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Fixed Aids to Navigation

Replacement Class Screening Report

Canadian Coast Guard
Pacific Region

2006

Canada

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Table of Contents

List of Figures

List of Tables

List of Appendices

Acronyms

BC – British Columbia

BMP – Best Management Practices

CCG – Canadian Coast Guard – Pacific Region

CEAA – *Canadian Environmental Assessment Act*

COSEWIC – Committee on the Status of Endangered Wildlife in Canada

DFO – Department of Fisheries & Oceans Canada

FA – Federal Authority

Fixed Aids – Fixed Short-Range Aids to Navigation

RA – Responsible Authority

RCSR – Replacement Class Screening Report

SARA – *Species at Risk Act*

the Agency – *Canadian Environmental Assessment Agency*

the Registry – *Canadian Environmental Assessment Registry*

VEC – Valued Ecosystem Components

1. Introduction

The Pacific region of the Canadian Coast Guard (CCG) includes British Columbia (BC) and the Yukon. This region consists of over 23,000km of coastline and numerous inland rivers and lakes. As a special operating agency within the Department of Fisheries & Oceans Canada (DFO), one role of the CCG is to install and operate over 1,800 Short-Range Aids to Navigation. These aids provide guidance to mariners through some combination of light, signage, or radar characteristics and can be either floating or fixed. Approximately 1,300 of the Short-Range Aids to Navigation are classified as *Fixed* Short-Range Aids to Navigation, or Fixed Aids.

Each year approximately 25 individual screening reports are conducted for the construction and replacement of the most common Fixed Aid designs in the Pacific Region. These designs have been incorporated into this Replacement Class Screening Report (RCSR) for the purpose of achieving a more cost effective schedule that honors environmental integrity.

The RCSR has evolved from previous Fixed Aid projects and follow-up programs that include proven design standards, best management practices, and effective mitigation that are supported by regulations and industry. The creation and implementation of this RCSR is a timely addition to the environmental initiatives at the CCG.

Transport Canada will also be an RA for fixed aid projects that require an approval under the *Navigable Waters Protection Act* and *w*hich trigger the CEAA. Transport Canada has agreed to use the process outlined in this RCSR to fulfill its EA requirements.

1.1 Class Screening and the Canadian Environmental Assessment Act

The *Canadian Environmental Assessment Act* (CEAA) and its regulations set out the legislative basis for federal environmental assessments. The legislation ensures that the environmental effects of projects involving the federal government are carefully considered early in project planning. CEAA applies to projects which require a federal authority (FA) to make a decision or take an action, whether as a proponent, land administrator, source of funding or regulator (issuance of a permit or license). The FA then becomes a responsible authority (RA) and is required to ensure that an environmental assessment of the project is carried out prior to making its decision or taking action.

Most projects are assessed under a screening type of assessment. A screening systematically documents the anticipated environmental effects of a proposed project, and determines the need to modify the project plan or recommend further mitigation to eliminate environmental effects or minimize the significance of these effects. Screenings are conducted for projects which have not been excluded under section 7 of the Act (i.e.

are not on the *Exclusion List Regulations*) or not on the *Comprehensive Study List Regulations* and have not been identified as requiring mediation or an assessment by a review panel.

The screening of some repetitive projects may be streamlined through the use of a class screening report. This kind of report presents the accumulated knowledge of the environmental effects of a given type of project and identifies measures that are known to reduce or eliminate the likely adverse environmental effects. The *Canadian Environmental Assessment Agency* (the Agency) may declare such a report appropriate for use as a class screening after taking into account comments received during a 30–day period of public consultation.

A replacement class screening consists of a single report that defines the class of projects and describes the associated environmental effects, design standards and mitigation measures for projects assessed within the report. It includes a conclusion of significance of environmental effects for all projects assessed by the replacement class screening. Once the Agency declares a replacement class screening report, no further environmental assessment and decision regarding the significance of the environmental effects are required for projects within the class, provided that design standards and mitigation measures described in the report are implemented.

1.2 Rationale for Replacement Class Screening

The applicability of the RCSR to Fixed Aid projects is based on the following six criteria:

1. *Well-defined Class of Projects:* The Fixed Aid project class includes common designs that are constructed according to standard techniques. The class has been created with certain Fixed Aid structure elements; projects that do not conform to listed structure designs will not be applicable to the RCSR.

2. *Well-understood Project-Environment Interactions:* The Government of Canada's understanding of project-environment interactions has been fostered through the completion of class-applicable structures in the Pacific Region since 1875. The CCG has been witness to the evolution of project technologies and has intensified environmental monitoring and follow-up in recent years to clarify interactions.

3. *Unlikely to Cause Significant Adverse Environmental Effects, Taking into Account Mitigation Measures:* Recent monitoring and follow-up programs have allowed the CCG to develop an inventory of low-impact and easily mitigated activities related to Fixed Aids. Activity-specific mitigation has been shown to effectively prevent adverse environmental effects. No significant residual or cumulative effects have been identified within the life of Fixed Aids.

4. *No Project-specific Follow-up Program Required:* Previous monitoring and follow-up programs have provided knowledge that has contributed to the current design criteria and construction methods, thus, further follow-up programs are unnecessary.

5. *Effective and Efficient Planning and Decision-making Process:* Implementation and alteration of Fixed Aid works is predictable and methodical. Projects are often identified at least six months in advance and require internal review before aid structures can be changed. Past experience ensures that planning and decision making processes are effective and efficient.

6. *Public Concerns Unlikely:* Aids to navigation are put in place for the public's safety and efficient use of navigable waters. The public is unlikely to dispute Fixed Aid works because they benefit the public and their implementation produces minimal environmental impacts that are easily mitigated.

1.3 Consultation

Wide-ranging consultation with other government agencies has occurred with DFO, Environment Canada, and Transport Canada. This communication has proven inter-governmental support for the project (Antcliffe 2005); a draft of the RCSR has been reviewed and comments have been incorporated before submission of the final draft to the Agency. Following its submission, the Agency conducted a 30-day public consultation on the RCSR. All comments received were taken into consideration and incorporated into the RCSR, as appropriate, before its declaration by the Agency.

As Fixed Aids are placed to increase the navigability of waterways, thereby increasing the public safety, public consultation in addition to that during the declaration process was deemed unnecessary. Negative public comments regarding construction, operation, or decommissioning activities of Fixed Aids have not been encountered in the past.

Internal consultation at the Coast Guard has been completed to ensure the validity of project activity descriptions. The practicality of mitigation has also been reviewed to provide the highest potential for successful implementation.

1.4 Canadian Environmental Assessment Registry

The purpose of the *Canadian Environmental Assessment Registry* (the Registry) is to facilitate public access to records relating to environmental assessments and to provide notice in a timely manner of assessments. The Registry consists of two components – an Internet site and a project file.

The Internet site is administered by the Agency. The responsible authority and the Agency are required to post specific records to the Internet site in relation to a RCSR.

Upon declaration of the class screening report, the Agency requires responsible authorities to post on the Internet site of the Registry, at least every three months, a statement of projects for which a RCSR was used. The statement should be in the form of a list of projects, and will include:

- the title of each project for which the replacement class screening report was used;
- the location of each project;
- contact information (name or number); and
- the date when it was determined that the project falls within the category of projects covered by the report.

Note: The schedule for posting a statement is:

July 15 – (for projects assessed from April 1 to June 30)
October 15 – (for projects assessed from July 1 to September 30)
January 15 - (for projects assessed from October 1 to December 31)
April 15 – (for projects assessed from January 1 to March 31)

The responsible authority must also provide annual confirmation of cumulative effects assessment conditions to ensure no new projects cause any significant adverse environmental effects.

The project file component is a file maintained by the responsible authority during an environmental assessment. The project file must include a copy of the RCSR. The responsible authority must maintain the file, ensure convenient public access, and respond to information requests in a timely manner.

Further sources of information regarding the Registry can be found in Appendix 1: Environmental Information Resources.

2. Projects Subject to Class Screening

2.1 Projects Subject to CEAA

Fixed Aid activities are projects under CEAA because they are undertakings in relation to a physical work. As the CCG is proponent, the completion of an environmental assessment is necessary before it can exercise any duty, power or function in relation to a project, as defined by subsection 5(1)a of CEAA.

Section 7 of CEAA states that projects will be excluded if: (a) the project is described in the *Exclusion List Regulations*; (*b*) the project is to be carried out in response to a national emergency for which special temporary measures are being taken under the *Emergencies Act*; or (*c*) the project is to be carried out in response to an emergency and carrying out the project forthwith is in the interest of preventing damage to property or the environment or is in the interest of public health or safety. (CEAA 2004)

In accordance with the *Exclusion List Regulations,* projects will be excluded from CEAA if an existing structure requires repair or maintenance (Section 1 of the *Exclusion List*); however, modifications of a structure will be subject to CEAA. In some instances, Fixed Aid projects may have several components. If all components of the project are described on the *Exclusion List Regulations,* the project is exempt from CEAA. If any component of the project is not described on the *Exclusion List Regulations,* an environmental assessment of the project, including all components, is required.

