



Basic Impact Analysis (BIA)

GI16-05

Restoring Coastal Sand Ecosystem on Sidney Spit (CoRe)

Sidney Spit,
Gulf Islands National Park Reserve

November 2016

Prepared by Pippi Lawn



Parks
Canada

Parcs
Canada

Canada



1. PROJECT TITLE & LOCATION

Ecosystems on the Edge – Restoring Coastal Sand Ecosystem on Sidney Spit (CoRe)

Proposed location of the restoration is the vegetated portion of the northern tip of Sidney Spit, Sidney Island ('Teardrop' site). Some project activities (i.e. installation of interpretive signage and minor trail reroute to protect common nighthawk nesting habitat) will also be situated in coastal sand ecosystem adjacent to the Day Use area.



Figure 1. Project location.

2. PROPONENT INFORMATION

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3. PROPOSED PROJECT DATES

Planned commencement: 2016-11-02
 Planned completion: 2018-03-31

4. INTERNAL PROJECT FILE #GI16-05

5. PROJECT DESCRIPTION

Restoration of coastal sand ecosystem on Sidney Spit, Gulf Islands National Park Reserve (GINPR), is proposed as part of a Conservation and Restoration (CoRe) project to improve habitat for species at risk ('*Ecosystems on the Edge – Restoration Plan for Restoring Coastal Sand Ecosystem on Sidney Spit*' (Lawn 2016)). The project involves removing invasive plant species with the assistance of volunteers, directly augmenting species at risk populations, and enhancing current visitor facilities. Through these activities, the project aims to improve the ecological integrity of the rare coastal sand ecosystem (CSE), aid in the recovery and future protection of four associated species at risk, and improve the visitor experience through installation of signage and fencing in a discrete portion of Sidney Island.

Encroachment and stabilization of the coastal sand ecosystem by invasive alien plant species and disturbance from human use threatens the structure of this rare ecosystem type and the survival of four species at risk populations – contorted-pod evening-primrose (*Camissonia contorta*) (endangered), silky beach pea (*Lathyrus littoralis*) (threatened), common nighthawk (*Chordeiles minor*) (threatened) and yellow sand-verbena (*Abronia latifolia*) (provincially red-listed) - all of which depend on open habitat in this dynamic ecosystem. The population of contorted-pod evening-primrose is at risk of imminent extirpation from the site. Invasion by shrubs (especially non-native Scotch broom) threatens the structure of this rare ecosystem type, contributing to the declining health of the Coastal/Marine Indicator. Removal of invasive plants, population augmentation of contorted-pod evening primrose, and management of human use will address these threats, identified as top priorities in GINPR's draft site-based action plan for species at risk.

Size of proposed restoration area: 0.55 ha

Materials:

- Hand tools and other equipment (e.g. loppers, handsaws, tarpaulins) for staff and volunteers
- Shovels and rakes
- Marine vessels for island access
- Interpretive signs and closure signs
- Fencing (fencing posts or stakes, rope, split rail, etc.)
- Miscellaneous monitoring equipment (gps units, camera, etc.)
- High accuracy Trimble Unit (Geo7x) for mapping species at risk
- Pin flags or pigtail stakes and flags for marking sensitive polygons containing species at risk



**Methods:**

Detailed methods are included in Appendix 2 (extracted from “*Ecosystems on the Edge - Restoration Plan for Restoring Coastal Sand Ecosystem on Sidney Spit*” (Lawn 2016)) and are summarized below.

Removal of target invasive plant species

Target invasive plant species (e.g. Scotch broom, European beach grass) will be removed using manual methods – basal cutting, pulling and digging according to best practices. Areas will be retreated where necessary to control individuals that have germinated or resprouted. The majority of restoration work will be conducted in fall and winter months when species at risk are dormant or absent, with only a few retreatment passes required outside of this period. In select sub-areas, a portion of the bryophyte/organic crust will be removed via scalping with a rake or other hand tools in non-sensitive areas or by hand in sensitive areas. Only the top layer will be removed and disturbance to the lower substrate minimized. This will restore patches of bare sand and increase suitable habitat available for species at risk, helping to achieve the project targets. Monitoring and review after the first season will allow for adaptive management and modification of methods if necessary in the second season. Cut invasive plant biomass will be placed onto tarpaulins and transported to designated, temporary staging piles located at or adjacent to the restoration site. Locations for staging piles will be carefully selected to avoid damage to species at risk or sensitive native vegetation and to minimize visitor impacts. Ultimately, disposal of piles of invasive plant biomass will be achieved through burning when conditions are suitable and under guidance of the Visitor Safety and Fire Operations Coordinator.

Seed augmentation and revegetation

Seed and plants for augmentation or revegetation are being propagated at the Conservation Nursery by the Species at Risk team, Coastal BC Field Unit, and will be sown/outplanted at the restoration site according to the schedule and system outlined in the restoration plan and in Appendix 2 of this document. Contorted-pod evening-primrose seed will be sown onto prepared habitat adjacent to occupied habitat to augment the population in fall of 2016 and 2017. Native plant plugs (e.g native dune grass, large-headed sedge) will be outplanted into areas where revegetation is required using small hand trowels.

Fencing and closure/restoration messaging signage

Strategic placement of fence posts, fencing and restoration signage will be planned in consultation with staff from Visitor Experience, Visitor Facilities and Assets and Cultural Resource Management. A total of approximately 350m of rope fencing between wooden posts and/or signage indicating closure of the area are planned for the Teardrop restoration site. Fencing and/or signage will be placed along sections of the boundary where visitors are most likely to attempt to enter and where habitat is most sensitive to damage. In addition to fencing and signage installed at the restoration site, up to 50m of split rail fencing or other barriers will be considered near the Day Use area to protect common nighthawk nesting habitat and yellow sand-verbena populations. Trail re-routing to improve beach access without traversing sensitive habitat will also be implemented at the Day Use area in consultation with staff from the Visitor Experience, Visitor Facilities and Assets and Cultural Resource Management sections.

Interpretive signage

Interpretive signage will be developed with assistance of GINPR External Relations and Visitor Experience (ERVE) staff to better communicate messaging on Coastal Sand Ecosystems and associated species at risk. These will be installed at the day use area and/or restoration site prior to project completion (March 2018).





6. PROJECT TIMING

Implementation will be completed by March 2018. The majority of invasive plant removals will be conducted between Nov 2016-Mar 2017 and Sep 2017-Mar 2018. Minor retreatment of European beach grass may be required in spring/summer 2017. Seed augmentation and outplantings will be conducted in fall 2016 and 2017. Fencing, closure signs and interpretive signs will be installed by project completion (Mar 2018).

