a mutualistic relationship with the Clark's Nutcracker; whereby, the distribution of Whitebark Pine across the landscape is almost exclusively due to the seed caching behaviour of this bird (Hutchins and Lanner 1982)."*
Lake summary:	The proposed Whitebark Pine Critical Habitat area was mapped as a ZOS. The finalized Critical Habitat area is to be reviewed and updated accordingly during future FIMP reporting. As well, during future development reviews, the most current / finalized Critical Habitat Areas are to be factored in accordingly.
Recommen-dations:	Development in Critical Habitat for Whitebark Pine is to be avoided or planned to prevent harm to the species and habitat present. It is recommended that avoidance measures be considered first, with no development in the ZOS. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations, and identify risks and suitable mitigation measures to reduce risks etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to.

Wildlife – CDC Red listed species	
Sensitivity summary:	Red listed species refers to any species or ecosystem that is at risk of being lost (extirpated, endangered or threatened) in BC. These species and ecological communities are likely to become endangered if limiting factors are not reversed. There were no red listed species mapped as a ZOS. White Sturgeon and Mountain Caribou were the only red-listed species identified to be present within 50 m of the foreshore. However, the historic ranges of these species span the full study area and were thus not used in the FHSI (all segments across the study area would contribute to the index equally). Instead, the approved Critical Habitats for these species were mapped as a ZOS. Also, Silver Hair Moss (*Fabronia pusilla*) was last observed in 1890 in Deer Park, and in 2001 the site was reported to be submerged behind a dam (BC Bryophyte Recovery Team 2007).
Lake summary:	Sensitive species present and rankings are updated and change with time as more information becomes available. During a proposed review, the QEP is to look up the species and habitat accounts for further details for current accounts in or adjacent to their project. This will involve using provincial database tools available at the time, such as the BC Conservation Data Centre (BC CDC) Species and Ecosystems Explorer and online iMap platform (BC CDC 2021a and 2022b)
Recommen-dations:	Development in areas with red-listed species present is to be avoided or planned to prevent harm to the species and habitat present. It is recommended that avoidance measures be considered first, with no development in the ZOS. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm species locations, and identify risks and suitable mitigation measures to reduce risks etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to.

Wildlife – CDC Blue-listed species	
Sensitivity summary:	The BC CDC (2022b) had polygons mapped for five blue listed species within 50 m of the Arrow Reservoir foreshore. Blue listed refers to any native species or ecological community considered to be of Special Concern in BC. These species or ecological communities have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. The current blue listed species mapped along the Arrow Reservoir shoreline are: Grizzly Bear, Canyon Wren, White-throated Swift, Western Bumble Bee, and Mountain Moonwort. These were all included as a ZOS, with the exception of Grizzly Bear, which had its own ZOS due to its specially designated habitat (see next).
Lake summary:	Sensitive species present and rankings are updated and change with time as more information becomes available. During a proposed review, the QEP will need to look up the species accounts for further details using the BC CDC iMap platform (2022b) or equivalent provincial database, for current accounts specific to their project area. For these reasons, these data were not included in the GIS database.
Recommen-dations:	Development in areas with blue listed species is to be avoided or planned to prevent harm to the species and habitat present. It is recommended that avoidance measures be considered first, with no development in the ZOS. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm species locations and identify risks and suitable mitigation measures to reduce risks, etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to.

Wildlife - Wildlife Habitat Area for a Species at Risk, Grizzly Bear	
Sensitivity summary:	The Grizzly Bear is an at-risk species listed to be of special concern both federally and provincially (SARA Schedule 1, and blue listed, respectively). There is a Grizzly Bear Wildlife Habitat Area (WHA) present along a great extent of the west bank of the Lower Arrow Lake (BC MoE 2022). In BC, WHAs are designated under the BC *Forest and Range Practices Act*. This WHA was specified as a Conditional Harvest Zone to protect this sensitive species.
Lake summary:	The Grizzly Bear WHA was mapped as a ZOS. Sensitive species and habitats present are updated as more information becomes available. During a proposed review, the QEP will need to use the BC Habitat Wizard mapping platform (BC MoE 2022) or equivalent provincial database, for current FRPA WHA accounts specific to their project area.
Recommen-dations:	Development in the Grizzly Bear WHA is to be avoided or planned to prevent harm to this species and its habitat. It is recommended that avoidance measures be considered first, with no development in the ZOS. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations, and identify risks and suitable mitigation measures to reduce risks, etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to.

Wildlife – Old Growth Management Area	
Sensitivity summary:	There were several shoreline sections where FRPA designated non-legal Old Growth Management Areas (OGMA) were present. These high value areas were identified as ZOS and included in the FHSI.
Lake summary:	OGMAs were mapped as a ZOS. Sensitive species and habitats present are updated as more information becomes available. During a proposed review, the QEP will need to use the BC Habitat Wizard mapping platform (BC MoE 2022) or equivalent provincial database, for current FRPA OGMA accounts specific to their project area.
Recommen-dations:	Development in a OGMA is to be avoided or planned to avoid harm to this habitat. It is recommended that avoidance measures be considered first, with no development in the ZOS. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm sensitive habitat locations and identify risks and suitable mitigation measures to reduce risks, etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to.

Wildlife – Raptor Nest	
Sensitivity summary:	Section 34 of the BC *Wildlife Act* prohibits possessing, taking, or destroying (i) a bird or its egg, (ii) the nest of an Eagle, Peregrine Falcon, Gyrfalcon, Osprey, Heron or Burrowing Owl, or (iii) the nest of a bird not mentioned in (ii), when the nest is occupied by a bird or its egg unless authorized under permit. This ZOS was established to identify the raptor nests requiring year-round protection in accordance with the *Wildlife Act*.
Lake summary:	Osprey and Bald Eagle nests observed along the Arrow Reservoir shoreline during the FIM were mapped as a ZOS. Nests of these birds are protected year-round, including when there are no adults, eggs or young present because of year over year use. Disturbance to these nest sites can harm the birds directly if actively present, or impact continued use due to site fidelity. Nesting sites are extremely sensitive for these reasons.
Recommen-dations:	Development in a raptor nesting ZOS is to be avoided or planned to avoid harm to the bird and nest. It is recommended that avoidance measures be considered first, with no development in the ZOS, which was mapped to include a 300 m buffer (as per Province of BC 2013). If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (field confirm nest location and identify risks and suitable mitigation measures to reduce risks, etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to.