Transport Canada may also declare itself a Responsible Authority for some of the Fixed Aid projects outlined in the RCSR. If an approval is required under paragraph 5(1)(a) of the *Navigable Waters Protection Act*, which is a trigger under the *Law List Regulations* of CEAA, and both CCG and Transport Canada are Responsible Authorities, CCG will be responsible for meeting the requirements for the Registry.

2.2 Projects Subject to the Replacement Class Screening Report

The candidate class for this RCSR involves the construction, operation, and decommissioning of two types of Fixed Aids: pile-based and concrete-based structures. Projects subject to the RCSR are those undertaken within the Province of BC and Canada's territorial waters (out to 12 nautical miles) in the Pacific Ocean. Projects undertaken in the Yukon Territory are not included in this RCSR and require an individual environmental assessment under the *Yukon Environmental and Socio-economic Assessment Act* or CEAA.

Characteristics of Pile-Based Structures Subject to the RCSR:

- built on land, within foreshore, or in water

- one to eight wood or steel piles with a diameter less than 60cm (24in)
- platform and ladder (aluminum or other suitable material)
- mast/tower (aluminum, fiberglass-reinforced plastic, or other suitable material)
- daymark (aluminum or other suitable material)
- electronic equipment (items include: light, solar panels, batteries, etc)

Characteristics of Concrete-Based Structures Subject to the RCSR:

- built above Lowest Low Water
- a base of less than 2.5m x 2.5m (height not restricted)
- platform and ladder (aluminum or other suitable material)
- mast/tower (aluminum, fiberglass-reinforced plastic, or other suitable material)
- daymark (aluminum or other suitable material)
- electronic equipment (items include: light, solar panels, batteries, etc)

Figure 1 shows examples of pile- and concrete-based Fixed Aids that meet the above criteria.

Figure 1: Typical concrete-based and pile-based RCSR structures

2.3 Projects Not Subject to the Replacement Class Screening Report

Fixed Aid projects that include any of the following are not subject to the RCSR:

- Pile-based structures with nine or more piles
- Structures requiring piles with a diameter greater than 60cm (24in)
- Concrete-based structures located below Lowest Low Water
- Concrete-based structures with a base of more than 2.5m x 2.5m
- Located in the Yukon Territory
- Requiring a provincial environmental assessment
- Requiring a permit, approval or authorization from another department other than Transport Canada (i.e. RA other than CCG and Transport Canada – see Section 5).
- Species at risk will be adversely effected (see below)

Projects are not suitable for application of the replacement class screening if they are likely to have an adverse effect on a species at risk, either directly or indirectly, such as by adversely affecting their habitat*, and/or that would require a permit under the *Species at Risk Act* (SARA). For the purposes of this RCSR, species at risk include:

- species identified on the List of Wildlife Species at Risk set out in Schedule 1 of SARA, and including the critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of SARA.
- species that have been recognized as "at risk" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or by provincial or territorial authorities.

* if, after reviewing the project description using the RCSR, it becomes known or reasonably suspected that species at risk could be adversely affect by the proposed project, do not proceed.

All projects that are found to be not applicable to the RCSR require an environmental review by a competent individual and will likely require an individual environmental assessment under CEAA. Note contents of the RCSR may be used in the preparation of the individual environmental assessment.

Figure 2 provides a flow chart that describes RCSR inclusion/exclusion.

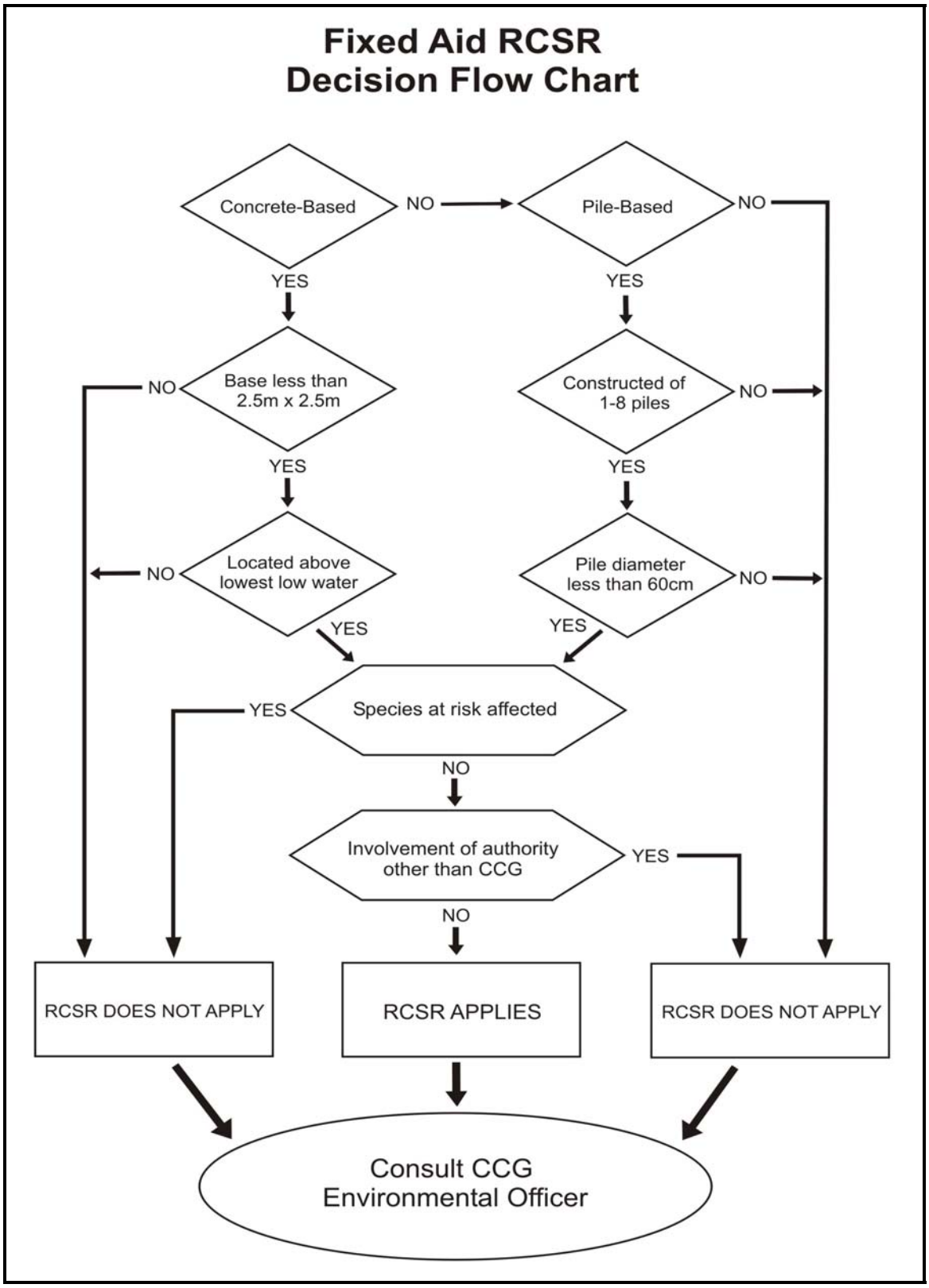

Figure 2: Fixed Aid RCSR Decision Flow Chart

3. Project Class Description

The Fixed Aid project class is characterized by a large boundary. All regions within BC and Canada's Pacific territorial waters are included in the project class. Fixed Aids may be built in all aquatic and terrestrial environments given that they meet the conditions identified in Section 2 of this report. Currently, the majority of Fixed Aids that have been constructed are in the Pacific coastal region with additional aids located on some major lakes in BC's interior. Figure 3 shows the class boundary and the existing locations of marine and freshwater Fixed Aids.