2016-2017

Activity	S	O	N	D	J	F	M
Write and review restoration plan							
Prepare BIA & SARA authorizations							
Hire restoration team							
Conduct invasive plant removals – target 50%							
Propagate seed in nursery							
Outplant seeds and plants at site							
Purchase & install subset of fencing/closure signs							
Plan interpretive signs							
National CoRe reporting							

2017-2018

Activity	A	M	J	J	A	S	O	N	D	J	F	M
Monitor SAR response and impacts on site												
Produce mid-project lessons learned report												
Adapt restoration plan												
Conduct invasive plant removals – target 100%												
Propagate seed in nursery												
Outplant seeds and plants at site												
Complete augmentation of CPEP population												
Install fencing/closure signs												
Reroute trail												
Finish installation of interpretive signage												
National CoRe reporting												
Final reporting												





6. VALUED COMPONENTS LIKELY TO BE AFFECTED

- Species at risk –
 - Potential for individuals of contorted-pod evening-primrose, silky beach pea and/or yellow sand-verbena to be inadvertently trampled during restoration work
 - Potential for the shallow seed bank of contorted-pod evening-primrose plants to be disturbed by restoration work
 - Potential for nesting common nighthawks and their young to be disturbed during restoration work
 - Potential for Edwards' beach moth to be negatively impacted by restoration work, through effects to its (unknown) larval host plant or overwintering pupae that may be present in sand
 - Removal of dense invasive species (shrub 'barrier') may make it easier for visitors and their pets to access sensitive habitat occupied by species at risk
 - Species at risk individuals may be present outside of previously identified occupied habitat and may, therefore, be encountered outside of restricted, flagged areas
- Soils & landforms –
 - Outplanting of nursery-raised plants may cause minor soil disturbance or localized changes to soil composition
 - Removal of invasive plant species may cause minor soil disturbance
 - Changes in vegetation cover may affect sand dynamics, including deposition and accretion patterns
 - Manual digging of small holes for placing fence posts may cause localized disturbance of soil surface
- Flora –
 - Some native vegetation may be crushed or damaged by trampling and other project activities
 - Potential introduction/spread of non-native seeds or plants into project area via outside equipment, tools and plant containers from nursery
 - Staging of piles of removed exotic invasive plant material at the site prior to disposal may crush, shade or damage some native vegetation
 - Burning of piles of removed exotic invasive plant material may damage some native vegetation
 - Despite removal of target invasive plant species, the presence of an underlying bryophyte/organic crust in some areas may promote continued growth of invasive species and prevent creation of dynamic, open habitat required by species at risk
 - Although deer do not currently access the restoration site, changes in site vegetation could potentially affect the deer browsing regime in the future
 - Eelgrass in the subtidal zone surrounding the site may be damaged by frequent, repeated anchoring from crews accessing the site
 - There is potential risk to donor populations from over-collection of propagules





- Fauna –
 - Some species will not benefit from the restoration, such as sparrows nesting in Scotch broom thickets or small mammals that prefer dense vegetation cover
 - Potential that visits to the site may disturb native fauna, including seals, shorebirds and seabirds
- Cultural sites –
 - There is potential for previously undetected cultural features to be damaged during restoration. No cultural features of concern have been detected at the site during previous archaeological surveys (*"2007-08 Archaeological Resource Management Programme, Gulf Islands National Park Reserve of Canada"*, Sumpter, Smith & Fedje, 2008).
- Visitor Experience –
 - Restoration activities could cause minor disturbance and change (open up) the viewscape. The restoration site itself is closed to public access as per a Superintendent's Order.





7. EFFECTS ANALYSIS

Included in #6 above.

8. MITIGATION MEASURES

In summary, the following mitigation measures will be implemented:

Natural Resources

1. The majority of restoration work will be scheduled outside of the plant growing season, when species at risk and other sensitive native plant species are absent or dormant.
2. Seasonally-occupied habitat for species at risk will be surveyed and mapped during baseline monitoring and the boundaries of these polygons will be flagged in the field prior to commencement of restoration. Entry will be minimized, and restricted to staff with specialized training. During volunteer or larger restoration events, additional flagging will be added to ensure participants do not enter these areas.
3. Areas in the immediate vicinity of habitat identified as seasonally occupied by contorted-pod evening-primrose will be treated in the fall and avoided in late winter/early spring, to minimize the risk of disturbance in case of early germination.
4. Minimally invasive techniques will be employed when treating exotic invasive plants within areas seasonally occupied by species at risk and adjacent areas – e.g. cutting exotic invasive plants as opposed to digging. Excavators and other machinery will not be used in these areas – methods will be restricted to low impact, manual techniques carried out by staff with specialized training.
5. The majority of restoration work will be scheduled when the common nighthawk is absent from the region (i.e. Sep-Mar). Early in the breeding season, locations of active nests will be identified and mapped during annual common nighthawk surveys and these sites will subsequently be treated as no-access zones until the birds depart in late summer.
6. Direct impacts to songbirds will be minimized as shrub removals will be conducted outside of the breeding and nesting season. High densities of shrub habitat will remain on the adjacent Hook Spit.
7. Impacts to nesting shorebirds (e.g. killdeer, spotted sandpiper) and seal pups will be minimized as the majority of restoration work will be conducting outside of the breeding season. Staff will assess the presence of wildlife prior to approaching the site and landing. In addition, staff will be made aware of preferred haul-out sites, nesting locations and other habitat attributes of concern if any work needs to be conducted during the breeding season. These sensitive areas will be avoided during work at the site. Time spent in the shoreline zone will be brief and noise will be kept to a minimum.
8. To reduce risk to overwintering pupae of Edwards' Beach Moth that may be present in sand substrate, low impact methods will be used to remove invasive plant species with minimal sand disturbance. It is unlikely that Scotch broom or European beach grass, two exotic invasive





species targeted for removal from the site, are used as a larval hosts for this species. However, large densities of these two species will remain on the adjacent Hook Spit.

9. Signage and/or fencing will be strategically placed along the boundary of vulnerable, closed areas. Educational messaging will be improved. A superintendent's order is already in place to close the restoration area to visitors, and increased law enforcement can be considered if improved facilities and messaging is deemed insufficient.
10. All crew members will be trained to recognize and identify species at risk that they may encounter on the site and will keep a look out for these species at all time. Additionally, volunteers will receive orientation and training to help them recognize these species. If any new occurrences are detected, the area will be vacated and work will not proceed in that sector until appropriate mitigations are applied. The project manager will notified, the new location recorded and surveyed, the boundaries flagged and entry restricted to staff with specialized training using low impact techniques.
11. Continuous monitoring will facilitate early detection of unintended effects and allow for adaptive management. Protection of species at risk is a top priority of the project and methods will be adjusted where necessary to ensure this is achieved. If existing mitigations prove insufficient, additional mitigations will be implemented.
12. Phytosanitary precautions will be followed to prevent introduction of new weeds to the site. Clothing, shoes, gear and tools will be carefully inspected for foreign substances (e.g. fruits, seeds) and cleaned before entering the site, using the cleaning kits and protocols developed by GINPR for this purpose.
13. Plant containers and seed supplies from the nursery will also be examined to identify any non-native and potentially invasive species. These will be removed prior to outplanting.
14. Staging locations will be carefully selected to minimize impacts to native vegetation. Potential locations will be surveyed prior to use to ensure piles are not placed on rare or sensitive vegetation.
15. Any burning of invasive plant material will be conducted on a very small, localized scale under safe conditions during the appropriate (non-dry) season, under the guidance of the Visitor Safety and Fire Coordinator. Locations will be carefully chosen to ensure native vegetation is not damaged by pile burning. If necessary, piles will be relocated to clear areas (e.g. non-vegetated beach zone) prior to burning to minimize risks to surrounding vegetation.
16. Options for installing a temporary mooring buoy will be investigated to minimize impacts to subtidal eelgrass when accessing the site via boat. Alternatively, if anchoring is required, anchors will be placed in clear areas or beyond boundaries of dense eelgrass or sea pen beds where possible.
17. To minimize soil disturbance during outplanting, tubular bulb-lifters or small trowels will be used to gently create the smallest hole necessary to insert the plant plugs, displacing a minimum amount of soil.
18. Ground disturbance will be minimized during fence installation by creating only small holes for placement of poles or using post pounding techniques.
19. Soil disturbance by removal of invasive plants will be minimized by using low impact techniques (e.g. manual cutting) to remove invasive plants in sensitive areas, such as where rare plants or





their seed banks may be present. In less sensitive areas, minor soil disturbance is unlikely to be major concern for this type of ecosystem, as sparsely-vegetated coastal sand ecosystems are adapted to some degree of sand movement.