Wildlife – Bat Site	
Sensitivity summary:	Bat ZOS information was reviewed and/or obtained from the Kootenay Community Bat Project (KCBP) biologists - Dr. Cori Lausen and Jason Rae of the Wildlife Conservation Society Canada (WSC), and Elodie Kuhnert (all pers comm. 2022). In the Kootenay Region, there are five sensitive bat species, seven species that are not at risk and one species that is unranked (Community Bat Programs of BC 2022): • SARA listed endangered species: Little Brown Myotis (*Myotis lucifugus*), and Northern Myotis (*Myotis septentrionalis*). • BC Blue listed species: Townsend's Big-eared Bat (*Corynorhinus townsendii*), Western Small-footed Myotis (*Myotis ciliolabrum*; suspected in Kootenay Region), and Fringed Myotis (*Myotis thysanodes*). • Species not at risk: Hoary Bat (*Lasiurus cinereus*), Silver-haired Bat (*Lasionycteris noctivagans*), Big Brown Bat (*Eptesicus fuscus*), Yuma Myotis (*Myotis yumanensis*), Californian Myotis (*Myotis californicus*), Long-legged Myotis (*Myotis Volans*), and Long-eared Myotis (*Myotis evotis*). • Unranked: Eastern Red Bat (*Lasiurus borealis*).
Lake summary:	All maternity bat roosts in the project area were mapped as ZOS for all species. The rationale for including species that are currently secure is as follows (C. Lausen pers. comm. 2022): *Although not yet documented in BC, white-nose syndrome (WNS) is expected to arrive. WNS is a fungus that attacks bats during hibernation and is easily spread, which has killed millions of Little Brown Bats in eastern Canada and US*. Bat roost data is considered sensitive and the locations have thus been masked and buffered by 200 m on the FHSI maps. If a development is proposed within a Bat ZOS, then the GIS database is to be reviewed to determine the source organization to be contacted. This will either be SPI (SPI_Mail@gov.bc.ca) or the Kootenay Bat Project (kootenaybats@gmail.com). See FIMP report for additional details.
Recommen-dations:	Development in sensitive bat roosting habitats is to be avoided or planned to avoid harm to the species and habitats. It is recommended that avoidance measures be considered first, with no development in the ZOS, which was mapped to include a 200 m buffer. If avoidance is not possible, a QEP is recommended to be retained to help guide proposed development (office and field confirm nest location and identify risks and suitable mitigation measures to reduce risks, etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to.

Wildlife –Aquatic Vegetation	
Sensitivity summary:	Aquatic vegetation provides valuable fish and wildlife habitats and important ecosystem functions. Studies on Arrow Reservoir have found this vegetation to provide habitat to a host of species including fish, amphibians, reptiles, bats and birds (see FIMP). The Arrow Reservoir FIM field assessment found emergent aquatic vegetation to be most prevalent, followed by overhanging, and wetland low and mid bench vegetation. Floating and submergent aquatic vegetation were nearly absent.
Lake summary:	Aquatic vegetation area was determined and was used to quantify this ZOS for each shoreline segment. Using the area calculation, the dense beds observed in the low-lying areas were evaluated greater than the thin line of emergent vegetation evident at the edge of many segments. The aquatic vegetation was mapped as a ZOS.
Recommen-dations:	Development in the Aquatic Vegetation ZOS is to be avoided or planned to prevent harm to the sensitive habitat present. It is recommended that avoidance measures be considered first, with no development in the ZOS. A QEP is recommended to be retained to help guide proposed development if avoidance is not possible (office and field confirm nest location and identify risks and suitable mitigation measures to reduce risks, etc.). Applicable federal, provincial and municipal legislation and processes are to be adhered to. Development proposed in this sensitive habitat may require a DFO *Fisheries Act* Authorization.

5.3. Shoreline Conservation Recommendations

Identify and protect high value areas that are essential for the long-term maintenance of fish and/or wildlife values as conservation areas. All legal tools are to be used to provide this protection, including establishment of parks, SARA designated critical areas, private land covenants and nature conservancy lands, as examples. It is recommended that shorelines with Very High and High Ecological Values, and in particular areas that overlap with ZOS, be protected through the establishment of conservation areas. It is recommended that no development occurs in these areas. Low impact water access recreation, Indigenous Peoples uses and habitat restoration may be permissible. However, permanent structures or alteration of existing habitat should not be acceptable.

Generally, all low-lying / valley bottom areas and other areas covered by ZOS on Arrow Reservoir provide high value habitats that should be considered for conservation, given the historical impacts resulting from hydro operations and the potential for other types of development (e.g., residential) due to their accessibility. As was reported in the FIMP, the low-lying shore types with some of the highest value habitats were Stream Mouth, Sand, and

Wetland (McPherson and Schleppe 2023). These shore types combined represented 9.5% of the total shoreline length and were assessed to be disturbed along 1% of their lengths. The remaining natural habitat for these shore types was thus present along 8.5% (or 43,136 m) of the shoreline. These areas are recommended to be the focus of conservation efforts. Also, as reported in the FIMP, the Gravel Shore Type represented a high percentage of the total Arrow Reservoir shoreline, at 34%, and it too was present in relatively low-lying areas (McPherson and Schleppe 2023). This was the shore type with the highest level of disturbance, at 7.6%. Because of this, it is also recommended that the natural Gravel Shore Type areas that overlap with ZOSs be reviewed for conservation opportunities. The areas for conservation should be further narrowed down or prioritized, for example by identifying the natural areas that overlap with ZOS (e.g., high value fish habitats, critical habitat, and/or emergent vegetation).