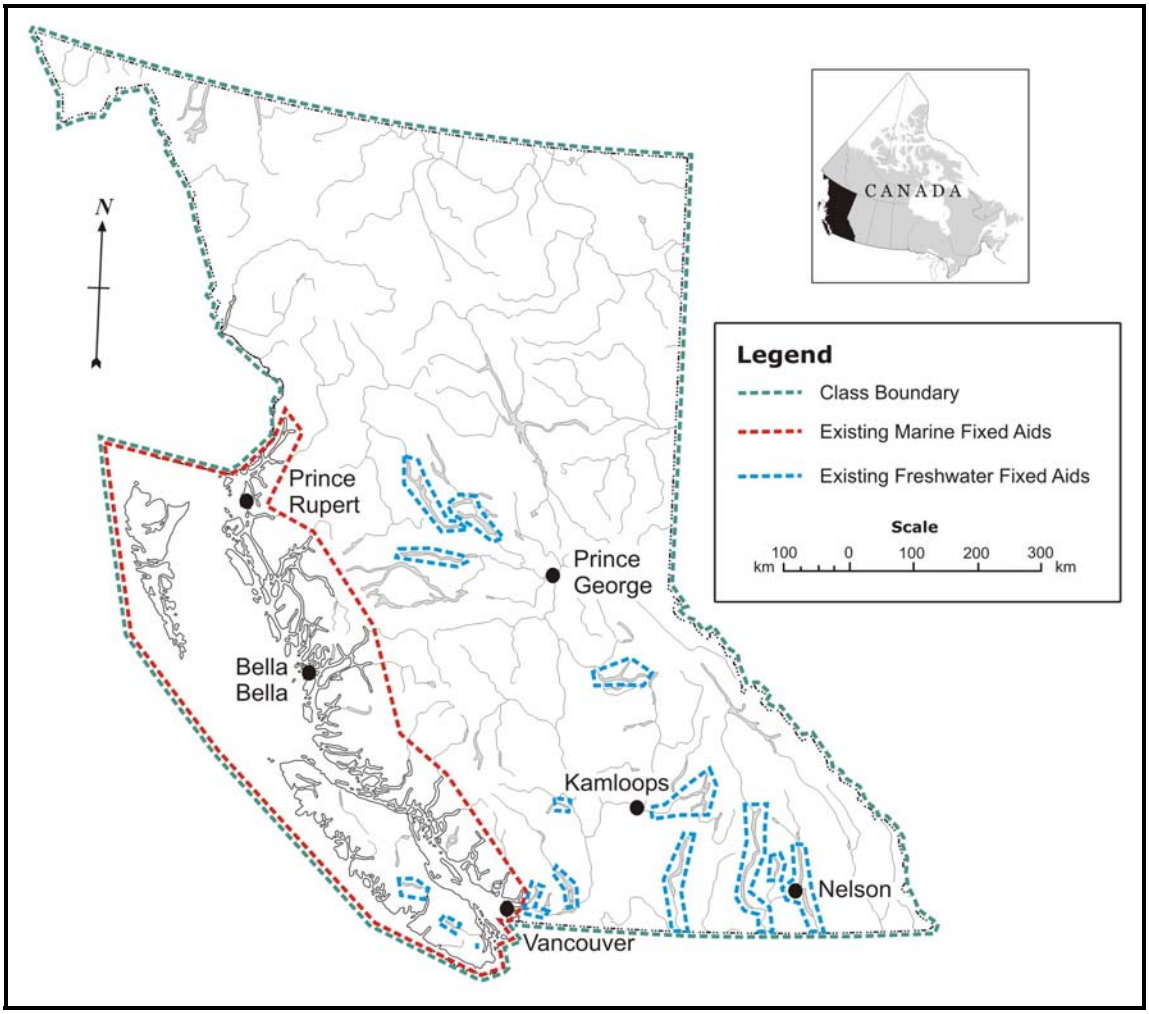

Figure 3: RCSR Boundaries

Within the project class, the project scope is separated into two areas: the material staging location and the Fixed Aid site. Material staging areas are often located as close as possible to the Fixed Aid site and are used when all supplies needed for the construction, operation, and decommissioning of the aid cannot be stored at the project site. These areas are often located in previously disturbed areas that allow easy road, water, and helicopter access: examples include logging roads, industrial yards, and outdoor

recreation areas. Materials and equipment are prepared at the staging area before they are transported to the Fixed Aid site by boat or helicopter. The Fixed Aid site is where the construction, operation, and decommissioning activities occur.

3.1 Seasonal Scheduling and Duration of Projects

Fixed Aid construction, operation, and decommissioning may occur during any season with the exception of seabird nesting season, which is specific to each individual site (See CCG-MS 2004). Apart from seasonality, the most important consideration for scheduling Fixed Aid activities is tide cycles.

Low tides are required when scheduling concrete-based Fixed Aid construction, operation, and decommissioning in the intertidal zone. Low tides ensure time for project activities to be conducted and concrete to be cured before the tide rises again. Usually, two consecutive low tide cycles allow enough time for project completion.

Tide cycles are not crucial to pile-based Fixed Aid construction, operation, and decommissioning as they most often occur in marine/aquatic environments. The only time that tides are a factor in planning pile-based project activities is in areas with shallow water; in this instance project activities are conducted during high tide events so that the barge stays afloat.

The construction and replacement of both concrete- and pile-based Fixed Aids each take approximately one week to complete. Operation phase activities most often require only one or two hours every four years for the life span of an aid.

3.2 Effects of the Environment on the Project

Under CEAA, an environmental assessment must consider potential effects the environment may have on projects. Increased weather extremes and a number of adverse events may affect permanent structures. Following standards and ensuring protection against these effects are increasingly important. Fixed Aid projects are vulnerable to a variety of effects from the environment such as:

- Extreme and adverse weather-related effects (i.e. temperature and precipitation) can delay project activities and can damage the physical integrity of projects, and/or cause unpredictable run-off, erosion or sedimentation during the construction phase and/or cause problems for machinery operation during construction or abandonment.
- Sinking or settling of soils, ground subsidence and ground surface movement could also damage physical integrity of projects, potentially leading to structural failures and/or a reduced quality of end products.

- Landscape and physical characteristics of project location (e.g. soil structure) could alter materials used in construction or cause for project re-location or impede the installation of underwater or underground structures.
- Normal wear on project components by weather-related effects and forces (i.e. wind, freeze/thaw cycles, water, sun exposure)

The effects that have been identified are considered mitigable and avoidable through design, the site chosen, and the use of stringent standards under which Fixed Aids are designed, constructed, operated and decommissioned. For example, requirements for pile depth and concrete base size will vary depending on the environment where the aids are being constructed. As well, chains are routinely used in the construction of Fixed Aids to lash the concrete forms in place to prevent movement caused by wind and waves. Specific mitigations to avoid effects of the environment on Fixed Aid projects are covered in Section 4.6, Appendix 3 and Appendix 4 of this RCSR.

3.3 Construction

Construction of Pile-based Fixed Aids

Pile-based structures are most often built in aquatic environments where a barge is required for construction. No specific site preparation measures are necessary for pile-based construction activities, though the specific construction methods used will vary according to substrate characteristics at each site.

Pile-based Fixed Aid construction consists of driving a pile into soft substrates with a hammer or drilling a pile into hard substrates. Piling may be constructed of steel or treated timber. Heavy equipment, such as conventional cranes, spud scows, support barges and other water borne equipment support the drills and hammers.

Once the piles are installed, the platform, tower, and other equipment are installed with use of a crane on the barge.

Construction of Concrete-based Fixed Aids

Construction of concrete-based Fixed Aids occurs above the lowest low tide or on land. Depending on the location, materials can be transported by helicopter, motor vehicle, or boat.

Site preparation methods can vary depending on site specific requirements. Aquatic areas including exposed rock often involve power-washing the site to remove marine growth. Reinforcing steel is then grouted into the rock to anchor the concrete. In upland areas, vegetation removal and excavation may be required to access acceptable supporting material. To reduce the amount of excavation in deep organic soils, mini-piles may be driven into the ground to provide extra support.

Once site preparation is complete, wood or metal forms are built, reinforcing steel is installed, and concrete is poured. The method used for concrete pouring depends on the

transportation method used to access the site: helicopters utilize hoppers; vessels with hoppers or by hand; and concrete trucks are used on land.

Once the base is completed, a platform, tower, and other equipment are installed using vessel, helicopter, or truck support.

3.4 Operation

Once constructed, aids operate self sufficiently. Lit aids operate by solar and battery power. Daybeacons are signs with navigational symbols, which are painted or marked with a sticker. Maintenance activities, conducted on a four year cycle, account for the operation of Fixed Aids. Maintenance visits take approximately one hour and involve electronics changeouts, brushing activities, and painting/mark replacement. Servicing may occur outside of the maintenance schedule in the event that a repair is required to maintain the efficacy of the aid.

3.5 Decommissioning

Pile-based Fixed Aids are decommissioned with cranes and support barges. Once navigational markers and supporting structures are removed from the piles, cranes are used to pull piles from the substrate below. All materials are taken off site for disposal. Pile-based structures are seldom abandoned because of their potential hazard to navigation, however in some cases abandonment may be deemed appropriate if the location is remote and poses no hazard.

Concrete-based Fixed Aids are also decommissioned by first removing aid marks and supporting structures. To remove the base, it can be moved in one piece or broken apart with a jackhammer or a small explosive charge. Concrete pieces are taken off site for disposal in a landfill or other suitable location. Areas affected by structure removal are left in a state which will support natural restoration. Abandonment of the concrete base occurs if the base creates no significant effect to navigability or aesthetics when left in place.

4. Environmental Review

Since 2000, an internal monitoring and follow up program run by CCG has been completed for Fixed Aid projects to assist in the development of standard structure design and project mitigation. Environmental review methods used in the creation of this report include desktop literature review, internal consultation, and review of monitoring and follow up programs.

4.1 Environmental Assessment Boundaries

The environmental assessment boundaries for the RCSR have been defined by the terrestrial boundaries BC and the outer limits of Canada's territorial waters in the Pacific Ocean. Within the RCSR boundary, the CCG manages over 23,000 km of coastline as well as several lakes located in the interior of BC and Vancouver Island (Natural Resources Canada 2005). No limitations regarding environmental information or scientific and technical methods have been identified within this area.

Smaller boundaries have been defined for the assessment scope to identify project-specific environmental effects. The project scope boundaries, including the staging and construction areas, will be used as a basis for the assessment. A radius of 200m around project areas has been found effective in capturing potential environmental effects resulting from project activities. The scope of assessment also includes areas between the staging and project sites that may be affected by low-flying aircraft.

A precise definition for the temporal scope of the project is difficult to predict. According to design standards the life span of a Fixed Aid is 25 years; the actual life span, however, depends on the environmental and anthropogenic conditions an aid experiences. Fixed Aids operate self-sufficiently with real potential for environmental effects possible only when project activities are engaged. Construction and decommissioning phases usually require one week for completion. Activities during the operation phase often require only one to two hours every four years during the life span of an aid.