20. Seeds for propagation will be collected following best practices for ethical seed collection. Only a small number of seeds/fruits were collected. Where possible, only a small percentage of each individual's seed will be taken (<5% of total fruits or seeds per plant). Care will be taken to not collect intensively from the same area or from small, isolated populations. The seeds will only be collected once or twice from donor populations, in order to establish an 'increase garden' in the nursery.

Cultural Resource Protection

1. No cultural features of concern have been detected at the restoration site during previous archaeological surveys (*"2007-08 Archaeological Resource Management Programme, Gulf Islands National Park Reserve of Canada"*, Sumpter, Smith & Fedje, 2008).. Nevertheless, staff will remain vigilant for indications of currently unknown cultural features. Only low impact methods with minimal sand disturbance are planned for the site.
2. Installation of fence and signs posts (at both the restoration site and Day Use area) and other activities involving digging will be planned in consultation with the Cultural Resource Management section.
3. If, at any time, cultural materials (shell/bone/artifacts) are discovered, work in the immediate area will stop and the Project Manager will be notified immediately. The Project Manager will liaise with the Cultural Resource Management Advisor (Laura Peterson, 250-654-4017) and Resource Conservation Manager (Nathan Cardinal, 250-654-4076), who may then contact archaeologists to evaluate the find.
4. If human remains are discovered, work will stop immediately, and, in addition to the above measures, the RCMP will be notified (to be done by Parks Canada staff). Appropriate management actions will be determined following liaison with the Coast Salish First Nations.

Visitor Experience

1. The ecological reasons for the project and benefits of protecting and restoring the coastal sand ecosystem will be communicated to visitors who are encountered during the restoration activity. Visitors approaching the site will be greeted warmly by restoration staff who will communicate educational messaging.
2. Social media and other outreach messaging approaches will be used to inform potential visitors about the project prior to arrival.
3. Visitor access to the beach surrounding the restoration site will still be permitted throughout the project.
4. Other than a boat for transport, no noisy or polluting equipment is planned for use during this work.
5. Signage will be placed near any fencing to explain its purpose.
6. Volunteer opportunities will be provided as part of the activity to build stewardship.





7. To ensure safety of volunteers (and staff), visits to the island during First Nations hunting season will adhere to the 'Operational Protocol for Parks Canada Staff working on Sidney Island during the period of Hunting by First Nations'.
8. Project activities will occur during daylight hours and mostly in the fall/winter when there is less visitor activity.





9. PUBLIC/STAKEHOLDER ENGAGEMENT & ABORIGINAL CONSULTATION

- 9 a) Indicate whether public/stakeholder engagement was undertaken in relation to potential adverse effects of the proposed project:
- No
 - Yes (describe the process to involve relevant parties and indicate how comments were taken into consideration).
- 9 b) Indicate whether Aboriginal consultation was undertaken in relation to potential adverse effects of the proposed project:
- No
 - Yes. Project was discussed in a Hul'q'umi'num Parks committee meeting (October 28, 2016) and no immediate concerns were identified – a site visit has been requested and will be accommodated. The project will also be presented at an upcoming WSANEC Leadership Committee when scheduled.

10. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

No significant residual or cumulative effects have been identified with this project once mitigation measures are employed. Over the long term, it is believed completion of the project will improve ecological integrity of the site and habitat quality for species at risk.

As a precaution, the following possible residual adverse effects and corresponding mitigation measures have been identified:

Risk: Despite precautions, restoration may have unanticipated effects on species at risk or native vegetation.

Mitigation measures: Baseline and follow-up monitoring throughout the time frame of the project and beyond will facilitate early detection of unintended effects and allow for adaptive management. Protection of species at risk is a top priority of the project and methods will be adjusted where necessary to ensure this is achieved. If existing mitigations prove insufficient, additional mitigations will be implemented.

Risk: Breeding Canada geese (introduced subtype) may damage native vegetation (including rare plants) through grazing, trampling, faecal inputs and introduction of invasive plant propagules. Removal of dense cover of exotic invasive plants may create more available nesting habitat for Canada geese at the restoration site, potentially increasing their use of this area.

Mitigation measures: GINPR's seasonal goose management program will be expanded to include this site. Geese will be hazed from the area early in the breeding season and the site regularly surveyed for nests. Eggs will be sterilized with the piercing method, as this has proven more effective than addling (shaking) alone at other restoration sites in GINPR for immediately reducing use of a given site by geese and deterring their future return. These activities will be conducted under permit issued by Environment Canada.





Risk: Conservation gains may be gradually diminished in the long term following completion of this two-year project, unless maintenance efforts are continued to control European beach grass resprouts and germination of new Scotch broom from the seed bank.

Mitigation measures: A long-term plan will be developed for continued maintenance after project completion, exploring use of existing resources, potential for application for additional resources, and use of the volunteer program. If ongoing resources are limited, eradication of reproducing invasive plants in target areas will be prioritized, in order to minimize ongoing recruitment

11. SURVEILLANCE

- Surveillance is not required
- Surveillance is required (provide details such as the proposed schedule and the focus of inspections)

Resource Conservation staff will be on site during restoration and volunteer events to ensure disturbance to natural and cultural resources and visitor experience is minimized.

12. FOLLOW-UP MONITORING

Follow-up monitoring is:

- not required
- required by legislation or policy (indicate basis of requirement – e.g. required by the *Species at Risk Act*; *Fisheries Act*, or the *Parks Canada Cultural Resource Management Policy*)
- required to evaluate effectiveness of mitigation measures and/or assess restoration success

13. SARA NOTIFICATION

Notification is:

- not required
- required under the *Species at Risk Act* (outline the nature of and response to any notification).





14. EXPERTS CONSULTED

This impact analysis was submitted for review by the GINPR Resource Conservation, Cultural Resource Management, Visitor Experience and Visitor Facilities and Assets sections, and by the CBCFU Species at Risk section.

Department/Agency/Institution: Parks Canada Agency	Date of Request: 21-10-2016
Expert's Name & Contact Information: Laura Peterson 250-654-4017, laura.peterson@pc.gc.ca	Title: Cultural Resource Management Advisor
Expertise Requested: Advice on cultural sensitivities and mitigations required.	
Response: Fence/sign installation and digging to be planned in consultation with the Cultural Resource Management section. A member of the CRM team will accompany restoration staff on an initial site visit prior to restoration.	

Department/Agency/Institution: Parks Canada Agency	Date of Request: 15-09-2016 & 21-10-2016
Expert's Name & Contact Information: Nathan Fisk 250-478-2424, nathan.fisk@pc.gc.ca	Title: Resource Management Officer (Propagation Specialist), Species at Risk Section
Expertise Requested: Recommendations on outplanting schedule and techniques and species at risk augmentation.	
Response: Provided advice on propagation, augmentation and outplanting schedule and techniques that have been incorporated into the methodology and reviewed relevant sections of the BIA.	