The data in this study and others suggest that densification of natural areas is likely of greatest risk to shoreline habitats that support fish and wildlife communities. In the absence of conservation lands being established, shoreline specific bylaws should be enacted by the local governments to protect these high value areas. It is recommended that the Regional District of Central Kootenay, the Columbia Shuswap Regional District, and the Village of Nakusp be consulted regarding how mapped shoreline colour zones and ZOS of this FDG can be best integrated into their respective Official Community Plans. This would help ensure that even habitats such as riparian areas, which too are very important, would have measures in place for their protection at the planning stage. Using the FDG as a planning tool is further described in the following sections of this report.

Together, the tools of conservation and bylaw development permit requirements will aid in the long-term protection of the reservoir, and the species and habitats it supports. The FIMP technical report provides other specific recommendations for local, provincial, and federal agencies to consider aiding in implementation of the FDG (McPherson and Schleppe 2023).

6. Step 3. Refer to the Activity Risk Matrix (ARM) to Determine Project Risk.

This step involves using the ARM to determine what the predicted level of risk is for your specific proposed activity, given the shoreline colour zone and ZOS present. It is a well understood concept that the potential for negative environmental impacts are deemed greatest in areas where values and risk are highest (Figure 3; DFO 2006). In the ARM, each colour zone and activity combination has been rated as having a risk of either: Very High (VH), High (H), Moderate (M), or Low (L) (Appendix B). These risk ratings reflect the potential impacts on fish and wildlife, with a Very High risk posing the greatest potential concern, and the Low Risk a lower level of concern. The ARM also identifies that if a ZOS is present, the risk also increases.

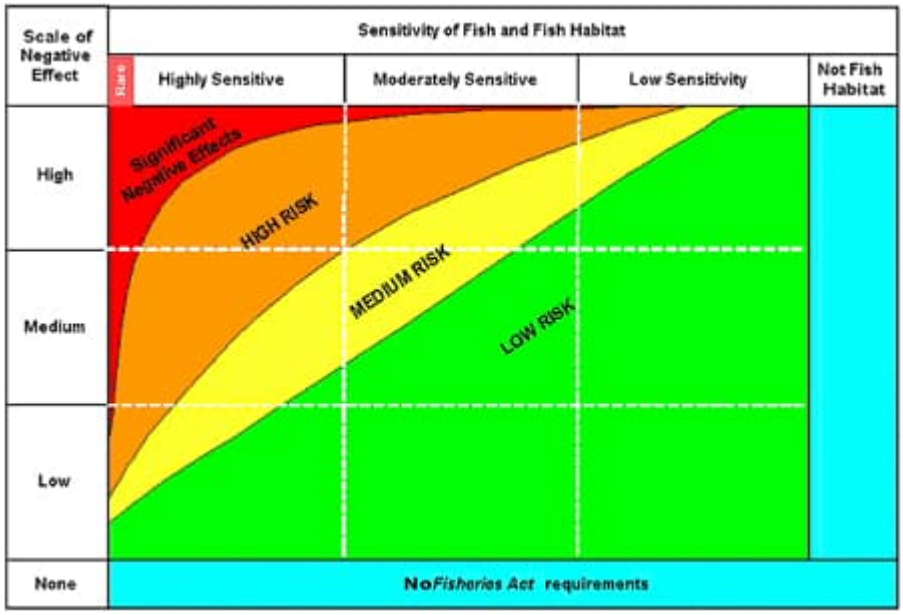


Figure 3. How the potential for negative effects relates to sensitivity and risk (DFO 2006).

6.1. Using the ARM

Clarifications for using the ARM are listed below:

1. If your activity is not listed, assume High Risk and contact FrontCounterBC for advice.
2. Where several activities with differing risk ratings are proposed for a single Project, the cumulative risk may increase. Consequently, it is recommended to seek the advice of a QEP to determine if the higher of the two risk ratings effectively captures the cumulative risk, or if the highest risk rating should be used [e.g., Very High]).
3. The ARM distinguishes between several activities above and below the present natural boundary (NB). The NB is the legal term BC Crown Land Branch uses to define the Crown Land property boundary along the shoreline. High Water Hark (HWM) is a similar standard term used by DFO when considering impacts to fish values. The NB and HWM are often located in the same location, but this can vary. Only a registered BC Legal Land Surveyor may determine the NB.
4. In some instances, the project may not seem to have a high degree of risk. However, the ARM also accounts for other accompanying impacts likely to occur once the modification is in place. For instance, once a dock is in place, other likely associated impacts are prop wash, maintenance, and boat traffic.

6.2. General Mitigation Hierarchy

The general principles of shoreline development are to design in such a way that there is "No Net Loss" in the quantity or quality of existing habitat. These principles are supported by the federal and provincial policy[1,2]). In general, these principles are achieved through application of the following mitigation options: (1) avoidance of environmental impacts and associated components; (2) minimization of unavoidable impacts on environmental values and associated components; (3) restore on site environmental values and associated components, and, (4) offset impacts to environmental values of components for residual impacts that cannot be minimized.

6.3. Very High and High Risk Activities

Most in-stream works in Red and Orange shoreline zone areas are considered Very High and High Risk activities. All activities in a ZOS are considered Very High Risk. Development in these areas has the potential to cause long-term or irreparable disturbance to the highly sensitive/unique values present. The Very High Risk activities in particular, are known to have significant challenges related to providing adequate mitigation to address the loss of fish and/or wildlife habitat values. For example, the dredging activity is considered Very High Risk in all colour zones, since it results in a major disturbance to the substrate, aquatic vegetation that may be present, and has the potential for direct impacts on aquatic life, and processes (wave climate and sediment transport). There may also be indirect impacts, such as on water quality, if for example the dredge is to support a marina.

