Guidance for Foreshore Plants in the Okanagan

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Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Thompson Okanagan Region | Resource Management | Ecosystems Section

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1.0 INTRODUCTION

The Thompson Okanagan Region of British Columbia (B.C.) is defined by numerous large lakes and foreshore areas that provide important habitat for a variety of species, including foreshore plants. Foreshore plant species at risk (SAR) are those species that are red-listed or blue-listed by the B.C. Conservation Data Centre (CDC), and those species that are federally endangered, threatened or considered of special concern under the *Species at Risk Act* (SARA). These species need to be considered during the planning and evaluation of foreshore developments to limit the potential for direct or cumulative adverse effects to plant SAR populations.

The purpose of this document is to provide region-specific guidance to qualified professionals (QPs) conducting foreshore plant SAR surveys and mitigating effects of foreshore developments on this species group in the Okanagan area. It is also intended to assist provincial and federal agencies, local governments and the public during the planning and adjudication of development activities. This document must be used in conjunction with the *Okanagan Large Lakes Foreshore Protocol* (the Protocol; FLNRORD 2018), which provides risk rankings for foreshore development activities and describes foreshore sensitivity zone determination for foreshore plants.

The guidance in this document is based on the information available at the time of publishing and will be periodically updated as new information becomes available. This guidance document applies to all works below the high water mark (HWM) on the following "large lakes" identified in the Protocol: Mabel, Sugar, Okanagan, Kalamalka, Wood, Skaha and Osoyoos. It will be used as guidance for all other lakes in the Okanagan area of the Thompson Okanagan Region (e.g., Vaseux Lake). The approach taken here is consistent with the Ministry of Forest, Lands, Natural Resource Operations and Rural Development's (FLNRORD) shared stewardship model to protect B.C.'s natural resources through collaboration, information sharing, education and use of best management practices (BMPs).

2.0 WHEN FORESHORE PLANT SPECIES AT RISK SURVEYS ARE REQUIRED

To date, survey efforts for foreshore plant SAR have been inconsistently applied with variable costs to proponents and unknown consequences to plant populations. The provincial guidance provided here requires that a certain level of foreshore plant SAR survey be conducted for all development activities that have the potential to adversely affect foreshore plant SAR populations. This potential is based on two factors: (i) the magnitude and likelihood of the development activity adversely affecting foreshore plant SAR populations (i.e., activity risk), and (ii) the known presence of and/or habitat suitability of the project area in supporting plant SAR populations (i.e., foreshore sensitivity zone). The rationale and data sources used to map the foreshore sensitivity zones for foreshore plants is provided Appendix A. Refer to the Protocol to determine the activity risk of your development and the foreshore sensitivity zone of your project area. Based on this information, Table 1 lists the level of plant SAR survey required.

Table 1 Foreshore Plant SAR Survey Requirements by Activity Risk and Zone

Activity Risk	Foreshore Sensitivity Zone			
	No Colour	**Yellow**	**Red**	**Black**
Low Risk (follows BMPs)	N/A	N/A	N/A	Contact Ecosystems Section Head before proceeding
Low Risk (does not follow BMPs)	Preliminary Assessment	Detailed Survey	Detailed Survey	
Moderate Risk	Preliminary Assessment	Detailed Survey	Detailed Survey	
High Risk	Preliminary Assessment	Detailed Survey	Detailed Survey	

Foreshore plant SAR surveys are not required for:

- Low Risk activities that follow available BMPs in a No Colour Zone (i.e., unknown potential habitat) or Yellow Zone (i.e., known potential habitat)
- Low Risk activities that follow available BMPs in a Red Zone (i.e., known foreshore plant SAR habitat); in this case the known presence of foreshore plant SAR precludes the need for additional survey effort, but mitigation is required as outlined in Section 5.0.

In all other cases, some level of foreshore plant SAR survey by a QP will be required.

A Preliminary Habitat Assessment following the methods in Section 4.1 is required in a No Colour Zone if existing BMPs cannot be followed, or if the proposed activity has a Moderate or High Risk. If the Preliminary Habitat Assessment identifies the presence of foreshore plant SAR or high potential habitat then a Detailed Plant SAR Survey will be required. Proponents may opt to bypass the Preliminary Habitat Assessment and move straight to a Detailed Plant SAR Survey.

A Detailed Plant SAR Survey following the methods in Section 4.2 is required in a Yellow Zone or Red Zone for all activities other than Low Risk activities that follow existing BMPs. Proponents may opt to bypass the Detailed Plant SAR Survey in a Red Zone and move straight to mitigation (Section 5.0) if a direct or indirect project interaction is already known. The proponent should contact the Thompson Okanagan Region Ecosystems Section Head prior to proceeding with surveys in a Black Zone (i.e., Critical Habitat), as foreshore development activities in these area are likely not consistent with Provincial priorities and direction.

Note: Some level of foreshore plant SAR survey by a QP is required for all projects other than Low Risk activities that follow available BMPs in No Colour, Yellow and Red Zones. Survey results will be reviewed as part of provincial natural resource applications. Failure to report survey results using the QP Checklist for Foreshore Developments (Appendix B of the Protocol) may result in cancellation of an application.