4.2 Environmental Setting

The primary purpose of Fixed Aids is to "facilitate the safe and expeditious movement of maritime traffic" (CCG-ANP 2005), and the locations selected for Fixed Aid placement reflect this purpose. Some environmental setting similarities may exist among Fixed Aid locations, such as rocky outcroppings or shallow aquatic environments, but specific environmental setting characteristics are not pertinent to the placement of an aid. Rather, Fixed Aid designs and construction methods are tailored to meet each individual environmental setting in which an aid is required.

As there are not specific environmental criteria that determine the location of Fixed Aids, a general description of the environmental settings in which concrete- and pile-based Fixed Aids are constructed is provided. In addition, a general description of the ecozones found within the province of BC is included below.

Environmental Settings of Concrete- and Pile-based Fixed Aids

Fixed Aids may be constructed on any of the substrates that occur across BC in terrestrial and aquatic environments. Typical substrates within project boundaries include rock, cobblestone, sand, or mudflats. Strictly terrestrial areas may also be characterized by the presence of soils or organic overburden.

Generally, concrete-based Fixed Aids may be built anywhere in the intertidal zone or on land. Rocky substrates in the intertidal zone and on land are the favored locations for concrete-based structures. In intertidal zones with soft substrates, small piles will be combined with the concrete structure to provide extra anchorage.

Both fresh and marine aquatic areas characterize the environmental setting where pile-based Fixed Aids are constructed. Piles are suitable for any type of substrate, from hard rock to soft mud. Construction methods and the pile depth will vary to compensate for the particular substrate characteristics in an area.

Ecozones

Most Fixed Aids are located within the Pacific Maritime Ecozone, which extends from the southern tip of Vancouver Island to Dixon Entrance, north of the Queen Charlotte Islands. This zone has mild winter temperatures and the most rainfall in Canada which provides ideal habitat for an abundance of terrestrial and aquatic species. Currently, this area has the fastest growing human population in the country. Fishing, shipping, tourism and marine recreation are the primary activities sharing the Pacific Coast.

The Boreal Cordillera Ecozone covers the northern portion of BC. Five mountain ranges, several major rivers, and long, cold winters distinguish this area. The population is very sparse and industry is limited to forestry and mining.

The Montane Cordillera Ecozone exhibits extreme diversity, extending from north-central BC to the United States boarder. Fixed Aids are located on and around major lakes and rivers in the south-central portion of this region. The climate is typified by hot, dry summers contrasted with cold winters. Industry ranges from forestry and mining, to agriculture and tourism. (Environment Canada 2005)

Heritage Resources

BC is rich with heritage resources from historic and pre-historic times, dating back 200 and 1,200 years respectively. The most frequently recorded archaeological sites include shell middens, culturally modified trees, burial sites, lithic scatters, pictographs and petroglyphs, and rock formation sites including fish weirs and traps, canoes runs and cairns. (IRWC 2000)

Species at Risk

There are numerous species at risk within the RCSR boundary due to the large area that it encompasses. Species include marine and terrestrial mammals, birds, amphibians, fishes, arthropods, mollusks, insects, vascular plants, mosses, and lichens. A list of species at risk has not been included in this report as the boundaries are much greater than the spatial extent of project activities and the list is very dynamic. Information regarding species at risk within project boundaries can be obtained from the Federal and Provincial listings for an area. See Appendix 1 for a list of environmental information resources that guides to more species at risk information.

4.3 Issues Scoping and Valued Ecosystem Components

Issue scoping included analysis of previous project activities with respect to locations and identified ecosystem receptors. The scoping exercise was internal and focused on existing information and corporate knowledge.

Valued Ecosystem Components (VEC) have been identified by assessing parts of the ecosystem that may be affected as a result of project activities. VEC are summarized into three categories: physical-chemical, ecological, and anthropogenic that contain several ecosystem components. Table 1 provides a summary of the VEC categories.

Table 1: Valued Ecosystem Components

VEC Category	Ecosystem Components
Physical - Chemical	• Water Quality • Land Resources • Atmospheric Quality
Ecological	• Species and Populations • Habitat and Communities
Anthropogenic	• Health and Safety • Social and Economic Stability

VEC were determined based on the benefits they provide ecologically and anthropologically. VEC-Project interactions were then identified by reviewing project activities and their relationship to physical-chemical, ecological, and anthropogenic elements. A summary of VEC justifications and project activities interactions is included in Table 2. For further identification of VEC-project interactions, refer to the VEC-Project Interaction Matrix in Appendix 2.

Table 2: VEC Justification and Project Activities Interaction

Valued Ecosystem Components	VEC Justification	Project Phase	VEC – Project Activities Interaction
Physical-Chemical			
Water Quality	- direct relationship to terrestrial and aquatic habitat quality and abundance. - supports anthropogenic uses such as fishing, recreation, drinking water, and transportation.	- construction	- chemical/physical interactions from machinery operation, power-washing, excavation, rock drilling, pile installation, concrete works
		- operation	- chemical/physical interactions from site access
		- decommissioning	- chemical/physical interactions from site access, machinery operation, pile and concrete base removal
Land Resources	-support habitat for terrestrial as well as near-shore aquatic species. - anthropogenic values include recreation, archaeological, and industrial	- construction	- chemical/physical interactions from site access, machinery operation, concrete works, excavation, rock drilling, pile installation
		- operation	- chemical/physical interactions from site access, brushing activities
		- decommissioning	- chemical/physical interactions from site access, machinery operation, pile and concrete base removal
Atmospheric Quality	- important indicator of habitat health - anthropogenic values include health, recreation, and aesthetic	- construction	- chemical/physical interactions from site access, machinery operation
		-operation	- chemical/physical interactions from site access, aid maintenance
		-decommissioning	- chemical/physical interactions from site access, machinery operation

Valued Ecosystem Components	VEC Justification	Project Phase	VEC – Project Activities Interaction
Ecological			
Species and Population Health	- indicator for ecosystem health and resiliency - anthropogenic values include recreation, industry, education, and health	- construction	- interactions from site access, machinery operation, power-washing, excavation, rock drilling, pile installation, concrete works
		-operation	- interactions from site access, aid maintenance
		-decommissioning	- interactions from site access, machinery operation, pile removal, concrete base removal
Community and Habitat Health	- contribute to species survival and biodiversity - anthropogenic values include recreation, industry, education, and health	- construction	- interactions from site access, machinery operation, power-washing, excavation, rock drilling, pile installation, concrete works
		- operation	- interactions from site access, aid maintenance
		- decommissioning	- interactions from site access, machinery operation, pile removal, concrete base removal
Anthropogenic			
Health and Safety	- contributes directly to enhancing quality of life - components for the building of strong families and communities	- all phases	- potential accidents and health repercussions from physical dangers including machinery operation and contact with chemicals
Economic Stability	- contributes directly to enhancing quality of life - contributes to development of individuals, communities, and sustainable practices	- all phases	- employment created at the individual and community level

4.4 Potential Environmental Effects

The discussion below provides a brief overview of the environmental effects associated with project activities. This discussion is separated into physical-chemical, ecological, and anthropogenic effects. The potential environmental effects associated with VEC/Project interaction and a summary of the mitigation that addresses these effects are provided in Appendix 3.

Physical-Chemical Effects

Water: Shoreline and bottom alteration and changes in surface water quality could result from construction and decommissioning activities; these include excavation, rock drilling, and installation/removal of piles and concrete bases. Fines, foreign materials and organic debris may also enter the aquatic environment due to project activities. These environmental effects are expected to last as long as construction, operation, and decommissioning phases are engaged: from approximately one day to one week.

Land: Site access and machinery operation could contribute to soil erosion, compaction and settling, and changes in stability. Rock drilling and excavation physically change rock structure in a small, localized manner and fines, foreign materials, and organic debris may enter the terrestrial environment. Environmental effects should only continue while project activities are engaged.

Atmosphere: The primary atmospheric effects are noise, dust, and fumes that result from machinery operation and activities. The application of paint during the operation phase will also result in the small scale release of fumes. The duration of these effects is equal to project activity duration: approximately one day to a week.

Ecological Effects

Aquatic and terrestrial species and populations will experience short term disturbance from project activities. Small scale habitat alteration will result from construction and decommissioning activities. At the community and habitat level, the environmental effects resulting from project activities are negligible. Project activities, and the environmental effects associated with them, are minor and short term and therefore too small to impact the community and habitat level.

Anthropogenic Effects

Project crews are vulnerable to health risks from exposure to fumes from machinery, dust from concrete works, and contaminated soils. Safety risks may result from machinery operation, accidental falls, and site access. Project activities positively affect economic stability by creating employment at the individual and community level. Further affects include potential disruption of heritage resources such as archaeological sites.