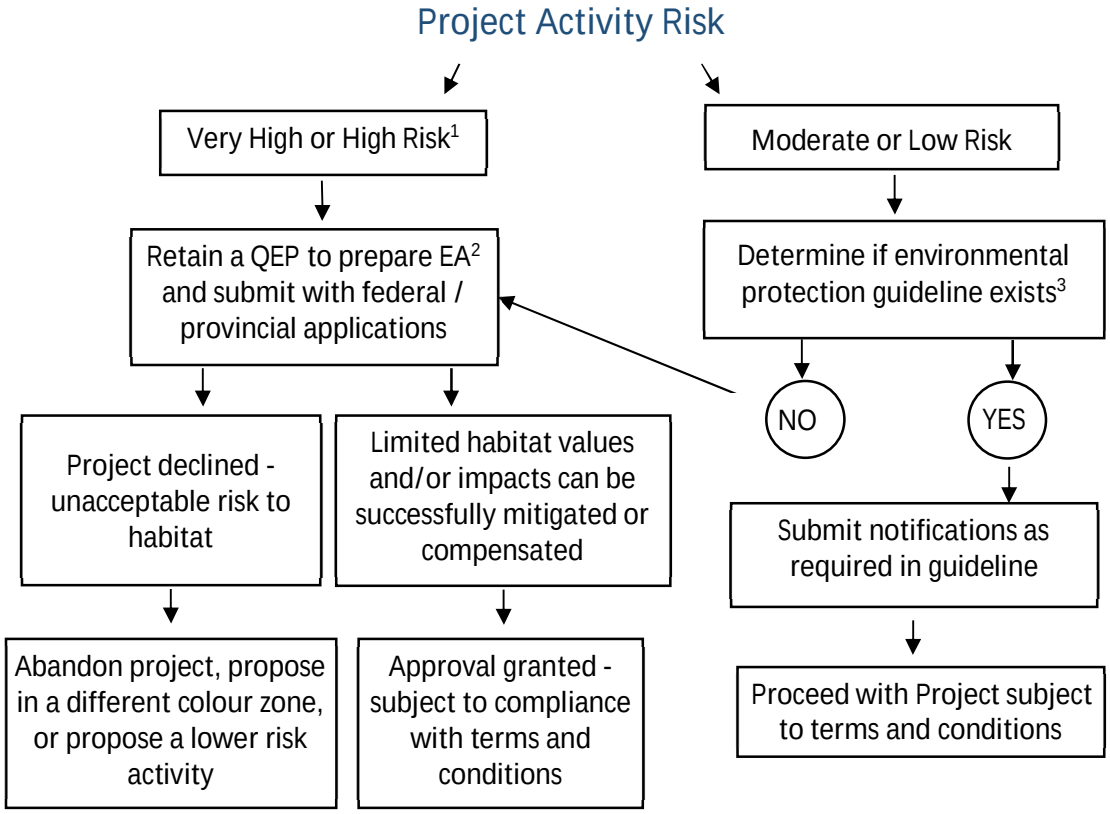
If your activity is identified as being Very High or High Risk, determine if you can modify the activity or location to reduce the risk. This may involve moving the project to a colour zone with less sensitive habitat or selecting a lower risk activity (Figure 4). If reducing the risk is not possible by re-designing or re-locating the project, there is a high likelihood that a detailed environmental assessment would be required to support the project application. In these areas, the high risks may trigger a request for a Harmful Alteration, Disruption or Destruction of Fish Habitat (HADD) Authorization under the federal *Fisheries Act*. If residual effects cannot be mitigated, compensation may be required. Acceptable mitigation and compensation measures would likely be very costly to implement. It is highly advised that a QEP be retained to assist with the project planning in all High and Very High Risk areas. A QEP should be knowledgeable about both the permitting and application process for proposed activities and be able to provide guidance on potential environmental risks and impacts. A QEP would likely conduct an environmental assessment within the project area, confirm risks, and make recommendations to reduce impacts to aid in the regulatory permitting process. Applications for these types of developments may not be supported by regulators and may not be approved, even if extensive and detailed information is provided as part of a permitting process.

As an example, the type of information that might be required to support an application for a proposed project located in a sensitive area could include, a detailed erosion control plan that might require a BC Legal Land Surveyor to determine the location of NB and property boundaries, a QEP to provide recommendations to mitigate construction works as part of an

[1] DFO Projects Near Water website: https://dfo-mpo.gc.ca/pnw-ppe/index-eng.html
[2] BC Environmental Mitigation Policy website: https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/environmental-guidance-and-policy/environmental-mitigation-policy.

environmental assessment, or an engineer may be needed to provide a detailed design for submission of permits under regulatory processes.

Figure 4. Typical Environmental Regulatory Review Decision-Making Process



[1] Very High or High Risk activities have the potential to raise significant concerns. These activities have great challenges related to providing adequate mitigation or compensation to address the loss of fish and/or wildlife habitat values, and could be costly to implement (may require compensation).

[2] Environmental Assessment

[3]BMP – Best Management Practice; ROS –Regional Operating Statement

6.4. Moderate and Low Risk Activities

With appropriate design and planning, Moderate and Low Risk activities could be incorporated along the foreshore with fewer impacts on fish and wildlife habitat values. Where available, these activities should follow applicable Best Management Practices (BMP), Standards and Codes of Practice (collectively BMP; see next section). Where BMPs are not available, or a deviation from the BMP is proposed, a QEP should be retained to complete the application. The application will be reviewed by the applicable agencies.

7. Step 4 – Determine Regulatory Requirements and Submit Applications

The final step when planning a foreshore development project is to determine the regulatory requirements necessary for the project to proceed and to submit those applications. Regulatory applications are to be made to the federal, provincial, or local governments for

necessary permits, authorizations, notifications, and reviews etc. Essentially any shoreline development will require the preparation of at least one regulatory application. The regulatory application's acceptance will be required for the project to proceed legitimately. Commencing work without approval may be considered unlawful and result in infractions such as trespass. Work that has not been approved may also be subject to enforcement actions by the respective agencies, and may require additional effort to mitigate any undesired environmental impacts that occurred. Alternatively, the project proponent could be required to remove all infrastructure and restore the area.