Department/Agency/Institution: Parks Canada Agency	Date of Request: 21-10-2016
Expert's Name & Contact Information: Brian Reader 250-478-5131, brian.reader@pc.gc.ca	Title: Species at Risk Manager
Expertise Requested: Advice on SARA authorization process.	
Response: Provided guidance on completing SARA authorization component of the BIA.	

Department/Agency/Institution: Parks Canada Agency	Date of Request: 21-10-2016
Expert's Name & Contact Information: Sibylla Helms 250-654-4073, sibylla.helms@pc.gc.ca	Title: Resource Management Officer
Expertise Requested: Review of basic impact analysis, methods and mitigations.	
Response: Provided edits and comments that have been used to revise this document.	





Department/Agency/Institution: Parks Canada Agency	Date of Request: 21-10-2016
Expert's Name & Contact Information: Morgan Davies 250-654-4019, morgan.davies@pc.gc.ca	Title: Resource Management Officer
Expertise Requested: Review of basic impact analysis, methods and mitigations.	
Response: Provided edits and comments that have been used to revise this document.	

Department/Agency/Institution: Parks Canada Agency	Date of Request: 21-10-2016
Expert's Name & Contact Information: Janet Mercer 250-654-4015, janet.mercer@pc.gc.ca	Title: Environmental Assessment Specialist
Expertise Requested: Review of basic impact analysis, methods and mitigations.	
Response: Provided advice on BIA process and edits and comments that have been used to revise this document.	





15. DECISION

Taking into account implementation of mitigation measures outlined in the analysis, the project is:

- not likely to cause significant adverse environmental effects.
- likely to cause significant adverse environmental effects.

NOTE: If the project is identified as likely to cause significant adverse effects, CEAA 2012 prohibits approval of the project unless the Governor in Council (Cabinet) determines that the effects are justified in the circumstances. A finding of significant effects therefore means the project CANNOT go ahead as proposed.


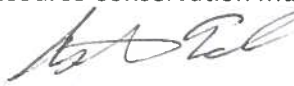
FOR SARA REQUIREMENTS:

- There are no residual adverse effects to species at risk and therefore the SARA-Compliant Authorization Decision Tool was not required

OR, the SARA-Compliant Authorization Decision Tool (Appendix 1) was used and determined:

- There is no contravention of SARA prohibitions
- Project activities contravene a SARA prohibition and CAN be authorized under SARA
- Project activities contravene a SARA prohibition and CANNOT be authorized

16. RECOMMENDATION AND APPROVAL

<p>Prepared by: Pippi Lawn Project Manager, Coastal Sand Ecosystems CoRe Project</p> 	<p>Date: 2016-10-19</p>
<p>Recommended by: Nathan Cardinal Resource Conservation Manager</p>  <p>Marcia Morash Superintendent, Gulf Islands National Park Reserve</p> 	<p>Date: 02 November, 2016</p> <p>Nov 2/16</p>
<p>Approved by: Brian Reader Acting Field Unit Superintendent Coastal British Columbia Field Unit</p>	<p>Date: November 3, 2016</p>
<p>Signature: </p>	





17. ATTACHMENTS

Appendix 1 – SARA-compliant authorization decision tool

Appendix 2 – Detailed restoration methodology

18. NATIONAL IMPACT ASSESSMENT TRACKING SYSTEM

- Project registered in tracking system
- Not yet registered (*CEAA 2012 requires PCA submit a report to Parliament annually. EIAs must be entered in the tracking system **by the end of April** to enable reporting.*)

*****Ensure that all required mitigation measures and conditions (e.g. follow-up monitoring requirements) are included in project permits and authorizations*****





Appendix 1: SARA-Compliant Authorization Decision Tool

- **This tool is for use when the BIA has determined that project activities will lead to residual adverse effects to THR, EN, or EX species at risk** (i.e. even after mitigation measures are applied, there are effects to individuals, residences or critical habitat of THR, EN or EX species at risk).
- This tool provides a structured process to determine if a SARA authorization is required, if it can be issued, and how to issue it.
- **Guidance for each question is provided within the form and should be deleted from the final version.**
- Consultation with a representative of the [Species Conservation and Management \(SCM\)](#) team is encouraged to help ensure consistent application of this tool.

Part A – Does a SARA authorization need to be considered for this activity?

1. Will the activity lead to residual adverse effects that contravene a SARA prohibition for a listed endangered (En), threatened (Th) or extirpated (Ex) species at risk, its residence or its critical habitat?

SARA prohibitions: s.32 - Cannot: kill, harm, harass, capture, or take individuals; possess, collect, buy, sell or trade individuals or parts of individuals; s.33 – Cannot damage or destroy residences; s.58 – Cannot destroy any part of critical habitat; s.80 - Cannot carry out an activity that is prohibited under a protection order.

Yes. Residual adverse effects of the activity will contravene a SARA prohibition.

It is possible that during restoration work to improve habitat for species at risk present at the site, some listed species at risk individuals (i.e. contorted-pod evening-primrose (En), common nighthawk (Tr), Edwards' beach moth (En)) may be harmed. Although there is always a risk of negative impacts when working in the vicinity of species at risk, precautions will be followed at all times to minimize potential disturbance to these species. The primary goal of this project is to benefit species at risk present at the site by improving habitat, removing identified threats and augmenting populations. Conversely, if the restoration was not conducted, the risk to species at risk at the site would be much greater. Further loss or degradation of suitable habitat would likely continue, potentially leading to reductions in size and extent of the populations and possible extirpation of contorted-pod evening-primrose from the site.

2. Is the activity authorized under S. 83 of SARA?

Yes. A SARA authorization is NOT required. The activity is authorized in a recovery strategy or action plan;

OR

Yes. A SARA authorization is NOT required. The activity is required for public safety, health or national security **AND** authorized by or under another Act of Parliament.

Document below:

- The specific section of the published recovery strategy or action plan that makes reference to section 83 of SARA

OR

- Why the activity is needed for public safety, health or national security and reference the Act of Parliament under which the activity is authorized (*you **MUST** consult a member of the [SCM team](#) if you plan to use the section 83 exception*).

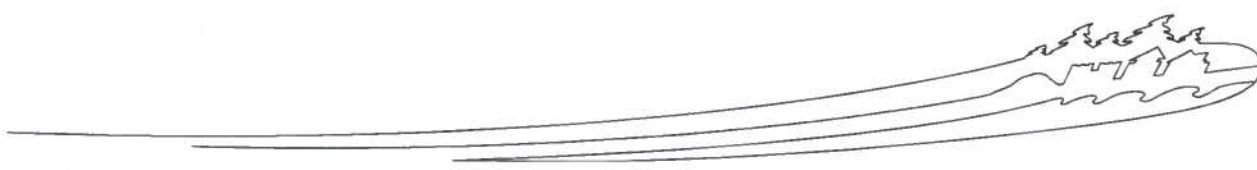
If all activities that would contravene a SARA prohibition are already authorized under SARA s.83, **check the first box in Part D and submit for approval.**

No. A SARA authorization is required. Continue to Part B.