4.5 Accidents and Malfunction

The likelihood of accidents or malfunctions occurring and causing negative environmental impacts due to project activities and physical works is minimal; Fixed Aid projects are routine and their effects are predictable and, therefore, mitigable. Potential accidents and malfunctions may occur at the staging location and during the construction, operation and decommissioning phases. These may include:

- vehicle collisions
- spills from equipment operated on site
- structural failures
- spills or leaks (from paint, chemicals, and concrete) into the marine and terrestrial environment

Project activities that could result in accidents and malfunctions largely relate to the operation and maintenance of heavy machinery, vehicles, and hand machinery. Structural failures, vehicle collisions, spills, and leaks would likely be attributed to human error. Spills resulting from improperly stored materials are also likely. During the operation phase, the most likely accident to occur is damage to Fixed Aids by passing vessels resulting in the loss of equipment and structures into the surrounding environment.

Accidents and malfunctions will be avoided through compliance with mitigation measures listed in Section 4.6, Appendix 3 and Appendix 4 of this RCSR. Vehicles will be regularly serviced to avoid malfunctions. Large spills will be reported in accordance with local legislations and contingency plans will also be in place.

4.6 Mitigation

Mitigation measures that address the environmental effects associated with Fixed Aid activities are based on existing Best Management Practices (BMP) and procedures. These documents are from various levels of government, industry BMP and internal CCG protocols. The mitigation measures included in these documents have been synthesized, modified, and enhanced for the purposes of this report.

A full copy of the RCSR mitigation measures is included in Appendix 3, which includes a summary of the potential environmental effects and mitigation measures that address these effects organized by VEC. Standard mitigation organized by project activity is included in Appendix 4 with the intention of providing a convenient reference for crews to access the mitigation to be implemented.

The primary source for the mitigation included in this report is the *BMP for Pile Driving and Related Operations*, which was developed by the BC Marine Pile Driving Contractors Association. This document provided a suitable starting point for mitigation

as it includes standard mitigation for RCSR-applicable project activities. The mitigation from the *BMP for Pile Driving and Related Operations* were enhanced to better protect VEC with use of the following documents:

- *CCG Protocol for On-site Visits to Navigations Aids in Sensitive Bird Nesting Sites*
- *BMP for Concrete Pouring Programs at DFO-CCG Sites*
- *BMP for Undertaking Maintenance Cleaning/Painting of CCG Lightstations*
- *BMP for Brushing Activities at CCG Sites*
- *Proceedings: Archaeological Training Workshop – CCG Lightstation Project*
- *Standards and Best Practices for Instream Works (Province of BC)*

CCG will ensure that mitigation measures will be implemented by including the necessary compliance with the RCSR and related BMP in contracts with outsourced projects. Furthermore, all CCG crews and staff will be introduced to the RCSR and required to implement it properly as part of standard operating procedures.

4.7 Analysis and Prediction of Significance of Residual Environmental Effects

Residual effects are "those environmental effects that remain after the application of design standards and the implementation of mitigation measures" (Virtue 2005). Under CEAA, the significance of residual environmental effects must be considered. This section provides criteria for evaluating the significance of potentially adverse residual environmental effects. Analysis of the significance of residual environmental effects is based on several criteria including magnitude, geographic extent, duration, frequency and reversibility (see Table 3). This table was developed in accordance with the November 1994 Agency Reference Guide, *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects,* and the *Responsible Authorities Guide to the Environmental Assessment Act* (CEAA-RA 2003). The criteria were assessed using past experience and professional judgment and are combined to determine whether or not an activity's effect is significant.

Table 3: Rating System Used to Determine the Significance or Residual Environmental Effects

Criteria	Negligible	Minor	Major
Magnitude	Minute levels of disturbance and/or damage (i.e. within natural variation)	Low levels of disturbance and/or damage (i.e. temporarily outside range of natural variation)	High levels or disturbance and/or damage (i.e. outside the range of natural variation)
Geographic Extent	Limited to direct project site	Extends beyond direct project site but remains within the project boundaries	Extends beyond the project boundaries
Duration of Effects	Less than one day	Days to weeks	A month or longer
Frequency of Effects	Occurs on a monthly basis or less frequently	Occurs on a weekly basis	Occurs on a daily basis or more frequently
Reversibility	Effects reversible over short term without active management	Effects reversible over short term with active management	Effects reversible over extended term with active management or effects are not reversible

The above rating system was used to determine whether or not a residual environmental effect was significant based on the following definitions:

Significant

A residual environmental effect is considered *significant* when it introduces frequent, major levels of disturbance and/or damage and when the effects last longer than a month and, extend beyond the project boundary following the application of mitigation measures. It is either reversible with active management or over an extended term or irreversible. A *significant* effect would not be consistent with well-defined environmental protection outcomes such as no degradation of shorelines, no loss of fish or aquatic habitat, etc. and as defined would not be tolerated under the Canadian Environmental Protection Act.

Not Significant

A residual environmental effects is considered *not significant* when it has minor or negligible levels of disturbance and/or damage and when the effects, last less than a week and, are contained within the project boundaries following the application of mitigation measures. An effect that is *not significant* is reversible with or without short-term active management.

Residual Effects and Significance

Identified VEC including water, land, atmosphere, species and populations/communities and habitats, and anthropogenic factors are affected by residual effects from project activities. Each of these residual effects has been examined according to the above criteria ratings and all of the residual effects were found to be insignificant. Table 4, below, includes a summary of the criteria and significance of the residual environmental effects associated with Fixed Aid projects.

Table 4: Significance of Residual Environmental Effects

VEC	Project Phase/Elements	Residual Environmental Effects	Criteria Ratings: Magnitude	Geographic Extent	Duration of Effect	Frequency of Effect	Reversibility	Significance
WATER QUALITY	Construction phase: pile installation	Chemical release from treated wood	1	1	1	1	1	**Not Significant**
LAND RESOURCES	Construction phase: pile installation, excavation	Physical change rock structure in a small, localized manner	1	1	1	1	2	**Not Significant**
ATMOSPHERIC QUALITY	All phases: machinery operation, site access by helicopter, boat, or vehicle	Chemical release of fumes and dust	1	1	1	1	1	**Not Significant**
	All phases: site access by helicopter, boat or vehicle	Noise	1	2	1	1	1	**Not Significant**
	Operation phase: maintenance activities such as painting and power-washing	Small scale release of fumes, fines, foreign materials (e.g. paint chips) and organic debris	1	1	1	1	1	**Not Significant**
SPECIES AND POPULATIONS/ COMMUNITIES AND HABITATS	All phases: site access, machinery operation, construction and decommissioning activities	Short term disturbance to terrestrial and aquatic species	2	2	1	1	1	**Not Significant**
ANTHROPOGENIC FACTORS	Decommissioning phase: concrete base abandonment	Aesthetic effect	1	1	3	1	1	**Not Significant**

Legend: 1=Negligible, 2=Minor, 3=Major

4.8 Cumulative Environmental Effects

CEAA requires that the assessment of potential environmental effects also consider the potential of cumulative environmental effects. Cumulative environmental effects are defined as "changes to the environment that are caused by an action in combination with other past, present and future human activities" (CEAA, 1999). Cumulative effects can occur when environmental effects take place so frequently in time or so densely in space that the effects of individual impacts cannot be assimilated. For example, an impact considered minor might become more significant if the analysis of the other activities indicates that the VEC is already affected, or could be affected, in different ways.

Under CEAA, the identification of likely future projects takes into consideration projects that are certain (i.e. approved, under regulatory review, or officially announced to regulatory agencies) and reasonably foreseeable (i.e. identified in a development plan that is approved or under review, or conditional upon approval of a development plan that is under review). Hypothetical actions (i.e. conjectural or discussed on a conceptual basis) are not considered. (CEAA 1999)

Many of the potential environmental effects associated with Fixed Aid projects are short-lived, localized and reversible; their capacity to act in a cumulative manner is minimal. For the purposes of this RCSR, the cumulative effects assessment must consider the potential cumulative effects resulting from: (1) other projects addressed by this RCSR, (2) other project/activities within the site boundaries, and (3) projects and activities occurring outside the site boundaries.

Interactions between Fixed Aid projects

The environmental effects associated with Fixed Aid projects, as defined by this RCSR, have been found to be negligible and limited to the immediate project area. Considering these factors, individual Fixed Aid projects are not likely to interact with each other and contribute to cumulative effects.

Interactions between Fixed Aid projects and other projects/activities inside the site boundaries

Interactions between Fixed Aid projects and other projects/activities inside the site boundaries must be factored into the consideration of cumulative effects.

Due to the small size of project boundaries it is highly unlikely that other projects will occur while Fixed Aid projects are occurring. Activities that could occur within project boundaries while Fixed Aid projects are occurring in aquatic environments include vessel traffic such as fishing, shipping, and recreation. In terrestrial environments there is potential that industrial, recreational, or residential activities may occur within project boundaries. The environmental impacts that could result from other projects/activities inside the site boundaries are not predicted to combine with Fixed Aid projects to create significant environmental effects.

Given that area of potential disturbance during the construction, operation, and decommissioning of Fixed Aids is limited to the immediate area of the project area, it is unlikely that Fixed Aid projects will interact with other project/activities inside the site boundaries and contribute to cumulative effects.

Interactions between Fixed Aid projects and projects/activities outside site boundaries

Interactions between Fixed Aid projects and projects/activities outside site boundaries must be considered during the assessment of cumulative effects.