Typical regulatory requirements for each activity listed in the ARM are provided in Appendix C. As well, Provincial BMPs have been listed in Appendix D[3]. Although summarized here, the requirements at the time of planning the project will need to be confirmed, as regulatory changes might occur. Also, the DFO website should be reviewed for applicable Standards and Codes of Practice that may help guide planning and development [4] . Contact FrontCounterBC to determine which provincial permits, approvals or authorizations you need, or retain a QEP for guidance.

This document does not provide a full summary of all potential requirements for a particular project. Proponents must ensure that they have adequately considered, consulted, and determined the necessary approvals required for a project to proceed prior to undertaking any works.

7.1. Other Considerations to Facilitate Project Approvals

This FDG addresses both existing and proposed works. Sometimes there are concerns with the installation of past structures, which may include, if the structures:

- Resulted in extensive impacts along the shoreline;
- Were installed without appropriate permits or approvals in place; and/or,
- Were not compliant with standard BMPs.

If any of the above concerns are present on the property where work is planned, then follow these steps, so that new applications, or applications for maintenance or expansion on existing projects, can be reviewed more effectively:

1. Determine if the existing works are on private land or Crown Land.
2. Determine if they are located in an Application Only Area/Reserve area established under the *Land Act*.
3. Determine if the works were authorized by the appropriate authority. If yes, skip to step 5.
4. Seek approval from the appropriate authority. Approval may or may not be granted depending on the situation. Previous projects installed without appropriate permits or approvals may be required to be removed as part of an application process.
5. Plan and update existing works to current Best Management Practices.

[3] A current list of provincial BMP's are available at: https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices

[4] DFO Project Near Water website: https://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html

6. Include other mitigation practices, such as landscape restoration (planting native riparian vegetation), substrate improvement (removing or mitigating existing groynes), and other habitat improvements.

8. References and personal communications

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Appendix A. Foreshore Guidance Document Map

Appendix B. Activity Risk Matrix (Risk ratings: NA = Not Allowed, VH = Very High, H = High, M = Moderate, and L = Low)

Activity[1]	Risk rating based on Ecological Ranking				Risk rating if Zone of Sensitivity Present[2]
	Very High	High	Moderate	Low / Very low	
Aquatic Vegetation Removal					
Removing native aquatic vegetation - by hand, or mechanical cutting for swimming areas and private beach access	VH	VH	VH	VH	NA
Removing non-native/invasive aquatic vegetation - by hand or mechanical cutting for swimming areas and private beach access	VH	VH	H	M	NA
Dredging, Infilling and Beach Creation					
Dredging - new or expansion works, no current tenure	VH	VH	VH	VH	NA
Maintenance dredging - dredged in last 10 years, no increase in footprint below the NB[1], dredged material deposited on land, within existing tenure	VH	VH	VH	VH	NA
Lake infilling - e.g. extension of upland landscaping	VH	VH	VH	VH	NA
Beach creation below the lake NB	VH	VH	VH	VH	NA
Foreshore sediment disturbance and removal of lakebed substrate (e.g., beach grooming)	VH	VH	H	M	NA
Foreshore Erosion, Sediment or Wave Control Structures					
New groyne construction or increase in existing footprint	VH	VH	VH	VH	NA
Maintenance of existing groyne, no increase in existing footprint, within existing tenure	M	M	L	L	NA
Erosion control (e.g. concrete, rip rap, vegetation, etc.)	VH	VH	H	M	NA
Infill breakwaters or boat basins	VH	VH	H	H	NA
Wave control structures (e.g., log booms)	VH	VH	H	M	NA
Boat Launches					
Construction of new hard surface boat launch or repair/upgrade of existing hard surface boat launch without land tenure	VH	VH	VH	H	NA
Upgrade/repair of existing hard surface boat launch with land tenure and within existing footprint	VH	H	H	M	NA
Upgrade/repair of existing hard surface boat launch with land tenure and increasing size of the existing allowable footprint	VH	VH	H	M	NA

Activity[1]	Risk rating based on Ecological Ranking				Risk rating if Zone of Sensitivity Present[2]
	Very High	High	Moderate	Low / Very low	
Construction of new boat rail launch or repair/upgrade of existing boat rail launch without land tenure	VH	H	M	L	NA
Upgrade/repair of existing boat rail launch with land tenure and within existing footprint	H	H	M	M	NA
Buoys					
Placement of up to 2 helical screw anchor mooring buoys for non-commercial use.	VH	H	M	L	NA
Placement of up to 2 non-helical screw mooring buoys for non-commercial use.	VH	H	H	M	NA
Placement mooring buoys for commercial use	Moorage # dependent - see Marina Activity rankings				NA
Docks, boathouses, pile supported structures, float home structures, and other - below NB					
Docks - floating, pile supported or removable	VH	H	M	L	NA
Floating or lake access boat house, covered boat storage, or permanent non-moorage structures	VH	VH	VH	VH	NA
Land boat house - located on land with access directly to the water	VH	VH	VH	H	NA
Pumphouse	VH	VH	VH	H	NA
Boat lifts	VH	H	L	L	NA
Float homes and house boats - refers to long term storage area.	VH	VH	VH	VH	NA
Float home/ house boats - refers to short term mooring (in bays).	VH	H	M	L	NA
Submarine cables, including related land clearing and equipment access.	VH	VH	VH	H	NA
Submarine cables - no land clearing necessary.	L	L	L	L	NA
Overwater piled structure (e.g. building, deck, etc.)	VH	VH	VH	VH	NA
Elevated boardwalk over water	VH	H	H	H	NA
Marinas					
Private dock moorage = < 6	VH	H	M	M	NA
Small Marina = 6 – 20 slips	VH	H	H	H	NA
Marina Large = >20 slips	VH	VH	VH	VH	NA
Water Withdrawal, Use or Discharge					