3.0 SURVEYOR QUALIFICATIONS

Foreshore plant SAR surveys and mitigation must be undertaken by a professional who deems themselves qualified to conduct these works and is typically a registered professional biologist (R.P.Bio.) with the B.C. College of Applied Biology. Surveyor qualifications are identified as one of the most important factors in completing successful plant SAR surveys. The qualifications listed in

Table 2 are recommended prerequisites for conducting plant SAR surveys in the Okanagan area. These prerequisites are consistent with those identified in other jurisdictions (e.g., Alberta Native Plant Council 2012, California Natural Resource Agency 2009, Washington State Department of Natural Resources (no date)).

Table 2 Plant Species at Risk Surveyor Qualifications

Prerequisite	Qualifications
Academic Background	▪ Academic background (Bachelor of Science, or higher) in botany, plant taxonomy, plant ecology or a related field ▪ Extensive training and/or field experience may substitute for a formal academic background in some cases
Field Experience	▪ Taxonomic field experience conducting plant SAR surveys or working under the direction of an experienced surveyor ▪ Minimum of 120 days field experience in plant ID for field crew leads ▪ Direct field experience with specific target species may substitute for general plant SAR field experience in some cases
Local Knowledge	▪ Knowledge of potential plant SAR and habitats in project area ▪ Knowledge of most or all plant species likely encountered in project area
Technical Skills	▪ Ability to use regional floras and familiarity with botanical terminology ▪ Ability to use maps, GPS, compass and clinometers (or equivalent tools) to record plant locations and habitat attributes ▪ Ability to collect voucher specimens, as required, following provincial protocols (MoE 1999) ▪ Ability to use data forms to accurately record and report occurrences

It is important that QPs conducting foreshore plant SAR surveys have advanced plant taxonomy skills to identify foreshore plant SAR and distinguish them from more common relatives. Qualified surveyors should also have a working knowledge of plant ecology to determine where best to search for plant SAR, which species might be present, and how to mitigate for potential project effects.

4.0 SURVEY METHODS

The methods described here provide a standardized approach for foreshore plant SAR surveys that can be consistently applied across development types in the Okanagan area. The desired outcome of these surveys is to identify, record and report all occurrences of foreshore plant SAR within a project area by following appropriate methods that maximize foreshore plant SAR detection.

4.1 Preliminary Habitat Assessment

The purpose of the Preliminary Habitat Assessment is to determine the potential for the project area to provide habitat for foreshore plant SAR, as the foreshore sensitivity zone of the project area has not been previously mapped as a Black, Red or Yellow Zone (i.e., habitat potential is unknown). A project area is considered to have a high potential to support plant SAR (i.e., equivalent to a Yellow Zone) if its foreshore habitat attributes match those identified in Table 3. A project area is considered to have a low potential to support plant SAR if it is definitively identified as not being suitable for foreshore plant SAR based on the habitat attributes in Table 3. A conservative approach should be taken when determining if a project area contains high or low potential habitat. For example, some foreshore plant SAR are associated with man-made features and/or disturbed areas.

Table 3 Attributes Identifying High and Low Potential Foreshore Plant SAR Habitat

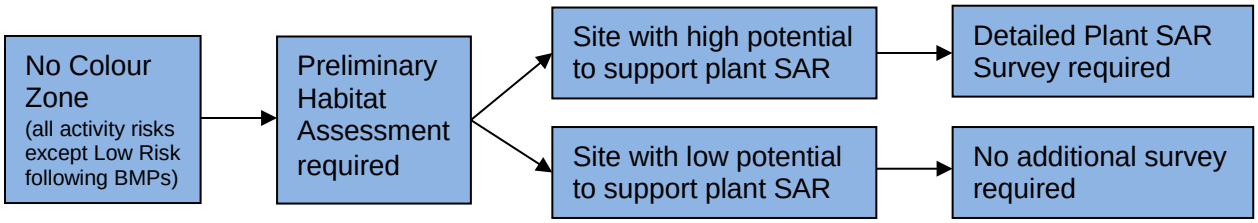
Foreshore Habitat Attribute[1]	Habitat Potential	
	High (Yellow Zone)	Low
Disturbance	Natural, modified	Disturbed
Exotic Plant Cover	<30% cover	>30% cover
Wave Action / Erosion	Minimal, infrequent	Substantial, frequent
Beach Substrate	Natural silts, sands and gravels	Imported, non-natural
Topography	Depression to gentle (<10%) slope	Moderate to steep (>10%) slope
Vegetation	Vegetation present	Non-vegetated

[1] Consult Recognizing Foreshore Plant SAR Habitat fact sheet for examples of foreshore habitats with high and low potential to support plant SAR

The Preliminary Habitat Assessment consists of desktop review and a preliminary project area visit to confirm the potential for the project area to support foreshore plant SAR. The following sources should be consulted as part of the desktop review:

- Foreshore inventory mapping (FIM)[1], terrestrial ecosystem mapping (TEM) and sensitive ecosystem inventory (SEI) mapping if available to determine habitat types and biogeoclimatic (BGC) zones present. Mapping data for the Okanagan area is available from EcoCat
- High quality, colour orthophoto images may also provide habitat information; use Google Earth, iMapBC and/or municipal/regional web mapping sources to identify potential habitats
- Site-specific photographs, consultant reports and landowner accounts