There is potential for a wide range of activities/projects to occur outside of Fixed Aid project boundaries. Similar to those activities that could occur inside project boundaries, fishing, shipping, recreation, and residential are expected activities outside of project boundaries. The environmental impacts of these activities are not foreseen to pose significant environmental effects when combined with Fixed Aid project activities. In addition, the remote nature of most Fixed Aid sites makes the likelihood of outside projects combining with Fixed Aid projects to produce cumulative effects even more unlikely. Taking mitigation measures into account, potential adverse environmental effects would be limited to the project site. Outside the immediate project area potential adverse cumulative environmental effects are considered insignificant.

Proper project planning and design will take into account surrounding infrastructure, and other projects or activities inside and outside of project boundaries which have potential to act in a cumulative manner on affected VEC. All residual environmental effects following the application of recommended mitigation measures were found to be negligible, insignificant, and limited to the immediate project area. Therefore, the potential for any cumulative effects to occur as a result of project interactions with other Fixed Aid projects, other projects or activities inside or outside the sites' boundaries are unlikely. Although the potential exists for short term environmental effects during construction and decommissioning, the implementation of recommended mitigation measures will result in insignificant impacts. CCG considers that projects under this RCSR will not likely contribute to significant adverse cumulative environmental effects. Assumptions made regarding cumulative environmental effects will be confirmed on a yearly basis.

5. Roles and Responsibilities

5.1 Responsible Authorities

As the Canadian Coast Guard is a special operating agency within the department, Fisheries & Oceans Canada can be considered the lead responsible authority for all components of the RCSR; CCG will represent DFO in application and management of this report. Structures and activities included in the report have been selected to minimize the potential for additional permitting and, therefore, the inclusion of other responsible authorities.

5.2 Roles and Responsibilities of Other Responsible Authorities and Federal Authorities

Transport Canada has agreed to use this replacement class screening with CCG to fulfill its EA requirements in instances where it is also a Responsible Authority for fixed aid projects. The following sections describe the roles and responsibilities of other Responsible Authorities and Federal Authorities that may be involved in fixed aid projects.

5.2.1 Transport Canada

Transport Canada has the responsibility to protect the right of public navigation under the federal *Navigable Waters Protection Act* (NWPA). The NWPA defines a navigable water as a "canal or any other body of water created or altered as a result of the construction of any works", but in practice includes "any body of water capable of being navigated by a floating vessel of any description, for the purposes of transportation, recreation or commerce". Construction or placement of a work in, on, over, under, through or across any navigable water may require approval from Transport Canada (paragraph 5(1)(a)). Formal approval is mandatory for a new bridge, dam, boom or causeway over navigable waters. Any other works that may cause changes to flow, water level or clearances in a navigable water body may also be of regulatory interest. For example, this may include the construction of "…any structure, device or thing… similar in character… that may interfere with navigation".

This RCSR does not exempt the proponent (CCG) from the requirement to obtain approval in accordance with Federal laws such as the NWPA. The NWPA still requires that the proponent (CCG) apply for approval of any work located in, on, over, under, through or across any navigable water. If Transport Canada issues specific approvals associated with a project under the NWPA, they become a Responsible Authority in accordance with the *Law List Regulations* of the CEAA. In such cases where CCG and

Transport Canada are both Responsible Authorities for a project CCG will be responsible for the Registry requirements.

If permitting or approval is required from an additional RA, other than CCG and Transport Canada, this RCSR will not apply and an individual assessment under the CEAA will be required. Potential responsible authorities of note include other entities that have been delegated with land management: Parks Canada, Port Authorities, and Indian & Northern Affairs, for example. If an additional approval is required from within DFO in the form of a Fisheries Act Authorization; the RCSR will not apply.

5.2.2. Federal Authorities

The following list includes federal authorities that have provided comments regarding this report's identification of potential environmental effects, suggested mitigation, and procedures. Comments have been incorporated as appropriate such that further referrals to these FAs will not be required:

- Environment Canada
- Fisheries & Oceans Canada – Habitat Management Program

Any project that requires further assessment by or referral to another FA will not be included in the RCSR.

5.3 Provincial and Territorial Coordination

CEAA allows the Minister of the Environment to enter into agreements with provincial and territorial governments related to the environmental assessments of projects where both governments have an interest. The bilateral agreement between the Province of British Columbia and the Federal Government provides guidelines for the roles and responsibilities of each government in the environmental assessment of such projects. This RCSR is not designed to compensate for provincial requirements nor does it eliminate the need for provincial project specific approvals where required. The RCSR does not exempt CCG to obey all other relevant provincial legislation.

Projects subject to the RCSR within Interior Lakes will require notification to appropriate regional offices of the BC Ministry of Environment and Land & Water BC. This coordination will provide information regarding species at risk and specific information concerning local habitats.

5.4 The Proponent

DFO, as proponent and represented by CCG, is the lead responsible authority for the RCSR. It will be the responsibility of the CCG to ensure that projects are properly identified as class-applicable, as well as ensuring applicable mitigation is implemented. CCG will also be responsible for monitoring the use of the RCSR and reporting to the Agency.

6. Procedures for Amending the Replacement Class Screening Report

The purpose of an amending procedure is to allow the modification of the RCSR after experience has been gained with its operation and effectiveness. The reasons for such modification may include:

- clarification of ambiguous areas of document and procedures;
- streamlining or modifying the planning process in areas where problems may have arisen;
- minor modifications and revisions to the scope of assessment to reflect new or changed regulatory requirements, policies or standards; and
- new procedures and environmental mitigation practices that have been developed over time.

The responsible authority will notify the Agency in writing of its interest to amend the RCSR. It will discuss the proposed amendments with the Agency and affected federal government departments and may invite comment from stakeholders and the public on the proposed changes. The responsible authority will then submit the amended RCSR to the Agency, along with a request that the Agency amend the RCSR and a statement providing a rationale for the amendment.

The Agency may amend the RCSR without changing the declaration period if the changes:

- are minor;
- represent editorial changes intended to clarify or improve the screening process;
- do not materially alter either the scope of the projects subject to the RCSR or the scope of the assessment required for these projects; and
- do not reflect new or changed regulatory requirements, policies or standards.

The Agency may initiate a new declaration for the RCSR for the remaining balance of the original declaration period or for a new declaration period of the changes:

- are considered to be substantial; or
- represent modifications to the scope of the projects subject to the class or the scope of the assessment required for these projects.

6.1 Term of Application

This report will be in effect for 5 years from its date of declaration. Near the end of the RCSR application period, the CCG will review content and usage to allow for report update and preparation for potential re-declaration

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8. Appendices

1. Environmental Information Resources
2. VEC-Project Interaction Matrix
3. Potential Environmental Effects and Mitigation Summary
4. Standard Mitigation Organized by Project Activity

Appendix 1

Environmental Information Resources

Environmental Information Resources

Government of Canada	• Species at Risk (www.speciesatrisk.gc.ca) • Species at Risk Registry (http://www.sararegistry.gc.ca/) • Species at Risk, Search by Map English: (http://www.speciesatrisk.gc.ca/map/default_e.cfm) French: (http://www.speciesatrisk.gc.ca/map/default_f.cfm) • Committee on the Status of Endangered Wildlife in Canada (http://www.cosewic.gc.ca)
Department of Fisheries and Oceans Canada	• Home page (http://www.dfo-mpo.gc.ca/) • Pacific Region Operational Statements (http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm)
Environment Canada	• Pacific and Yukon Region (http://www.pyr.ec.gc.ca/EN/index.shtml) • Canadian Environmental Assessment Agency (http://www.ceaa-acee.gc.ca) • Canadian Environmental Assessment Registry (http://www.ceaa-acee.gc.ca/050/index_e.cfm)
Province of British Columbia	• Home page (http://www.gov.bc.ca/bvprd/bc/home.do)
BC Parks	• Home page (http://wlapwww.gov.bc.ca/bcparks/)
Ministry of Environment	• Endangered Species and Ecosystems (http://srmwww.gov.bc.ca/atrisk/index.html) • BC Species and Ecosystems Explorer (http://srmapps.gov.bc.ca/apps/eswp/)
Heritage Resources	• Archaeology Branch Web Site (http://srmwww.gov.bc.ca/arch/)
Land and Water British Columbia Inc.	• Home page • (http://lwbc.bc.ca/)
Yukon Environmental and Socio-economic Assessment Board	• Home page • (http://www.yesab.ca/)