<p>Part B – Is the activity eligible for authorization under SARA? ****Complete ONLY if you have answered <u>NO</u> to Question 2, above****</p>	
<p>3. Does the activity fall into one of the following three categories?</p> <p>Select the appropriate box (check only one) and continue to Question 4 OR, If the proposed activity DOES NOT fit in any of the three categories below the activity CANNOT be authorized, and you can check the second box in Part D and submit for approval.</p> <p><input type="checkbox"/> The activity is scientific research related to the conservation of the species and conducted by qualified persons; OR</p> <p><input checked="" type="checkbox"/> The activity benefits the species or is required to enhance its chance of survival in the wild ; OR</p> <p><input type="checkbox"/> Affecting the species is incidental to the activity (i.e. the purpose of the activity is not to engage in an activity that is prohibited under SARA (e.g., kill, harm, harass...an individual; destroy a residence or critical habitat). For example, fishing for a listed species cannot be permitted, but accidental by-catch <i>may</i> be.</p>	
<p>4. Alternatives that would reduce the impact(s) on the species have been considered and the best solution adopted</p> <p>Document below and continue to Question 5. <i>This question is an additional requirement to the questions in the BIA template.</i></p> <ul style="list-style-type: none"> • No action – This alternative was considered and deemed to have a higher risk of negative impacts to SAR present at the site than the proposed project. If the restoration is not conducted, very little quality habitat for species at risk will continue to remain, and further loss or degradation of suitable habitat will likely take place, potentially leading to reductions in size and extent of already small populations and possible extirpation of contorted-pod evening-primrose from the site. Taking no action would fail to address threats identified in the recovery strategy for contorted-pod evening-primrose. • Use of machinery for invasive plant removals – This alternative would be more efficient and expedient from a restoration perspective but was ultimately rejected due to the higher risk of disturbance to species at risk. • Proposed project – This has been selected as the best solution as it: (a) takes actions to improve quality of habitat for species at risk present at the site and addresses priority threats to their survival; while (b) using lower-impact, manual removal techniques that will cause less disturbance to the substrate than machinery, resulting in a lower risk of disturbance to SAR individuals or seed banks. An additional action, augmentation of the contorted-pod evening-primrose population with additional seed produced in the nursery, is expected to further assist this species. 	
<p>5. All feasible measures must be taken to minimize the impact of the activity</p> <p>Ensure that the mitigations identified in Section 8 of the BIA template to address effects to species at risk are as comprehensive as possible, and continue to Question 6.</p>	
<p>6. Will the activity jeopardize the survival or recovery of the species?</p> <p><i>Document here your analysis of whether the activity will jeopardize survival or recovery of the species. The analysis must consider and refer to relevant SARA recovery documents (e.g. COSEWIC status reports, recovery strategies, action plans), and/or Parks Canada Detailed Assessments for the species, if available. In particular, refer to the population and distribution objectives, the threats to the species, and the identification of critical habitat (including the location, amount - if available, biophysical attributes, and the activities likely to destroy).</i></p>	





NOTE: If the BIA determines there are no alternatives or mitigation measures that can prevent destruction of critical habitat or non-compliance with a protection order, you **MUST** consult a member of the [SCM team](#) for further advice.

Yes. The activity CANNOT be authorized.

Check analysis with the [SCM team](#). Then check the second box in Part D and submit for approval. **ENSURE THIS CONCLUSION IS TAKEN INTO CONSIDERATION IN SECTION 10 OF THE BIA TEMPLATE (SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS) AND DOCUMENTED IN THE BIA TEMPLATE, SECTION 15 – DECISION.**

No. The activity CAN be authorized. Complete explanation and continue to Part C.

The project is designed to help, not jeopardize, the recovery of listed species at the site (contorted-pod evening-primrose, common nighthawk and Edwards' beach moth). The project accomplishes or contributes to several top priority activities identified in Gulf Islands National Park Reserve's draft site-based action plan (SBAP) for species at risk recovery:

- Habitat conservation for contorted-pod evening-primrose, silky beach pea, Edwards' beach moth, and common nighthawk (SBAP Activity # 1)
 - *Removal of priority exotic invasive species (i.e. European dune grass, Scotch broom) at Sidney Spit in small sections (habitat management areas) starting with a habitat management area at the tip of Sidney Spit. Long term goal is eradication of priority invasive species from each area and an increasing number managed areas as resources allow (SBAP Activity # 1).*
 - *Other provincially listed SAR that will benefit: Yellow sand-verbena.*
- Population recovery of contorted-pod evening-primrose (SBAP Activity # 2)
 - *If contorted-pod evening-primrose does not naturally increase its population size then develop and implement a population level augmentation plan for Sidney Spit*
- Visitor awareness and compliance to protect common nighthawk (SBAP Activity # 4)
 - *Interpretive signage, fencing and trail building to educate visitors and direct them away from sensitive dune habitats on Sidney Island (e.g. Sidney Spit and around day use area)*
- Incorporate species at risk monitoring and recovery into visitor opportunities (SBAP Activity # VE1).
 - *Promote ecosystem restoration and volunteer opportunities*

The project addresses a key threat to contorted-pod evening-primrose identified in the Recovery Strategy for this species (i.e. competition from invasive plants). According to the Recovery Strategy, enhancement of adjacent habitat at the tip of Sidney Spit will increase population viability and restoration of new habitat patches will provide opportunities for new or expanded populations. Conversely, the quality of critical habitat at this site will not be maintained if the spread of invasive species is not controlled (Recovery Strategy for Contorted-pod Evening-primrose, Parks Canada, 2011).

Likewise, the project is likely to benefit rather than jeopardize common nighthawk, as this species requires open, vegetation-free habitats or clearings for nesting, including bare sand patches in sparsely-vegetated coastal sand ecosystems, where they lay their eggs directly on the ground/sand (Status Report, COSEWIC, 2007). The majority of restoration work will be conducted outside of the breeding season, when this migratory species is seasonally absent from the site.

Although little is known about the specific habitat requirements of Edwards' beach moth, including lack of information as to its larval host plant, the project is unlikely to harm the species at this location and may, in fact, benefit it by restoring degraded habitat dominated by invasive shrubs back towards sparsely-vegetated habitat dominated by native dune plants. According to its Status Report, the moth is restricted to sparsely-vegetated coastal sand ecosystems, as well as sandy habitat adjacent to saltmarsh, and generally occurs in





areas with 5-35% vegetation cover. The project addresses likely threats to the species that were discussed in the Status Report: i.e. vegetation succession and invasive species such as Scotch broom. The project is unlikely to jeopardize the species, as the majority of restoration work will be conducted outside of its flying season, substrate disturbance (in case of overwintering life stages in sand) will be limited, and the restoration site is only a small portion of occupied area for this species on Sidney Island.

The project will take an adaptive management approach, using ongoing monitoring and mid-project review to detect any unanticipated impacts early and adjust methods and mitigations if necessary.

Part C - Prepare the SARA authorization and posting explanation

7. Prepare the authorization

The authorization will be issued using the EIA process and SARA s.74

Issue the SARA authorization using the [template on the intranet](#) and complete Question 8 to prepare the posting for the [SAR Public Registry](#).

8. Provide description for posting

SARA requires that an explanation of why a SARA authorization is issued be posted in the SARA Public Registry in both official languages within 30 days of the authorization being issued. Prepare the explanation, using the information you entered in the BIA and previous sections of this Appendix. Your regional SCM representative will have the explanation translated and will publish it on the SARA registry.