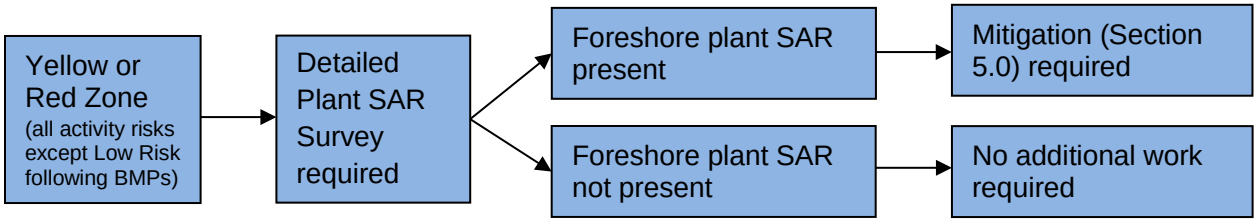
Available mapping, imagery and reporting may not capture project area-scale habitat features. A preliminary project area visit to evaluate the foreshore habitat potential based on Table 3 is required unless the foreshore habitat potential can be confirmed as high via desktop methods. In all cases where the Preliminary Habitat Survey identifies that a project area contains foreshore habitat with a high potential to support plant SAR, a subsequent Detailed Plant SAR Survey following the methods in Section 4.2 is required. Proponents may opt to bypass the Preliminary Habitat Assessment and move straight to a Detailed Plant SAR Survey in a No Colour Zone. No additional survey is required if the project area is found to contain foreshore habitat with a low potential to support plant SAR based on the Preliminary Habitat Survey. The QP Checklist (Appendix B of the Protocol) must be used to report the results of the survey.



[1] FIM is available for several large lakes (Mabel, Kalamalka, Wood, Okanagan, Skaha, Osoyoos) in the Okanagan and may be used as preliminary tool in determining whether a subject property contains habitat with a higher potential to support foreshore plant SAR. FIM results (e.g., substrate, shoreline, land use, vegetation modifications) are summarized by the dominant attributes of each segment, each at least 50 m in length with no maximum specified (Schleppe 2011) therefore the description of the segment may not accurately represent a specific site within the segment

4.2 Detailed Plant SAR Survey

The purpose of the Detailed Plant SAR Survey is to identify, record and report all occurrences of foreshore plant SAR in habitats that are known to support foreshore plant SAR or have a high potential to support foreshore plant SAR. The following sections describe methods to conduct a Detailed Plant SAR Survey including compiling a list of potential species, preparing for and conducting the field survey, and reporting requirements. Proponents may opt to bypass the Detailed Plant SAR Survey in a Red Zone and move straight to mitigation (Section 5.0) if a direct or indirect project interaction is already known.



4.2.1 Compile List of Potential Species

Planning for a plant SAR field survey involves compiling a list of plant SAR that have the potential to occur in the project area based on the habitat requirements of the species. A list of the plant SAR known to occur in foreshore habitats in the Okanagan is provided in Appendix B[2]; other foreshore plant SAR may be present in survey areas and may be discovered over time. This species list is provided as a default list; species-specific ranges and habitat requirements may exclude certain species from the search list depending on the area being surveyed. The following resources can be used to refine the foreshore plant SAR list prior to field surveys:

- Consult BC Species and Ecosystems Explorer (CDC 2018b) to determine which foreshore plant SAR are present in the general area.
- Use iMapBC[3] (DataBC 2018) to determine if there are mapped known occurrences or observations of plant SAR at or near the project area
- Shortlist the plant list based on species-specific range and habitat requirements using resources such as the following:
  - Species Fact Sheets (if available)
  - E-Flora BC (Klinkenberg 2013)
  - BC Species and Ecosystems Explorer (CDC 2018b) search by species name, then click on name in results to access Reports and References, including status reports

Note: Inventory efforts for many foreshore plant SAR have been limited to date; the absence of a record for a species within a particular area does not necessarily mean that the species is absent from an area.

[2] Appendix B includes vascular plants only; non-vascular mosses and lichens are not included at this time

[3] Known plant SAR occurrences are recorded in iMapBC as CDC records and Wildlife Species Inventory (WSI) records. CDC records are high quality, peer-reviewed records. WSI records may be either survey observations (SO) or incidental observations (IO) that do not meet the standards required to be included as CDC records, but in general have been quality controlled prior to data entry and are considered to be informative records

4.2.2 Prepare for Field Survey

Numerous factors affect plant SAR detectability, including the plant's attributes (flower phenology, size, colour, morphology, abundance), the observer (experience, number), and the survey design (length of survey, season and year of survey, number of surveys) (e.g., Alexander et al. 2012, Chen et al. 2009). The following preparation maximizes the potential for detecting plant SAR:

- Assemble surveyor teams that meet the qualifications in Section 3.0 and that are large enough or have enough hours allotted to provide the required coverage of potential habitats within the project area, recognizing that ease of survey may vary by species and habitat type
- Consult available resources including regional floras, herbarium collections and fact sheets prior to conducting fieldwork, and review the specific flowering or optimal identification periods for shortlisted plant SAR to determine required survey period(s)
- Plan to survey at least once during the optimal survey time for each shortlisted species, typically during flowering or fruiting to increase detection rate; multi-species assessments may require multiple surveys to capture all species during their flowering period
- If available, visit known plant SAR sites annually to re-familiarize surveyors with the species and its specific habitat, and also to determine state of phenology (i.e., optimal survey time); this will also help the surveyor to develop a "search image" for what the species looks like and where it might be found within the project area

4.2.3 Conduct Field Survey

The objective of the Detailed Plant SAR Survey is to identify and record all occurrences of plant SAR within a project area. This is achieved through complete survey coverage of potential habitats within a given project area. A complete Detailed Plant SAR Survey allows the adverse effects on SAR species/population from a proposed development to be assessed.

For smaller project areas (<1 ha), survey effort requires complete coverage on foot of all suitable habitats within the potential disturbance footprint including the main development area, as well as areas for ancillary developments (e.g., pathways), construction laydown, equipment access and areas with a high potential for disturbance during operation. Where complete coverage of the project area is not feasible (i.e., larger project areas >1 ha), survey efforts must, at a minimum, include searching all variations of suitable habitat (i.e., intuitive controlled survey; U.S. Department of the Interior 2009) on foot until no further unique plant species can be found. Chest waders or a small boat may be required to access wetted areas of the foreshore.

The following field gear is typically required to complete a Detailed Plant SAR Survey:

- GPS unit (high accuracy), camera and field forms for data collection
- Field guide books, fact sheets and other resources to assist with identification
- Ruler and magnifying glass for identification of diagnostic traits
- Small trowel, plastic bags and plant press for collecting voucher specimens
- Clinometer, compass and measuring tape for describing habitat and population

The following methods help ensure that sufficient onsite data is collected to accurately identify species and habitat associations, and meet reporting requirements (Section 4.2.4). For all project areas where a Detailed Plant SAR Survey is required:

- Provide a full description of the project area; record the slope, aspect, elevation, moisture regime, substrate, condition and disturbance for each ecological community present
- Conduct a complete plant species inventory of the project area; at a minimum document dominant and indicator species associates for each ecological community present

If plant SAR or potential plant SAR are encountered while conducting the survey:

- Collect photos of all relevant parts of the plant, particularly those used for identification (e.g., flowers, leaves, stems, roots, seeds), for each plant SAR or potential plant SAR encountered
- Collect GPS locations for each plant SAR or potential plant SAR population encountered; preferred coordinate systems are BC Albers or Universal Transverse Mercator (UTM)
- Document condition of the plant SAR population, existing and potential threats as a result of the proposed development, and potential redesign, relocation, and mitigation measures to avoid and/or mitigate potential threats to the populations
- Use the Plant at Risk Observation Spreadsheet (CDC 2018a) to record data including data of survey, location/directions, number of individuals, area covered, habitat description and condition, and elevation.
- Check identifications using regional flora, herbarium collections and expert botanists, and obtain verifications of identifications:
  - Illustrated Flora of British Columbia (Douglas et al. 2002)
  - Flora of the Pacific Northwest: An Illustrated Manual (Hitchcock and Cronquist 2001)
  - BC Species and Ecosystems Explorer (CDC 2018b)
  - Provincial herbariums: BC Royal Museum and UBC Herbarium
  - FLNRORD Plant SAR Training Herbarium (contact Ecosystems Section)
- Collect voucher specimens for plant SAR following *Voucher Specimen Collection, Preparation, Identification and Storage Protocol: Plants & Fungi* (MoE 1999) and the guidelines from Norton et al. (1994): (i) collect photos rather than plant material to verify species identity, particularly as preliminary records, (ii) limit collection to one specimen per plant SAR for new occurrences and no collection in resurveyed (i.e., known) locations, (iii) collect no more than 1:20 individuals found, and only 5% of seeds, fronds, leaves, etc. from an individual, and (iv) limit collections of reproductive parts (flowers, fruits) where only a few individuals are found

4.2.4 Reporting

Reporting includes documenting survey effort and methods, reporting plant SAR that are observed, and assessing interactions between proposed developments and plant SAR populations/habitats:

- Report all new and resurveyed rare plant occurrences to the CDC; plant SAR observations and null data in the Okanagan should also be reported to Ecosystems Section using the same CDC forms
- Clearly identify surveyor qualification, the level of survey effort (e.g., person hours in the field, area covered, habitat searched) and timing of survey relative to specific flowering or optimal identification periods
- Evaluate the potential for adverse effects to plant SAR populations or habitat as a result of the proposed project and develop measures to mitigate these effects (see Section 5.0)

- Complete, sign and submit the QP Checklist (Appendix B of the Protocol) with all provincial natural resource applications where a plant SAR survey is required

This information may be incorporated into a larger environmental impact assessment report that considers other biological resources associated with the project area. Any deviation from the survey methods described in Section 4.0 must be reported, and a biologically relevant technical rationale must be provided by a QP for any such deviation.