Appendix 2

VEC – Project Interaction Matrix

		Valued Ecosystem Components																																									
		PHYSICAL – CHEMICAL EFFECTS																	ECOLOGICAL EFFECTS												ANTHROPOGENIC EFFECTS												
		WATER QUALITY						LAND RESOURCES					ATMOSPHERIC QUALITY						SPECIES AND POPULATIONS – TERRESTRIAL				SPECIES AND POPULATIONS – AQUATIC				COMMUNITIES AND HABITATS				HEALTH AND SAFETY		SOCIAL AND ECONOMIC STABILITY										
PROJECT PHASE	PROJECT ACTIVITIES	WATER TABLE ALTERATION	GROUND WATER FLOW	GROUND WATER QUALITY CHANGES	SHORELINE AND BOTTOM ALTERATION	SURFACE FLOW VARIATION	SURFACE WATER QUALITY CHANGES	SOIL EROSION	UNIQUE PHYSICAL FEATURES	COMPACTION AND SETTLING	STABILITY (SLIDES AND SLUMP)	GEOLOGY	AIR QUALITY	WIND	INVERSION/ FOGGING	TEMPERATURE	NOISE	DUST	TERRESTRIAL VEGETATION	BIRDS AND MAMMALS	AMPHIBIANS AND REPTILES	INVERTEBRATES	AQUATIC VEGETATION	BIRDS AND MAMMALS	AMPHIBIANS AND REPTILES	FISH AND INVERTEBRATES	TERRESTRIAL COMMUNITIES	TERRESTRIAL HABITATS	AQUATIC COMMUNITIES	AQUATIC HABITATS	HEALTH RISKS (Chemical)	SAFETY RISKS (Physical)	DEMOGRAPHY	LOCAL ECONOMY	REGIONAL TRANSPORTATION	COMMUNITY INFRASTRUCTURE	HEALTH EDUCATION AND SOCIAL SERVICES	HERITAGE RESOURCES	LIFESTYLE AND QUALITY OF LIFE	LABOUR	REGIONAL ECONOMY	LAND/ RESOURCE USE	AESTHETIC
CONSTRUCTION	**MACHINERY OPERATION** (incl. operation of all equipment required for construction operations below)							•		•	•		•				•	•	•	•	•	•	•	•	•	•					•	•		•	•			•		•	•		•
	POWER-WASHING (physical alteration/impact)						•																•			•																	
	EXCAVATION (physical alteration/impact)				•		•	•			•	•					•	•	•	•	•	•		•	•	•		•			•	•						•					•
	ROCK DRILLING (physical alteration/impact)				•		•					•					•	•					•			•																	
	PILE INSTALLATION (physical alteration/impact)				•		•					•					•			•			•	•		•				•													
	CONCRETE WORKS (physical alteration/impact)				•		•											•			•		•		•	•				•	•												
OPERATION	**SITE ACCESS** (incl. transportation methods)																•	•	•	•	•	•	•	•	•	•						•		•						•	•		
	AID MAINTENANCE (incl. power washing, painting, equipment replacement)						•						•						•												•	•			•				•	•	•	•	
DECOMMISSIONING	**MACHINERY OPERATION** (incl. operation of all equipment required for operations below)							•		•	•		•				•	•	•	•	•	•	•	•	•	•					•	•		•	•			•		•	•		•
	PILE REMOVAL (physical alteration/impact)				•		•										•						•	•	•	•				•													
	CONCRETE BASE REMOVAL (physical alteration/impact)				•		•											•		•			•	•		•				•													
	CONCRETE BASE ABANDONMENT (physical alteration/impact)																		•	•	•	•	•	•	•	•		•		•													•

Appendix 3

Potential Environmental Effects

And Mitigation Summary

VEC	Potential Environmental Effects	Mitigative Measures
WATER RESOURCES	Shoreline and bottom alteration, siltation, and other changes in water quality could result from excavation, rock drilling, and installation/removal of piles and concrete bases.	SITE ACCESS 1. Site access practices must be undertaken with regard to resident flora and fauna, especially during times of the year when they are most sensitive. EXCAVATION/ ROCK DRILLING 1. Dust and fines entering the water must be avoided. 2. Loose material at excavation sites should be managed to avoid excessive migration of silt and debris to nearby waters, especially during heavy rainfall events. 3. All excavation below Highest High Water should be completed by hand, as no vehicles should be operated in the intertidal zone. 4. Any blasting will follow the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters. PILE INSTALLATION 1. All equipment will be maintained in proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline and other petroleum products. 2. Where possible, new timber piles will comply with the BMP for the use of treated wood in aquatic environments as developed by the Canadian Institute of Treated Wood and the Western Wood Preservers Institute. 3. Where the BMP pilings are not available, creosote pilings will stand for a minimum of 45 days prior to installation. These requirements are for new pilings only and will not restrict the use of re-used timber piling. Reused pilings will not be subject to any additional treatments. 4. When cleaning out pipe piles (i.e. air lifting), if the material that is to be removed inside the pipe is non-toxic, then it shall be redistributed in a manner that will minimize damage to the surrounding aquatic fish habitat.

VEC	Potential Environmental Effects	Mitigative Measures
WATER RESOURCES continued	Shoreline and bottom alteration, siltation, and other changes in water quality could result from excavation, rock drilling, and installation/removal of piles and concrete bases.	PILE REMOVAL 1. Contractors will position their water borne equipment in a manner that will minimize damage to identified fish habitat (e.g. eel grass). Where possible, alternative methods will be employed (e.g. use of anchors instead of spuds). 2. When demolition is required on timber pile structures, the contractor will remove the piling by mechanical means and avoid breaking the piling at the mud line or below. All demolition operations should be monitored in order to control and contain the construction debris. CONCRETE WORKS 1. When pouring concrete all spills of fresh concrete must be prevented. If concrete is discharged from the transit mixer directly to the form work or placed by wheelbarrow, proper sealed chutes must be constructed to avoid spillage. If the concrete is being placed with a concrete pump, all hose and pipe connections must be sealed and locked properly to ensure the lines will not leak or uncouple. Crews will ensure that concrete forms are not filled to overflowing. 2. All concrete forms will be constructed and sealed in a manner which will prevent fresh concrete or cement laden water from leaking into the surrounding water. 3. All tools, pumps, pipes, hoses and trucks used for finishing, placing or transporting fresh concrete must be washed off in such a way as to prevent the wash off water from entering the marine environment. The wash water will be contained and disposed of upland in an environmentally acceptable manner. CONCRETE BASE REMOVAL 1. Contractors where possible will position their water borne equipment in a manner that will minimize damage to habitat. 2. All debris deposited throughout the life of the aid should be removed from the site.

VEC	Potential Environmental Effects	Mitigative Measures
WATER RESOURCES continued	Fines, foreign materials and organic debris may enter the aquatic environment due to project activities Fines, foreign materials and organic debris may enter the aquatic environment due to project activities	AID MAINTENANCE 1. Activities should be completed in such a way as to minimise the amount of fines and organic debris that may enter nearby aquatic environments. 2. Equipment maintenance activities must be completed in a manner that prevents the deposit of foreign materials to the environment. 3. An approach of "contain and recover" should be adopted. Drop sheets or other means should be used to prevent paint chips and other debris from entering the surrounding environment. Refuse should be disposed of properly.
LAND RESOURCES	Soil erosion, compaction, and settling, and changes in stability may result from machinery operation.	SITE ACCESS 1. Site access practices must be undertaken with regard to resident flora and fauna, especially during times of the year when they are most sensitive. MACHINERY OPERATION 1. All equipment will be maintained in proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline and other petroleum products. 2. Vehicles should not be operated below the line of Highest High Water in the intertidal zone. 1. Operations should only operate where entirely necessary to complete the works to reduce effects to nearby soils, vegetation, and resident species. Respect should be given to the natural environment to minimise the footprint of the project.
	Rock drilling and excavation physically change rock structure	EXCAVATION/ROCK DRILLING 1. Rock drilling and excavation activities must be conducted conservatively so that physical changes to rock remain small and localized.
ATMOSPHERIC QUALITY	Fines, foreign materials and organic debris may enter the terrestrial environment due to project activities	AID MAINTENANCE 1. Activities should be completed in such a way as to minimise the amount of fines and organic debris that may enter nearby terrestrial and aquatic environments. 2. Equipment maintenance activities must be completed in a manner that prevents the deposit of foreign materials to the environment. 3. An approach of "contain and recover" should be adopted. Drop sheets or other means should be used to prevent paint chips and other debris from entering the surrounding environment. Refuse should be disposed of properly.

VEC	Potential Environmental Effects	Mitigative Measures
ATMOSPHERIC QUALITY continued	Noise, dust, and fumes result from project activities.	MACHINERY OPERATION 1. Machinery must be operated efficiently, to ensure that noise and air quality issues are short-term and local.
	Paint applied during the operation phase will result in the small scale release of fumes.	AID MAINTENANCE 1. Painting activities should be completed in such a way as to minimise the amount of fumes that may enter the environment. The amount of paint used should be minimized and unused containers must be covered.
SPECIES AND POPULATIONS/ COMMUNITIES AND HABITATS	Short term disturbance from project activities to both terrestrial and aquatic species.	PILE INSTALLATION 1. Contractors will position their water borne equipment in a manner that will minimize damage to identified fish habitat (e.g. eel grass). Where possible, alternative methods will be employed (e.g. use of anchors instead of spuds). 2. Whenever contractors are working in areas where spawning is present, appropriate monitoring by a qualified person will be undertaken and activities ceased if spawn disruption is apparent. 3. If pile installation activities are causing fish kill, work must cease immediately and contractors will be responsible for introducing effective means of reducing the level of shock waves or introduce measures that will protect fish from entering the potentially harmful shock wave area. For example, appropriate mitigating measures would include the deployment a bubble curtain over the full length of the wetted pile that would defuse the shock waves to an acceptable level. 4. If, after preventive measures are introduced, visual monitoring reveals unacceptable conditions (fish kill), then work will stop immediately and the system reviewed and corrected. 5. Any instances of fish kill must be reported to the appropriate agencies (DFO). 6. When cleaning out pipe piles (i.e. air lifting), if the material that is to be removed inside the pipe is non-toxic, then it shall be redistributed in a manner that will minimize damage to the surrounding aquatic fish habitat.