Activity[1]	Risk rating based on Ecological Ranking				Risk rating if Zone of Sensitivity Present[2]
	Very High	High	Moderate	Low / Very low	
Waterline - directional drilling	M	M	M	M	NA
Waterline - open excavation	VH	VH	H	M	NA
Geothermal heating/cooling - commercial, industrial, strata or multi-family	VH	VH	VH	H	NA
Geothermal heating/cooling - single family residence	H	H	M	L	NA
Treated effluent discharge pipe	VH	VH	VH	VH	NA
Commercial water withdrawals (addressed through water licencing, with physical activites addressed elsewhere in this table)	-	-	-	-	-
Transition to Private Land from Crown Land					
Application to purchase or lease crown land (crown grant)	VH	H	M	L	NA
Land development, on private land - above NB					
Native vegetation modification/removal, including for: buildings (e.g., boathouses, covered boat storage, permanent non-moorage structures), beach creation, landscaping, and septic fields.	VH	VH	VH	H	NA
Non-native vegetation modification / removal, including for: buildings (see above), landscaping, beach creation, and septic fields.	VH	H	M	L	NA
Drilling and blasting	VH	VH	VH	H	NA

Legend:

[1]NB refers to present natural boundary. NB is the legal term BC Crown Land Branch uses to define the property boundary. Often NB and High Water Hark (HWM) are similar. Only a registered BC Legal Land Surveyor may determine NB.

[2]For all activities, if species or Critical Habitat listed under the Species at Risk Act (SARA) are present, refer to DFO Projects Near Water Website (https://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) and/or the specific SARA Recovery report for the species (referenced in Section 5.2) for next steps.

[3]Refer to DFO Land Development Guidelines (http://stewardshipcentrebc.ca/PDF_docs/StewardshipSeries/LandDevelopmentGuidelines.pdf)

Appendix C. Legal Requirements and Policy

The following provides a brief summary of environment related legislation that may be applicable to a proponent's project. While this list is fairly inclusive, other pieces of legislation may be applicable, and proponents are to ensure that they have identified all legislation that may apply to their project. The Federal Project Near Water website may be updated to reflect the integration of permitting under the *Species at Risk Act* and *Fisheries Act.* It is the proponents 'responsibility to refer to the Projects Near Water website for any updates.

Federal Acts:

- *The Department of Environment Act*
- *Fisheries Act*
- *Species at Risk Act (SARA)*
- *Migratory Birds Convention Act*
- *Canada Wildlife Act*
- *Navigable Waters Protection Act*
- *Pesticides Act*
- *Canadian Environmental Assessment Act (CEAA)*
- *Indian Act*

Federal Regulations:

- *Canada Environmental Protection Act* Regulations
- *Migratory Birds Regulations*
- *Fisheries Act Regulations*
- *Wildlife Area Regulations*

Provincial Acts:

- *Water Sustainability Act*
- *Fish Protection Act*
- *Wildlife Act*
- *Land Act*
- *Weed Control Act*
- *Environmental Management Act*

(Contaminated Sites Regulations)

- *Local Government Act*
- *Heritage Conservation Act*
- *Health Act (e.g., Sewerage System Regulation)*

Local Government:

- Development Permit Areas (DPAs)
- Subdivision Servicing Bylaw
- Official Community Plans
- Floodplain Management Bylaw
- Building Bylaw
- Zoning Bylaws

The Legal Requirements table, provided below (Table C1) identifies the main fish and wildlife habitat regulatory requirements for typical foreshore activities. These requirements involve three regulatory processes:

1. Obtaining a BC Crown Land tenure - to request permission for use of provincial Crown land.
2. Obtaining a BC Water Sustainability Act Section 11 notification or approval for making changes in and about a stream.
3. Obtaining necessary DFO acceptance through a Project Review. DFO staff will review the project plans to identify the potential risks of the project to the conservation and protection of fish and fish habitat. During the review, it will be determined if the project will: a) impact an aquatic species at risk, result in the death of fish and the harmful alternation, disruption or destruction of fish habitat, or need authorization under the *Fisheries Act*.
4. Obtaining a development permit, where necessary as outlined by district and regional official community plans.

Although potential regulatory requirements (e.g., permits) are listed, the requirements at the time of planning the project should be confirmed, as regulatory changes do occur. FrontCounterBC should be contacted to confirm these requirements.

The Legal Requirements table only provides direction related to protecting fish and wildlife habitat values, and as such, does not consider other development factors (such as erosion hazards, drinking water quality, or navigation considerations). Proposed works may be subject to requirements such as: local government zoning or permitting, BC *Water Sustainability Act* approvals or notifications (in addition to those noted above) and Water License applications, Heritage Conservation Act permits, Land Act permits, licenses or permissions for occupation of Crown Lands, or Navigable Waters Protection Act approvals. It remains the responsibility of the project proponent to verify this information and meet all regulatory requirements that may apply to their project.

Table C1. Summary of typical legal environmental requirements for select development activities.