5.0 MITIGATION FOR FORESHORE PLANT SPECIES AT RISK

General measures for mitigating effects to environmentally sensitive features are provided in the existing provincial guidance documents (e.g., *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia* (MoE 2014), *Standards and Best Practices for Instream Works* (MoE 2018b)). The mitigation measures provided here relate specifically to foreshore plant SAR on the Okanagan's large lakes. Mitigation will be required where foreshore plant SAR are identified within the project area. The Environmental Mitigation Policy for British Columbia (MoE 2018a) provides provincial policy on mitigating impacts to environmental components and developing mitigation plans. The associated Environmental Mitigation Procedures support implementation of the Policy and provide guidance for considering environmental values, effects to these values as a result of project interactions, and mitigation measures to avoid, minimize, restore or offset adverse effects. These Procedures should be considered when developing mitigation for foreshore plant SAR.

Avoid → Minimize → Restore → Offset

5.1 Selecting Targets for Mitigation

Identifying the environmental values and associated environmental components (i.e., attributes of the environmental values that can be measured, managed, and maintained) that will be adversely affected by a proposed project is the basis for mitigation planning. Table 4 provides an example of a specific plant SAR value, its potential components and possible indicators of those components relative to the federal recovery strategy management targets set for this species. This example may be used as a guide for proponents and QPs in identifying the foreshore plant SAR value, specific components and target for mitigation relative to current conditions (documented in the Detailed Plant SAR Survey), as well as the management target for the species. Refer to the Environmental Mitigation Procedures for additional information on defining values, components, indicators and management targets, as well as a detailed description of the mitigation hierarchy.

Table 4 Example of Plant SAR Environmental Value, Components and Indicators

Value[1]	Component	Possible Indicators	Management Target[2]
Short-rayed Aster	Functional habitat area	% area occupied	To maintain the distribution, and to maintain or (where feasible) improve the abundance, of all known extant populations of this species in Canada, as well as any other extant populations that may be identified in Canada
	Functional habitat condition (of area occupied)	% open habitat % native substrate % invasive cover % disturbance	
	Population size	# individuals	
	Reproductive success	# flower heads	

[1] See Environmental Mitigation Procedures for guidance on selecting values, components and indicators
[2] Management target from Environment Canada (2013)

5.2 Avoid and Minimize

Avoidance, as defined in the Environmental Mitigation Procedures, means to fully avert any potential impact on one or more environmental components resulting from a project or activity. Complete avoidance of adverse effects is the preferred mitigation option for foreshore plant SAR, which can be hard to restore or offset. For plant SAR, the following avoidance measures should be considered:

- **Relocate** project components outside of known plant SAR populations
  - Move developments to less sensitive foreshore or upland areas
  - Provide single equipment access points during construction and single beach and dock access points during operation
  - Move ancillary developments away from the foreshore area where possible
  - Use existing disturbed areas, roads, and trails where possible
- **Redesign** project components to avoid known plant SAR populations
  - Reduce construction and operational footprints (e.g., smaller storage/laydown areas, narrower docks and paths)
  - Use methods such as directional drilling or boring instead of trenching
  - Use piled or otherwise elevated structures and see-through decking on docks and recreational pathways
- **Avoid** project components that are not compatible with known plant SAR locations
  - Do not move, alter or cover natural beach substrates, which may support seed banks
  - Do not alter surface or groundwater hydrology, microclimate, topography, soil conditions (moisture), vegetation/cover and habitat quality
  - Do not clear riparian and foreshore vegetation in known plant SAR locations; these activities may also result in non-compliance with the Riparian Areas Regulation
  - Do not trample or drive over foreshore plant SAR populations and habitat
  - Do not conduct landscaping practices such as mowing, seeding, fertilizing, watering and using pesticides in foreshore areas
- Install “no develop, no access” buffers around known plant SAR populations
  - *Develop with Care* (MoE 2014) recommends minimum buffers of 30 m for many environmental values in urban settings and 60 m in rural settings
  - Available federal recovery strategies for foreshore plant SAR incorporate 50 m buffers into critical habitat designations (e.g., Environment Canada 2013)

- Developments subject to the Riparian Areas Regulation (Province of British Columbia 2004) typically require the establishment of a 15 to 30 m Streamside Protection and Enhancement Area (SPEA). The SPEA is measured from the high water mark of the lake and identifies the riparian area where disturbance must be avoided.

Minimize, as defined in the Environmental Mitigation Procedures, means to partially avoid or reduce the level of impacts on one or more environmental components resulting from a project or activity. This should only be considered where complete avoidance is not possible. For plant SAR, the following minimizing measures should be considered:

- Orient developments perpendicular to the shoreline
- Conduct maintenance activities during the winter and spring[4] when most annual plants have died, seeds have not yet germinated and water levels are generally lower
- For removable docks and platforms, establish a set route for equipment access to the foreshore and a set location for storage of the structures during the off season that is away from known plant SAR populations, preferably upland
- Limit access to foreshore areas, particularly where these area are naturally vegetated; consider fencing or other barriers to limit access; if fencing is required, use an open style that allows passage by small mammals and waterfowl
- Carefully remove invasive plants from areas with plant SAR and employ weed reduction techniques during construction and operation (e.g., vehicle wash stations, hand pulling, use of weed-free topsoil)
- Limit sediment, deleterious substances and debris from entering foreshore plant SAR habitat
- Restore disturbed areas to their pre-disturbance condition and complete restoration activities, including erosion control, as soon as possible following construction/disturbance

Note: In certain cases, complete or partial avoidance may be the only acceptable mitigation option for plant SAR, and a project may not be permitted if adverse effects cannot be avoided.