Regional or Local Number: GI16-05

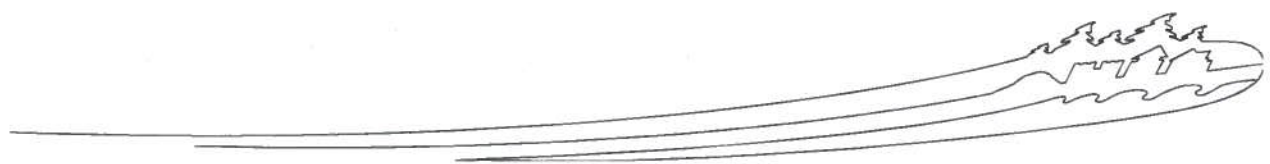
Purpose –

- **The activity is necessary or beneficial to the species**

Description of the Activity

Parks Canada will restore a portion of coastal sand ecosystem on Sidney Spit, Gulf Islands National Park Reserve, by removing target invasive plant species, augmenting the population of endangered contorted-pod evening-primrose, and enhancing current visitor facilities through installation of signage and fencing. The primary goal of this restoration project is to benefit species at risk present at the site by improving habitat, removing identified threats and augmenting populations. Although it is possible that some species at risk individuals (i.e. contorted-pod evening-primrose (En), common nighthawk (Tr), Edwards’ beach moth (En)) may be harmed during the restoration work, mitigations will be followed to minimize these risks, and the net effect of the work on these populations is likely to be positive. Alternatively, if the restoration was not conducted, further loss or degradation of suitable habitat would likely continue.

- Start Date of Authorization: 2016-11-01 End Date of Authorization: 2018-03-31
- Issuing Authority: Parks Canada Agency
- Authority Used:
 - Species at Risk Act
 - Canada National Parks Act
- Location of Activity: British Columbia
- Affected Species:
 - Contorted-pod evening-primrose (En)
 - Common nighthawk (Tr)
 - Edwards’ beach moth (En)



**Pre-Conditions –**

- (a) All reasonable alternatives to the activity have been considered and the best solution has been adopted: Taking no action would fail to address threats identified in the recovery strategy for contorted-pod evening-primrose and very little quality habitat would be available for species at risk present at the site. If the restoration is not conducted, further loss or degradation of suitable habitat will likely take place, potentially leading to reductions in size and extent of already small populations and possible extirpation of contorted-pod evening-primrose from the site. Use of machinery for invasive plant removals would be more efficient from a restoration perspective but this alternative was rejected due to the higher risk of disturbance to species at risk. The proposed project was accepted as the best solution as it takes actions to improve quality of habitat for species at risk present at the site and addresses priority threats to their survival; while using lower-impact, manual removal techniques that will cause less disturbance. Augmentation of the contorted-pod evening-primrose population with additional seed produced in the nursery is expected to further assist this species.
- (b) All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals: The majority of restoration work will be scheduled when the species at risk (SAR) occurring at the site are dormant or absent for the season. Seasonally-occupied habitat will be flagged and entry minimized and restricted to staff with specialized training. Low impact methods will be employed when treating invasive plants within areas occupied by SAR to minimize disturbance to individuals, their substrate and seed banks – e.g. cutting exotic invasive plants as opposed to digging. All crew will be trained to recognize and identify SAR that they may encounter. Repeated monitoring will facilitate early detection of unintended effects and adaptive management. Phytosanitary precautions will be followed to prevent introduction of new weeds to the site. Locations for staging and burning of cut invasive plant material will be surveyed prior to use and not sited near habitat occupied by SAR.
- (c) The activity will not jeopardize the survival or recovery of these species: While there may be temporary, relatively minor adverse effects to a low number of individuals through restoration activities, the overall residual effect for the SAR populations at the site is expected to be positive. These activities are recommended approaches to contribute to the recovery of these species and will not jeopardize their survival.

Contact Person(s)

Provide name and coordinates of a PCA contact.

Pippi Lawn

Coastal Sand Ecosystem Project Manager

Gulf Islands National Park Reserve of Canada

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pippi.lawn@pc.gc.ca

Telephone: 250-654-4097





Part D – SARA Authorization Decision	
Select the appropriate answer and continue to Part E.	
<input type="checkbox"/> This activity does not require a SARA authorization, as indicated in Questions 1 and 2.	
<input type="checkbox"/> This activity requires a SARA authorization but CANNOT be authorized because it does not fit into one of the three required categories (see response to Question 3) OR it does not meet one of the SARA pre-conditions (see responses to Questions 4-6).	
This activity meets the SARA authorization requirements; an authorization may be issued (see response to Questions 3-6). The residual adverse effects (effects remaining after mitigations have been applied) MAY contravene the following SARA prohibition:	
<input checked="" type="checkbox"/> s.32 - Cannot: kill, harm, harass, capture, or take individuals; possess, collect, buy, sell or trade individuals or parts of individuals;	
<input checked="" type="checkbox"/> s.33 – Cannot damage or destroy residences;	
<input type="checkbox"/> s.58 – Cannot destroy any part of critical habitat;	
<input type="checkbox"/> s.80 - Cannot carry out an activity that is prohibited under a protection order	

Part E – SARA Authorization Recommendation and Approval	
Prepared by: Author: Pippi Lawn (Coastal Sand Ecosystem Project Manager) Reviewer: Nathan Cardinal (Resource Conservation Manager)	Date: 2016-10-21
Recommended by: Name & Position: <i>Nathan Cardinal, Resource Conservation Manager</i>	Date: <i>02 November 2016</i>
Decision Approval	
Name & Position (<i>FUS/Director of a Waterway, or Delegate</i>): Brian Reader, Acting Field Unit Superintendent, Coastal BC Field Unit	
Signature: <i>Brian Reader</i>	Date: November 3, 2016





Appendix 2. Detailed Restoration Methodology

Extracted from "Ecosystems on the Edge – Restoration Plan for Restoring Coastal Sand Ecosystem at Sidney Spit" (Lawn 2016)

Preparation

Baseline monitoring

Initial vegetation and species at risk monitoring must be completed before commencement of restoration in order to assess the baseline condition for subsequent comparison and to help mitigate impacts to species at risk.

Vegetation monitoring was conducted in the summer of 2016 to establish pre-restoration condition of the site. Average percent cover was determined for structural components, including trees/shrubs, bare sand, total vegetation, herbaceous vegetation, moss, woody debris and indicator species (Scotch broom, European beach grass, native dune grass and species at risk), using randomly-distributed permanent sampling plots. Average maximum tree/shrub heights were also assessed. For detailed methodology, refer to the 'Coastal Sand Ecosystem Vegetation Monitoring Protocol, GINPR' (Lawn 2016), stored at the following location: G:\EI monitoring\Indicators and Measures New\Coastal_Coastal Sand Ecosystem Vegetation\Protocol.

Contorted-pod evening-primrose and silky beach pea populations have been monitored annually since 2012 and 2014, respectively, and were most recently monitored in May 2016. Individuals were counted and high-resolution polygons defining boundaries of occupied habitat were delineated using a Trimble Geo7x unit.

Number of nesting pairs and nest locations for the common nighthawk have been surveyed annually since 2015, and were recorded most recently in June 2016. As this species is migratory, they will not be present at the site when the majority of restoration activities will be conducted (Oct-Mar).

Flagging of species at risk

Occupied areas of species at risk habitat that were identified and mapped during baseline monitoring in spring/summer 2016 will be discretely delineated in the field prior to commencement of restoration activities. Entry and disturbance will be minimized in these areas and additional mitigating measures applied. Access will be restricted to staff with specialized training. During volunteer or larger restoration events, additional flagging will be added to ensure participants do not enter these areas. Mitigating measures are discussed in more detail in Section 2.4.1.