Activity[1]	Crown Land Tenure	BC Water Sustainability Act-Section 11[2]	Federal Fisheries Act Review[4]	Other
Aquatic Vegetation Removal				
Removing native aquatic vegetation - by hand, or mechanical cutting for swimming areas and private beach access	N	Y	See DFO website	-
Removing non-native/invasive aquatic vegetation - by hand or mechanical cutting for swimming areas and private beach access	N	Y	See DFO website	-
Dredging, Infilling and Beach Creation				
Dredging - new or expansion works, no current tenure	Y	Y	Y	-
Maintenance dredging - dredged in last 10 years, no increase in footprint below the NB, dredged material deposited on land, within existing tenure.	N	Y	See DFO website, likely N	-
Lake infilling - e.g. extension of upland landscaping	Y	Y	Y	-
Beach creation below the lake NB	Y[3]	Y	Y	-
Beach creation above the lake NB, assumes on the applicant's land	N	Y	See DFO website, likely N	See DFO Land Development Guidelines[5]
Foreshore sediment disturbance and removal of lakebed substrate (e.g., beach grooming)	N	Y	See DFO website, likely Y	-
Foreshore Erosion, Sediment or Wave Control Structures				-
New groyne construction or increase in existing footprint	Y	Y	Y	-
Maintenance of existing groyne, no increase in existing footprint, within existing tenure	N	Y	N	-
Erosion control (e.g. concrete, rip rap, vegetation, etc.)	N	Y	See DFO website	-
Infill breakwaters or boat basins	Y	Y	See DFO website	-
Wave control structures (e.g., log booms)	Y	Y	See DFO website	-
Boat Launches				-
Construction of new hard surface boat launch or repair/upgrade of existing hard surface boat launch without land tenure	Y	Y	See DFO website	-

Activity[1]	Crown Land Tenure	BC Water Sustainability Act-Section 11[2]	Federal Fisheries Act Review[4]	Other
Upgrade/repair of existing hard surface boat launch, within land tenure, and within existing footprint	N	Y	N	-
Upgrade/repair of existing hard surface boat launch, within land tenure, and increasing size of the existing allowable footprint	Y	Y	Y	-
Construction of new boat rail launch or repair/upgrade of existing boat rail launch without land tenure	Y	Y	See DFO website	-
Upgrade/repair of existing boat rail launch with land tenure and within existing footprint	N	Y	N	-
Buoys				
Placement of up to 2 helical screw anchor mooring buoys for non-commercial use.	Y[3]	Y	N	Federal Navigable Waters Act
Placement of up to 2 non-helical screw mooring buoys for non-commercial use.	Y[3]	Y	N	Federal Navigable Waters Act
Placement mooring buoys for commercial use	Y	Y	N	-
Docks, boathouses, pile supported structures, float home structures, and other - below NB				
Docks - floating, pile supported or removable	Y[3]	Y	See DFO website	-
Floating or lake access boat house, covered boat storage, or permanent non-moorage structures	Y	Y	Y	-
Land boat house - located on land with access directly to the water.	Y	Y	See DFO website	-
Pumphouse	Y	Y	Y	-
Boat lifts	Y[3]	Y	See DFO website	-
Float homes and house boats - refers to long term storage area.	Y	Y	Y	-
Float home/ house boats - refers to short term mooring (in bays).	Y	Y	See DFO website	-
Submarine cables, including related land clearing and equipment access.	N	Y	See DFO website	-
Submarine cables - no land clearing necessary.	N	Y	N	-
Overwater piled structure (e.g. building, deck, etc.)	Y	Y	See DFO website	-
Elevated boardwalk over water	Y	Y	See DFO website	-

Activity[1]	Crown Land Tenure	BC Water Sustainability Act-Section 11[2]	Federal Fisheries Act Review[4]	Other
Marinas				
Private dock moorage = < 6	Y[3]	Y	See DFO website, likely Y	-
Small Marina = 6 – 20 slips	Y	Y	Y	-
Marina Large = >20 slips	Y	Y	Y	-
Water Withdrawal, Use or Discharge				
Waterline - directional drilling	N	Y	See DFO website	May require a Water License
Waterline - open excavation	N	Y	See DFO website	May require a Water License
Geothermal heating/cooling - commercial, industrial, strata or multi-family	Y[3]	Y	See DFO website	May require a Water License
Geothermal heating/cooling - single family residence	Y[3]	Y	See DFO website	May require Water License
Treated effluent discharge pipe	Y[3]	Y	N	Environment Canada
Commercial water withdrawals	Y[3]	Y	See DFO website	Requires Water License
Transition to Private Land from Crown Land				-
Application to purchase or lease crown land (crown grant)	Y	N	N	-
Land development, on private land - above NB				
Native Vegetation modification / removal	N	Y[3]	See DFO website	-
Non-native Vegetation modification / removal	N	Y[3]	See DFO website	-
Drilling and blasting	N	Y	See DFO website	If < 30 m NB, contact local government
Boathouses / covered boat storage / permanent non-moorage structures	N	Y[3]	See DFO website	Refer to Local Government
Building and development permit application	N	Y[3]	Y[3]	Refer to Local Government
Landscaping with Native Vegetation	N	N	See DFO website	Refer to Local Government

Activity[1]	Crown Land Tenure	BC Water Sustainability Act-Section 11[2]	Federal Fisheries Act Review[4]	Other
Landscaping with Non-native Vegetation	N	N	See DFO website	Refer to Local Government
Septic application	Y[3]	N	N	Refer to Health Authority

Legend:

[1]NB refers to present natural boundary. NB is the legal term BC Crown Land Branch uses to define the property boundary. Often NB and High Water Hark (HWM) are similar. Only a registered BC Legal Land Surveyor may determine NB.

[2] BC Water Sustainability Act Approval or Notification.

[3] Although indicated as Yes, the requirement is structure/location dependent. Refer to FrontCounterBC.

[4]DFO Projects Near Water Website (https://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html). For all activities, if species or Critical Habitat listed under the Species at Risk Act (SARA) are present, refer to this website.

[5]Refer to DFO Land Development Guidelines (http://stewardshipcentrebc.ca/PDF_docs/StewardshipSeries/LandDevelopmentGuidelines.pdf) .

Appendix D. Best Management Practices

The BC Ministry of Environment (Province of BC 2023d) defines best management practices (BMPs) as “guidelines that help development projects meet necessary legislation, regulations and policies. For example, legislation might dictate that projects cannot harm a stream, while best management practices provide practical methods to avoid harming a stream.”

The table below provides a summary of potentially applicable environmental and archaeological BMPs. This list is not exhaustive, other applicable BMPs may be available for a given project, and updates occur regularly. Thus, it is recommended that the website be accessed at the following link for a current updated list: https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices.