5.3 Restore, Offset and Translocate

Restoration and offsetting of foreshore plant SAR values, or translocating foreshore plant SAR may be mitigation options where complete or partial avoidance is not possible. Restoration, as defined in the Environmental Mitigation Procedures, includes onsite activities to restore, replace or remediate environmental components that are adversely affected by the project. For example, this may include rehabilitating a previously disturbed part of the project area to have the specific habitat characteristics to support foreshore plant SAR by removing invasive weeds, recontouring the foreshore area or removing debris. Offsetting, as defined in the Environmental Mitigation Procedures, means to counteract, or make up for, an impact on an environmental component that cannot be adequately addressed through other mitigation measures in the hierarchy. Offsetting (also known as compensation) is the last and least preferred option in the mitigation hierarchy, and may include offsite restoration, land securement, conservation covenants and/or populations management areas.

[4] Instream works should also be conducted during least risk timing windows for fisheries

Translocation may be considered as part of onsite restoration or offsetting for plant SAR values. Translocation involves deliberately moving plant SAR plants or propagules (i.e., seeds, cuttings, substrate containing seed bank) from one location to another, either onsite or offsite, to mitigate threats. Translocation often results in poor survivorship and can be expensive, especially when follow-up monitoring is included in the cost. Guidance and best practices for translocation are provided in the document *Guidelines for Translocation of Plant Species at Risk in British Columbia* (Maslovat 2009), which does not endorse mitigation plantings or moving existing populations to facilitate development of any kind. However, translocation may be an option for some plant SAR populations where habitat loss is eminent and all other options have been considered.

Restoration and offsetting projects are often much more expensive than avoiding or minimizing adverse effects and may not be possible for many of the plant SAR listed in Appendix B. In addition, options for these types of projects are generally limited in the Okanagan, as much of the foreshore areas are privately owned, previously disturbed and/or do not contain the specific habitat attributes (i.e., slope, soil moisture regime, substrate, cover) required to support foreshore plant SAR, which is in part why these species are rare. It is provincial opinion that there are often significant challenges to providing acceptable and adequate restoration and offsetting for the loss of plant SAR populations and habitat, and that the costs to such projects may be prohibitive. Contact the Thompson Okanagan Region Ecosystems Section Head prior to submitting a restoration, offsetting or translocation plan for adverse effects to plant SAR as part of a development proposal.

6.0 SUMMARY

This document provides region-specific guidance to QPs conducting foreshore plant SAR surveys and mitigating effects of foreshore developments on this species group in the Okanagan area. This document must be used in conjunction with the Protocol, which provides risk rankings for foreshore development activities, foreshore sensitivity zone determination for foreshore plant SAR, and a QP Checklist that must be submitted to the Province with all provincial natural resource applications for foreshore developments.

Some level of foreshore plant SAR survey is required for all projects with the exception of Low Risk projects that follow available BMPs in No Colour, Yellow and Red Zones. This document provides the required qualifications to conduct a foreshore plant SAR survey, as well as methods for conducting both Preliminary Habitat Assessments and Detailed Plant SAR Surveys required by the Protocol. Where foreshore plant SAR are found, this document provides mitigation measures for development activities.

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APPENDIX A FORESHORE PLANT SPECIES AT RISK ZONE RATIONALE AND DATA SOURCES

This document describes the data sources and rationale used to develop the Black, Red and Yellow zones for Foreshore Plants for the Okanagan Large Lakes Foreshore Protocol. For Foreshore Plants, the zones include both areas below and above the high water mark (HWM) of the lakes, recognizing that areas below the low water level (LWL) likely do not support plant growth and areas above the HWM may be outside of provincial jurisdiction. As the different zones are sourced from different data, one or more zones may be applicable to a given project area (e.g., Black Zone identified for specific plant overlapping Yellow Zone for high suitability habitat for multiple species). However, as a general rule, Black Zones supersede Red Zones, which supersede Yellow Zones. A summary of changes between the 2009 Protocol mapping and this mapping is also provided.