Removal of Target Invasive Plant Species

Overall approach to invasive plant treatment at site

Manual removal of target invasive plant species, specifically Scotch broom and European beach grass, will be conducted by restoration technicians and volunteers in fall and winter months (September/October to Mar) for the duration of the project (2016-2018). The entire teardrop site, a discrete (0.55ha) area of Sidney Spit, will be treated. Removals will proceed in a systematic fashion, commencing in the southern half of the site. A minimum of 50% of the total project area will be treated





in the first year. If time remains within the first year, additional areas within the site will be treated, moving in a northerly direction. For additional areas treated within the first year in excess of the southern 50% of the site, removal of mature Scotch broom plants will be prioritized if time is limited.

In the second year, all remaining areas will be treated. In addition, any areas treated in the first year will be re-treated for re-emerging target species that have germinated from the seed bank or resprouted from below-ground roots or rhizomes.

Sub-areas in the immediate vicinity of habitat that has been identified as seasonally occupied by rare plants (e.g. contorted-pod evening-primrose) will be treated in the fall and avoided in late winter/early spring, to minimize the risk of disturbance in case of early germination.

Removal of Scotch broom

Scotch broom (*Cytisus scoparius*) will be treated during fall and winter months using best practices for manual removal. As recommended by Fairbarns (2012), the largest individuals (basal diameter of >2 cm) will be cut with hand saws or bypass loppers at a height of 10-30 cm above the sand surface to minimize impacts to the substrate and facilitate detection and treatment of resprouting individuals. According to Fairbarns (2012), the majority of larger individuals treated in this way in this type of habitat are unlikely to resprout, based on past control efforts elsewhere in the region.

Moderately sized individuals (basal diameter of 3 mm – 2 cm) should be lopped below the root collar underneath the sand surface, verifying that all stem material has been removed by inspecting for the presence of root hairs in the area immediately above the cut (Fairbarns 2012). This technique represents the best balance between minimizing soil disturbance and maximizing control efficacy for this size class of plants, which tend to resprout readily if lopped above the junction of root and shoot (Fairbarns 2012).

Small individuals (basal diameter of <3mm) can be pulled by hand without significant disturbance to the soil (Fairbarns 2012). This technique tends to be more efficient than cutting for treating dense concentrations of small individuals. Pulling will not be used in habitat occupied by contorted-pod evening-primrose in order to minimize disturbance to its seed bank.

Treated areas will be inspected the following spring to ensure no mature, flowering plants have been missed that could produce seed if left untreated.

Scotch broom in previously treated areas will be re-treated if necessary in the second year (Sep 2017 – Mar 2018) to control individuals that have germinated or resprouted. If time is limited, the focus will be on mature individuals that could potentially reproduce the following year.

Removal of European beach grass

Treatment of European beach grass (*Ammophila arenaria*) is more challenging as it possesses extensive networks of underground rhizomes that resprout readily. Use of machinery (e.g. excavators) is not appropriate over much of the restoration site due to the presence of sensitive species at risk with shallow, easily-disturbed seed banks. Consequently, treatment of this species will be restricted to non-invasive, hand removal methods at this site. Localized infestations of European beach grass may be treated manually through techniques described by Bellefleur (pers comm, 2012) and Fairbarns (2012). Where species at risk or sensitive native plants are present, European beach grass will be treated by





repeatedly hand-pulling or using a carpet knife to cut small clusters of plants below their base (i.e. below the first or second rhizoid) (Bellefleur, pers comm, 2012). In sub-areas with no species at risk or sensitive native plants, shovels may be used to dig to a depth of 20cm (Fairbarns 2012; Pickart 1997). Alternatively, garden forks may be used to pry and lift the plants (Helms, 2016, pers. comm.). In all cases, multiple passes at monthly to quarterly intervals over several years will be required to control regrowth and deplete deep root reserves (Bellefleur, pers comm, 2012; Fairbarns 2012; Pickart 1997). Biomass present and effort required will diminish greatly with subsequent passes, but re-treatment must be continued on a regular basis until eradicated to increase the likelihood of long-term success (Fairbarns 2012).

Initial treatment and multiple monthly follow-up treatments will be conducted during the primary restoration field period (Oct-Mar) when the full field crew is available. A few follow-up passes will also be required in 2017 during the spring/summer season, when technicians hired for this project will not be present. These additional passes will be conducted by the Project Manager with the assistance of existing resources and/or volunteers.

Other invasive grasses

Where feasible, patches of other priority invasive grasses (e.g. common velvet grass, *Holcus lanatus*) may be removed concurrently with removal of Scotch broom and/or European beach grass. In this case, manual techniques would be employed (i.e. pulling or cutting below base with carpet knife). This will only be conducted if it can be achieved efficiently and if resource permit. Removal of the other two species represents a higher priority for this project.

Scalping of bryophyte/organic crust

In select sub-areas, a portion of the bryophyte/organic crust will be removed via scalping. This will be achieved with a rake or other hand tools in non-sensitive areas or by hand in areas surrounded by species at risk. Only the top layer will be removed and disturbance to the lower substrate minimized. Where extensive, stabilizing bryophyte mats are present, this will restore patches of bare sand and increase suitable habitat available for species at risk (Ennis, pers. comm., May 2015; Page, pers. comm., Sept 2016). It will help achieve the project target of 15% open sand, improve conditions for highly-adapted native species and make the microhabitat less suitable for invasive species that require higher moisture and nutrient levels.

Storage and disposal of invasive plant biomass

Cut invasive plant biomass will be placed onto tarpaulins and transported to designated, temporary staging piles located at or adjacent to the restoration site. Locations for staging piles will be carefully selected to avoid damage to species at risk or sensitive native vegetation. Biomass will be left to desiccate in the sun in large groupings until disposal is scheduled. Care will be taken to orient European beach grass material within piles so that they are subject to exposure and their rhizomes do not have easy access to favourable substrate, to prevent regrowth. Ultimately, disposal of piles of invasive plant biomass will be achieved through burning when conditions are suitable. Burning will be conducted under the guidance of the Visitor Safety and Fire Operations Coordinator.





Adaptive Management

A portion of the total project area will be treated during the first winter (2016-2017) and response monitored in spring of 2017 to allow for adaptive management. Based on review, removal methods may be modified during the second winter (2017-18) to ensure maximum efficiency and minimize any identified impact to SAR.

Ongoing monitoring of time taken to treat specific areas will be used to refine removal rates and estimates of effort (person hours) required per area, improving accuracy of projections in the second year. Based on these results, the restoration approach may be adjusted or activities reprioritized to ensure project success within the allotted time frame.

Ongoing Maintenance

Due to regeneration from underground rhizomes, ongoing maintenance treatment of European beach grass will likely be required beyond the 2-year funded time frame of this project to maintain conservation gains over the long term. Ongoing maintenance may also be required for Scotch broom seedlings that have germinated from the seed bank, although the harsh coastal sand ecosystem environment will likely reduce Scotch broom germination intensity relative to that observed following similar restoration activities at terrestrial sites.

A long-term plan will be developed for continued site maintenance after project completion, exploring use of existing resources (A-base funding) as identified in the draft Site-Based Action Plan, potential for application for additional resources (B-base funding), and feasibility of using volunteer capacity developed during the course of this project to continue maintenance efforts. Depending on resources, the priority for ongoing maintenance will be eradication of reproducing invasive plants in target areas to minimize ongoing recruitment.