VEC	Potential Environmental Effects	Mitigative Measures
SPECIES AND POPULATIONS/ COMMUNITIES AND HABITATS continued	Short term disturbance from project activities to both terrestrial and aquatic species.	PILE REMOVAL 1. Contractors will position their water borne equipment in a manner that will minimize damage to identified fish habitat (e.g. eel grass). Where possible, alternative methods will be employed (e.g. use of anchors instead of spuds).
ANTHROPOGENIC	Project crews are vulnerable to health risks from exposure to fumes from machinery, dust from concrete works, and contaminated soils. Safety risks may result from machinery operation, accidental falls, and site access. In addition, the public may affected by temporary disruptions to navigability during works.	GENERAL 1. Activities should be completed in such a way as to minimise the amount of fines and organic debris. 2. Ensure all personnel involved with activities are adequately trained and utilize appropriate personal protective equipment. 3. Storage of fuels and petroleum products will comply with safe operating procedures, including containment facilities in case of a spill. Onsite crews will have emergency spill equipment available.
		MACHINERY OPERATION 1. Machinery must be operated efficiently, to ensure that noise and air quality issues are short-term and local. PILE INSTALLATION 1. Proper notice should be given to transportation authorities to warn of potential disruptions to navigability during works.

VEC	Potential Environmental Effects	Mitigative Measures
ANTHROPOGENIC continued	The aesthetic of construction, operation, and decommissioning could be perceived to be negative.	GENERAL 1. Aesthetic effects created by activities will be short-term and localized. Sites should be kept in a tidy manner during activities and left in a good condition at the end of the project. Concrete base abandonment will be conducted only in remote sites, where aesthetic effects are not a concern. CONCRETE BASE ABANDONMENT 1. Care should be taken to remove all components of the Fixed Aid that are not incorporated into the concrete base. 2. All debris deposited throughout the life of the aid should be removed from the site. 3. Areas near the base should be protected from excessive disturbance. 4. Concrete base abandonment will be conducted only in remote sites, where aesthetic effects are not a concern.
	Archaeological sites could be inadvertently disturbed or damaged by project activities	GENERAL 1. Archaeological sites in remote locations are not likely to have been previously identified. Care should be taken to observe archaeological deposits while work is being completed. Work must be stopped if evidence shows a potential archaeological artifact or deposit.

Appendix 4

Standard Mitigation by Project Activity

PROJECT ACTIVITY	MITIGATION
GENERAL (to be incorporated into all activities below)	1. Ensure all personnel involved with activities are adequately trained and utilize appropriate personal protective equipment. 2. Storage of fuels and petroleum products will comply with safe operating procedures, including containment facilities in case of a spill. 3. Waste or any miscellaneous unused materials will be recovered for either disposal in a designated facility or placed in storage. Under no circumstances will materials be deliberately thrown into the marine or terrestrial environment. 4. Onsite crews will have emergency spill equipment available. 5. All activities should be completed in such a way as to minimize stress and disturbance to resident flora and fauna. 6. Operations should only operate where entirely necessary to complete the works to reduce effects to nearby soils, vegetation, and resident species. Respect should be given to the natural environment to minimize the footprint of the project. 7. Aesthetic effects created by activities will be short-term and localized. Sites should be kept in a tidy manner during activities and left in a good condition at the end of the project. 8. Archaeological sites in remote locations are not likely to have been previously identified. Care should be taken to observe archaeological deposits while work is being completed. Work must be stopped if evidence shows a potential archaeological artifact or deposit.
MACHINERY OPERATION	1. All equipment will be maintained in proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline and other petroleum products. 2. Vehicles should not be operated below the line of Highest High Water in the intertidal zone. 3. Operations should only operate where entirely necessary to complete the works to reduce effects to nearby soils, vegetation, and resident species. Respect should be given to the natural environment to minimise the footprint of the project. 4. Machinery must be operated efficiently, to ensure that noise and air quality issues are short-term and local.
POWER-WASHING	1. Activities should be completed in such a way as to minimise the amount of fines and organic debris that may enter nearby aquatic environments.
EXCAVATION/ROCK DRILLING	1. Rock drilling and excavation activities must be conducted conservatively so that physical changes to rock remain small and localized. 2. Dust and fines entering the water must be avoided. 3. Archeological sites in remote locations are not likely to have been previously identified. Care should be taken to observe archaeological deposits while work is being completed. Work must be stopped if

PROJECT ACTIVITY	MITIGATION
EXCAVATION/ROCK DRILLING continued	evidence shows a potential archaeological artifact or deposit. 4. Loose material at excavation sites should be managed to avoid excessive migration of silt and debris to nearby waters, especially during heavy rainfall events. 5. All excavation below Highest High Water should be completed by hand, as no vehicles should be operated in the intertidal zone. 6. Any blasting will follow the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters.
PILE INSTALLATION	1. All equipment will be maintained in proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline and other petroleum products. 2. Contractors where possible will position their water borne equipment in a manner that will minimize damage to identified fish habitat (e.g. eel grass). Where possible, alternative methods will be employed (e.g. use of anchors instead of spuds). 3. Proper notice should be given to transportation authorities to warn of potential disruptions to navigability during works. 4. Whenever Contractors are working in areas where spawning is present, appropriate monitoring by a qualified person will be undertaken and activities ceased if spawn disruption is apparent. 5. Where possible, new timber piles will comply with the BMP for the use of treated wood in aquatic environments as developed by the Canadian Institute of Treated Wood and the Western Wood Preservers Institute. 6. Where the BMP pilings are not available, creosote piling will stand for a minimum of 45 days prior to installation. These requirements are for new pilings only and will not restrict the use of re-used timber pilings. Reused pilings will not be subject to any additional treatments. 7. If pile installation activities are causing fish kill, work must cease immediately and contractors will be responsible for introducing effective means of reducing the level of shock waves or introduce measures that will protect fish from entering the potentially harmful shock wave area. For example, appropriate mitigating measures would include the deployment a bubble curtain over the full length of the wetted pile that would defuse the shock waves to an acceptable level. 8. If, after preventive measures are introduced, visual monitoring reveals unacceptable conditions (fish kill), then work will stop immediately and the system reviewed and corrected. 9. Any instances of fish kill must be reported to the appropriate agencies (DFO). 10. When cleaning out pipe piles (i.e. air lifting), if the material that is to be removed inside the pipe is non-toxic, then it shall be redistributed in a manner that will minimize damage to the surrounding aquatic fish habitat.

PROJECT ACTIVITY	MITIGATION
CONCRETE WORKS	1. When pouring concrete all spills of fresh concrete must be prevented. If concrete is discharged from the transit mixer directly to the form work or placed by wheelbarrow, proper sealed chutes must be constructed to avoid spillage. If the concrete is being placed with a concrete pump, all hose and pipe connections must be sealed and locked properly to ensure the lines will not leak or uncouple. Crews will ensure that concrete forms are not filled to overflowing. 2. All concrete forms will be constructed and sealed in a manner which will prevent fresh concrete or cement laden water from leaking into the surrounding water. 3. All tools, pumps, pipes, hoses and trucks used for finishing, placing or transporting fresh concrete must be washed off in such a way as to prevent the wash off water from entering the marine environment. The wash water will be contained and disposed of upland in an environmentally acceptable manner.
SITE ACCESS	1. Site access practices must be undertaken with regard to resident flora and fauna, especially during times of the year when they are most sensitive.
AID MAINTENANCE	1. Equipment maintenance activities must be completed in a manner that prevents the deposit of foreign materials to the environment. 2. Power washing activities must follow mitigation provided under “POWER-WASHING” 3. An approach of “contain and recover” should be adopted. Drop sheets or other means should be used to prevent paint chips and other debris from entering the surrounding environment. Refuse should be disposed of properly. 4. Painting activities should be completed in such a way as to minimise the amount of fumes that may enter the environment. The amount of paint used should be minimized and unused containers must be covered.
PILE REMOVAL	1. Contractors will position their water borne equipment in a manner that will minimize damage to identified fish habitat (e.g. eel grass). Where possible, alternative methods will be employed (e.g. use of anchors instead of spuds). 2. When demolition is required on timber pile structures, the contractor will remove the piling by mechanical means and avoid breaking the piling at the mud line or below. All demolition operations should be monitored in order to control and contain the construction debris.
CONCRETE BASE REMOVAL	1. Contractors where possible will position their water borne equipment in a manner that will minimize damage to identified fish habitat (e.g. eel grass). Where possible, alternative methods will be employed (e.g. use of anchors instead of spuds). 2. All debris deposited throughout the life of the aid should be removed from the site.
CONCRETE BASE ABANDONMENT	1. Care should be taken to remove all components of the Fixed Aid that are not incorporated into the concrete base.

PROJECT ACTIVITY	MITIGATION
CONCRETE BASE ABANDONMENT continued	2. All debris deposited throughout the life of the aid should be removed from the site. 3. Areas near the base should be protected from excessive disturbance. 4. Concrete base abandonment will be conducted only in remote sites, where aesthetic effects are not a concern.