Black Zone (i.e., Critical Habitat)

The Black Zone Layer for foreshore plant SAR includes Critical Habitat (CH) polygons identified in a federal recovery strategy by the Canadian Wildlife Service (CWS). As of the end of 2017, three foreshore plant SAR have final[5] CH polygons identified: *Ammannia robusta* (scarlet ammannia)[6], *Rotala ramosior* (toothcup)[7] and *Symphyotrichum frondosum* (short-rayed aster)[8]. CH for these species is described in the recovery strategies as the area occupied by individual plants or patches of plants (all records within last 25 years, unless there is reason to consider the occurrence as extirpated, e.g., habitat removed or degraded to the extent that it is clearly unsuitable), including the associated potential location error from GPS units (ranging from 5 m to 100 m uncertainty distance), plus an additional 50 m to encompass immediately adjacent areas (i.e., Critical Function Zone Distance (CFZD)). The CFZD is defined as the threshold habitat fragment size required for maintaining constituent microhabitat properties for a species (e.g., critical light, moisture, humidity levels necessary for survival), and existing research[9] provides a logical basis for including a minimum CFZD of 50 m as part of CH for rare plant species occurrences. Where areas of CH, based on occurrences, are in close proximity (outer boundaries of location uncertainty plus CFZD areas are less than 100 m apart), and/or where they occur in association with the same distinct ecological feature, showing continuous ecological attributes between them, the connective habitat (i.e., the area in-between occurrences) is identified as critical habitat.

Additional CH may be identified for these species or for other foreshore plant SAR in the future, and will be added to the Black Zone layer during scheduled updates if available.

Summary of Update:

- 2009 mapping did not include a Black Zone Layer (CH was not identified for foreshore plant SAR until 2013)

[5] CH has been proposed for *Lipocarpha micrantha* (small-flowered lipocarpha) but was not included in the Black Zone Layer as shapefiles were not publically available https://www.sararegistry.gc.ca/document/default_e.cfm?documentID=3139
[6] *Ammannia robusta*: http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_scarlet_ammannia_e_final.pdf
[7] *Rotala ramosior*: http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_toothcup_e_final.pdf
[8] *Symphyotrichum frondosum*: http://www.sararegistry.gc.ca/virtual_sara/files/plans/rs_short-rayed_alkali_aster_e_final.pdf
[9] See rationale in http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_grand_coulee_owl_clover_e_final.pdf

Red Zone (i.e., Known Habitat)

The Red Zone Layer for foreshore plant SAR includes known occurrences identified either by the BC Conservation Data Centre (CDC) or in surveys led by FLNRORD Ecosystems Section. This layer includes both (i) CDC records[10] (representing the area occupied including potential GPS error) plus a 50 m buffer to correspond to the CFZD, and (ii) recent (2007-2014) survey points (potential GPS error not included/available) plus a 50 m buffer to correspond to the CFZD. Where survey points have corresponding CDC records, the CDC record takes precedence. The 50 m buffer takes into account indirect and edge effects of development, as well as species biology, as many foreshore plant SAR are annual, early successional species with populations that fluctuate in size from year to year based on environmental conditions, and seeds that are easily dispersed long distances by wind, water and waterfowl. Additional surveys may identify additional occurrences of these species in the future, and will be added to the Red Zone layer during scheduled updates if available.

Summary of Update:

- 2009 mapping identified potential habitat for six foreshore plant SAR only (*Ammannia robusta* (scarlet ammannia), *Lipocarpha micrantha* (small-flowered lipocarpha), *Rotala ramosior* (toothcup), *Potentilla supina* ssp. *paradoxa* (bushy cinquefoil), *Euphorbia serpyllifolia* var. *serpyllifolia* (thyme-leaved spurge) and *Cyperus squarrosus* (awned cyperus)); 2018 mapping includes the foreshore plant SAR listed in Appendix B
- 2009 mapping based on McIntosh (2010)[11] survey of Osoyoos Lake (excluded Indian Reserve lands); 2018 mapping includes a compilation of 2007-2014 foreshore plant SAR waypoints (actual) from additional surveys contracted or completed by FLNRORD in 2007, 2009[12], 2013[13] and 2014[14,15], as well as CDC foreshore plant species occurrences that are located within 50 m of an Okanagan large lake
- 2009 mapping included a 100 m buffer; this buffer was reduced to 50 m in 2018 mapping to maintain consistency with CH rationale provided by CWS, recognizing that the survey data does not take into account GPS error (GPS error is included in CDC data, which supersedes survey data)

Yellow Zone (i.e., High Potential Habitat)

The Yellow Zone Layer for foreshore plant SAR includes higher potential habitat (i.e., meets criteria in Table 3) identified during two surveys led by the FLNRORD Ecosystems Section, one in 2009 on Osoyoos Lake and one in 2013 on Osoyoos Lake and Vaseux Lake. The data includes survey points (potential GPS error not included/available) plus a 50 m buffer to correspond to the CFZD. The 50 m buffer takes into account indirect and edge effects of development, as well as species biology, as many foreshore plant SAR are annual, early successional species with populations that fluctuate in size from year to year based on environmental conditions, and seeds that are easily dispersed long distances by wind, water and waterfowl. Additional surveys may identify additional potential habitat

[10] Only CDC records to 2015 were included in Red Zone Layer due to lag time between when mapping was completed and report was published
[11] McIntosh 2010, Osoyoos Lake http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=18269
[12] McIntosh 2010, Osoyoos Lake http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=18269
[13] Miller 2013, Ellison Lake http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=42359
[14] McIntosh 2014, Osoyoos and Vaseux Lakes http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=42360
[15] McIntosh 2014, Ellison Lake http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=44085

for these species in the future, and will be added to the Yellow Zone layer during scheduled updates if available.