FrontCounterBC or a QEP should be contacted for more information on recent Provincial BMP’s that may be specifically applicable to the Project.

For Federal documents, the *Projects Near Water* website by Fisheries and Oceans Canada should also be referred to (https://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html).

Table D1. Summary of BMPs and guidelines that may be applicable to development in the Kootenay Region.

Provincial BMPs	Target - species habitat	Applicability	Web Link
Natural Resource Best Management Practices	Key website to locate Province of BC BMPs and guidelines. Search here first for updates. Includes many listed below and others, in the categories of amphibians and reptiles, backcountry tourism or commercial activities, bats, plants, raptors, urban environment, wetlands, working around water and region specific		https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices
Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia (2014)	Sensitive Species Terrestrial Aquatic Riparian	Works involving any form of land development.	https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care
Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia (2014)	Amphibians and Reptiles	Ecosystems comprised of aquatic habitats, rocky outcrops and forested areas.	https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices
Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (2013)	Raptors	Terrestrial ecosystems comprised of mature coniferous and mixed woodlands.	http://www.env.gov.bc.ca/wld/documents/bmp/raptor_conservation_guidelines_2013.pdf
Best Management Practices Guidelines for Bats during Urban and Rural Land Development in British Columbia in BC (2016)	Bats	Terrestrial ecosystems, insect rich riparian zones, as well as wetlands, forest edges and open woodland.	http://a100.gov.bc.ca/pub/eirs/viewDocumentDetail.do?fromStatic=true&repository=BDP&documentId=12460
Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia Understanding your obligations under the Water Sustainability Act and Water Sustainability Regulation (2022)	Aquatic	Any projects undertaken in and around a stream.	https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf

Table D1. Summary of BMPs and guidelines that may be applicable to development in the Kootenay Region.

Provincial BMPs	Target - species habitat	Applicability	Web Link
Best Management Practices for Hazard Tree and Non-Hazard Tree Limbing, Topping or Removal (2009)	Terrestrial Aquatic	Works involving tree removal.	https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/hazardtree_26may_09.pdf
Standards and Best Practices for In-stream Works (2004)	Terrestrial Aquatic	Wharves, piers, docks, boathouses, and small moorings in and about a stream	https://a100.gov.bc.ca/pub/eirs/lookupDocument.do?fromStatic=true&repository=BDP&documentId=3536
Bank Stabilization Specific BMPs	Terrestrial Aquatic	Bank stabilization works that could impact fish or wildlife habitat.	https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf
Best Management Practices for Boat Launch Construction & Maintenance on Lakes (2006)	Terrestrial Aquatic	Boat Launch Construction & Maintenance on Lakes (Okanagan specific)	http://www.env.gov.bc.ca/okanagan/documents/BMPBoat_LaunchDraft.pdf
Best Management Practices for Small Boat Moorage on Lakes (2006)	Terrestrial Aquatic	Small Boat Moorage on Lakes (Okanagan specific)	http://www.env.gov.bc.ca/okanagan/documents/BMPSmallBoatMoorage_WorkingDraft.pdf
Best Management Practices for Installation and Maintenance of Water Line Intakes (2006)	Aquatic	Installation and Maintenance of Water Line Intakes (Okanagan specific)	http://www.env.gov.bc.ca/okanagan/documents/BMPIntakes_WorkingDraft.pdf
Beaver Management Guidelines (2001)	Aquatic	Areas that support beaver communities.	http://www.env.gov.bc.ca/van-island/pa/pdf/Beaver-Guide.pdf
Tree replacement criteria (1996)	Terrestrial	Works involving tree removal and replacement.	http://www.env.gov.bc.ca/wld/documents/bmp/treereplcrit.pdf
Kootenay-Boundary Water Sustainability Regulation Terms and Conditions (2018)	Aquatic	Changes in and around a stream of the kind listed in	https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/terms_conditions_koot_bdy_may2018.pdf#

Table D1. Summary of BMPs and guidelines that may be applicable to development in the Kootenay Region.

Provincial BMPs	Target - species habitat	Applicability	Web Link
		Part 3 of the *Water Sustainability Regulation.*	:~:text=If%20works%20are%20proposed%20on%20a%20stream%20that,the%20species%20of%20fish%20found%20at%20the%20site
Fish Habitat Rehabilitation Procedures (1997)	Aquatic	Works with an erosion and sediment risk near water.	https://www.for.gov.bc.ca/hfd/library/ffip/Slaney_PA1997_A.pdf
Guidelines for Wetland Protection and Conservation in British Columbia: Land Development (2009)	Wetlands	Wetland protection near development sites.	https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/wetland_ways_ch_10_development.pdf
Land Development Guidelines for the Protection of Aquatic Habitat (1992)	Aquatic	Works undertaken in areas adjacent to riparian features.	https://stewardshipcentrebc.ca/portfolio/land-development-guidelines/
Best Management Practices for Whitebark Pine (2021)	Terrestrial	Works undertaken in areas adjacent to Whitebark Pine Critical Habitat	https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/whitebark_pine_bmp.pdf
DFO Standards and Codes of Practice	Aquatic	Beaver dam breaching and removal, Clear span bridges, Culvert maintenance, Ice bridges and snow fills, Routine maintenance dredging for navigation, Temporary fords, and Temporary cofferdams and diversion channels.	https://www.dfo-mpo.gc.ca/pnw-ppe/practice-pratique-eng.html
Ktunaxa Nation Council BMPs	**Target Area**	**Applicability**	**Web Link**

Table D1. Summary of BMPs and guidelines that may be applicable to development in the Kootenay Region.

Provincial BMPs	Target - species habitat	Applicability	Web Link
Guidelines for Conducting Archaeological Assessment in Ktunaxa Territory	Archaeology	Activities with moderate to high risk to Archaeological values	https://www.ktunaxa.org/