The Yellow Zone Layer is incomplete (patchy) for Osoyoos Lake and Vaseux Lake, and has not been completed for any other Okanagan large lake. Where required by the activity risk in a No Colour Zone (see Section 2.0), proponents must conduct a Preliminary Habitat Assessment of their project area to determine the potential for foreshore plant SAR habitat as per the criteria in Table 3 (i.e., high potential plant SAR habitat = Yellow Zone). Do not assume that a foreshore area has low potential habitat value if it is not mapped as Black, Red or Yellow.

Summary of Update:

- 2009 mapping identified potential habitat for six foreshore plant SAR only (scarlet ammannia, small-flowered lipocarpha, toothcup meadow-foam, short-rayed alkali aster, bushy cinquefoil, thyme-leaved spurge and awned cyperus); thyme-leaved spurge and awned cyperus were down-listed to Yellow status by the BC CDC in May, 2015 so were not included in 2018 mapping; 2018 mapping includes the foreshore plant SAR listed in Appendix B
- 2009 mapping based on McIntosh (2010)[16] survey of Osoyoos Lake (excluded Indian Reserve lands); 2018 mapping includes additional data not previously included from that survey, as well as data from McIntosh (2013)[17] survey of north end of Osoyoos Lake and Vaseux Lake

No Colour Zone (i.e., Unknown Potential Habitat)

Foreshore area that are not mapped as Black, Red or Yellow are within the No Colour Zone (i.e., there is no No Colour Zone layer). Where required by the activity risk (see Section 2.0), proponents must conduct a Preliminary Habitat Assessment of their project area to determine the potential for foreshore plant SAR habitat as per the criteria in Table 3 (i.e., high potential plant SAR habitat = Yellow Zone). Do not assume that a foreshore area has low potential habitat value if it is not mapped as Black, Red or Yellow.

[16] McIntosh 2010, Osoyoos Lake http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=18269
[17] McIntosh 2014, Osoyoos and Vaseux Lakes http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=42360

APPENDIX B OKANAGAN FORESHORE PLANT SPECIES AT RISK LIST

Foreshore plant SAR are those species that are found in and around lakeshores. Table C-1 provides a list of known vascular foreshore plant SAR from eight plant families that are associated with low elevation foreshore habitats in the Okanagan area.

Table C-1 Vascular Foreshore Plant SAR of the Okanagan Area

Scientific Name[1,2]	Common Name	Family	Status[3]
Ammannia robusta	scarlet ammannia	Lythraceae	Red / E
Bidens vulgata	tall beggarticks	Asteraceae	Blue
Carex comosa	bearded sedge	Cyperaceae	Blue
Carex hystericina	porcupine sedge	Cyperaceae	Blue
Cyperus erythrorhizos	red-rooted cyperus	Cyperaceae	Blue
Elatine rubella	three-flowered waterwort	Elatinaceae	Blue
Eleocharis coloradoensis	dwarf spike-rush	Cyperaceae	Red
Eleocharis engelmannii	Englemann's spike-rush	Cyperaceae	Red
Eleocharis geniculata	bent spike-rush	Cyperaceae	Red / E
Eleocharis ovata	ovate spike-rush	Cyperaceae	Blue
Limosella acaulis	Owyhee mudwort	Scrophulariaceae	Red
Lindernia dubia var. *anagallidea*	false-pimpernel	Scrophulariaceae	Blue
Lindernia dubia var. *dubia*	yellowseed false-pimpernel	Scrophulariaceae	Red
Lipocarpha micrantha	small-flowered lipocarpha	Cyperaceae	Red / E
Potentilla supina ssp. *paradoxa*	bushy cinquefoil	Rosaceae	Blue
Rotala ramosior	toothcup	Lythraceae	Red / E
Salix amygdaloides	peach-leaf willow	Salicaceae	Blue
Schoenoplectus saximontanus	Rocky Mountain clubrush	Cyperaceae	Red
Symphyotrichum frondosum	short-rayed aster	Asteraceae	Red / E
Verbena hastata	blue vervain	Verbenaceae	Blue

[1] List modified from BC Species and Ecosystems Explorer (CDC 2018b) search completed January 3, 2018 based on habitat requirements and known locations; list should not be considered exhaustive
[2] Thompson Okanagan Region Plant Species at Risk Fact Sheet available for some species
[3] CDC status; species that are federally endangered (E), threatened (T), or special concern (SC) under SARA are also indicated

These species rely on natural fluctuations in water levels to carry out their life histories. Many are annual species that grow each year from seeds buried in the substrate that houses their seed bank. Many of these plants also have low competitive ability and require the open habitats generated by seasonal flooding during freshet to germinate. As a generalization, the best time to survey for these species is in the summer and fall as flowing and fruiting typically occur once water levels are lower. These species may be subject to large annual population fluctuations due to varying environmental conditions, with seeds present in the seed bank even if no seedlings or mature plants are observed. Of these species, 68% have “inventory” as a Conservation Framework action (CDC 2018b), indicating that survey efforts to date for these plant species group have been low.