Seed Augmentation and Revegetation

Seed Collection

To augment populations of priority species at risk and produce plants for re-vegetation of restored area with native species, modest amounts of seed have been collected following best practices for ethical seed collection (outlined at: http://www.goert.ca/at_home_guidelines_native.php). Where possible, seed was collected at or near the restoration site (to preserve local genetics), only a small percentage of each individual's seed was taken (<5% of total fruits or seeds per plant) and seed was collected from a diverse range of well-spaced plants from all size ranges and microhabitats present. Care was taken to not collect intensively from the same area or from small, isolated populations. Phytosanitary procedures were followed at all times to minimize risk to the donor population. Seed harvested from plants in GINPR was collected under permit: PCA Research & Collection Permit #GINP-2016-22122 and SARA-compliant authorization #FRH-2016-21599-SARA. Seed was placed in labelled, dry envelopes, transported to the Conservation Nursery at Fort Rodd Hill National Historic Site (FRHNHS), and used to establish an 'increase garden' by propagation specialists with the Coastal BC Field Unit (CBCFU) Species at Risk Section.





Several seed pods of contorted-pod evening-primrose (*Camissonia contorta*) were collected from the restoration site on Sidney Spit in June 2016 and previously. Likewise, several seed heads of native dune grass (*Leymus mollis*) were collected from the site in August 2016. No silky beach pea (*Lathyrus littoralis*) seed was collected from the site in 2016, due to low numbers of pods and heavy predation by rodents. However, approximately 80 silky beach pea seeds were collected with permission from a larger population on Tsawout lands at neighbouring TŪKĪEN (Cordova Spit).

Additional seed may be collected in 2017 if required and if population sizes permit.

Propagation and Nursery Growth

Propagation is being undertaken by the CBCFU Species at Risk team in a specialized nursery facility, the Conservation Nursery at FRHNHS. Seed collected from the field has been prepared and sown in the fenced, outdoor facility within cold frames, flats and pots using methods appropriate for each species. Plants are raised in sandy growing medium, similar to the substrate at the outplanting site.

For contorted-pod evening-primrose (*Camissonia contorta*), where nursery-raised seed will be used to augment the population of this annual species at the restoration site, the nursery has already produced 1 lb of seed (approximately 3-4 million seeds). Nursery-raised contorted-pod evening-primrose plants grow much larger and produce many more seed than individuals grown in the wild, so this is an efficient technique for increasing seed supply. As the nursery-raised plants flower and set fruit, the resulting, second-generation seed are collected and stored until sown at the field site. A subset of this seed will be retained by the nursery to produce the next generation of supply plants at the nursery.

Native dune grass (*Leymus mollis*) and large-headed sedge (*Carex macrocephala*) plants are also been grown at the nursery from seed collected from the field. For these two species, the nursery-grown plants themselves will be outplanted to the restoration site once they reach an appropriate size, as opposed to being used for direct seeding. Plugs of these two species take approximately two years to reach adequate maturity and should be available for outplanting by fall of 2017.

Silky beach pea (*Lathyrus littoralis*) seed have also been sown in the nursery to establish an 'increase garden'. This species requires a couple of year of growth between germination and flowering, so progeny will not be available to augment the silky beach pea population at the restoration site until shortly after completion of the current project (i.e. post spring 2018).

Planting Protocol

Seed and plants for augmentation or revegetation will be sown/outplanted at the restoration site according to the schedule and system outlined in Table A1. Seed and plants will be transported to the restoration site via boat, either in their containers (for plants) or in labelled envelopes (for seed). Phytosanitary precautions will be followed to ensure new invasive species are not introduced. Prior to arrival at the site, staff will thoroughly clean all clothing, shoes and equipment using designated cleaning kits. Containers and seed supplies from the nursery will be carefully inspected and any non-native and potentially invasive species removed.





Table A1. Planting schedule and method for each species.

Species	Season for Planting	Year	Type of Planting	Source	Methods
Contorted-pod evening-primrose	Fall (Oct-Nov)	2016 & 2017	Direct sowing of seed	Nursery-raised from donor seed collected from Sidney Spit	Clear bryophyte crust to expose bare sand prior to sowing seed. Scatter seed on prepared critical habitat adjacent to occupied habitat to augment population.
Native dune grass	Fall	2017	Outplanting plugs	Nursery-raised from donor seed collected from Sidney Spit	Use small hand trowel to insert plugs into soil/sand where revegetation is required. Ensure adequate spacing to prevent creation of dense cover.
Large-headed sedge	Fall	2017	Outplanting plugs	Nursery-raised from donor seed collected from Sidney Spit	Use small hand trowel to insert plugs into soil/sand where revegetation is required. Ensure adequate spacing to prevent creation of dense cover
Yellow sand-verbena	Fall	2017	Direct sowing of seed	Seed collected from Sidney Spit and redistributed	Collect seed from existing dense populations and distribute to areas that require revegetation using direct sowing.
Silky beach pea	Fall	Post 2018	Direct sowing of seed and outplanting of plants	Nursery-raised from donor seed collected from Cordova Spit	Sow seeds or insert plants into sand/soil using small hand trowel in suitable, cleared habitat in area further inland than existing population to reduce vulnerability of population to extirpation from storms or other extreme events.

Fencing and Signage

Strategic placement of fence posts, fencing and restoration signage will be planned in consultation with staff from Visitor Facilities and Assets. A total of approximately 350m of rope fencing between wooden posts and/or signage indicating closure of the area are planned for the Teardrop restoration site.

Fencing and/or signage will be placed along sections of the boundary where visitors are most likely to attempt to enter and where habitat is most sensitive to damage. For example, highly accessible areas that are also occupied by species at risk will be prioritized. Figure X shows possible locations for fencing and signage at the restoration site.

In addition to fencing and signage installed at the restoration site, up to 50m of split rail fencing or other barriers will be considered near the Day Use area to better protect adjacent common nighthawk nesting habitat. Trail re-routing to improve access to the beach without traversing sensitive habitat will also be implemented at the day use area in consultation with staff from the Visitor Experience and Visitor Facilities and Assets sections.

A subset of closure signage and/or fencing will be installed at the restoration site by May 2017, prior to the peak visitor season. The remainder of the closure signage and/or fencing will be installed by March 2018.





Interpretative Products

Interpretive signage will be developed with assistance of GINPR External Relations and Visitor Experience (ERVE) staff to better communicate messaging on Coastal Sand Ecosystems and associated species at risk. These will be installed at the day use area and/or restoration site prior to project completion (March 2018).

Project staff will also work with ERVE staff to communicate project activities, outcomes and messaging through other personal and non-personal media, including presentations, interpretive programming, social media posts and articles. This is outlined in more detail in Section 2.5, Communications and Outreach.

Monitoring

Effective monitoring will be conducted to track response of vegetation and species at risk to restoration efforts. Vegetation monitoring will be conducted in permanent sampling plots situated throughout the restoration site in the spring/summer of 2017 and again in the spring/summer of 2018. Baseline data have already been gathered from these plots in 2016, as part of the 'Coastal Sand Ecosystem Vegetation' measure within GINPR's Ecological Integrity Condition Monitoring Program. The monitoring protocol for this measure (Lawn 2016) includes assessment of cover of trees/shrubs and bare sand, two structural components for which targets have been established for the restoration project (see section 2.1.3). Consequently, applying this protocol during follow-up monitoring at the site will ensure collection of data required for reporting on progress towards targets in Parks Canada's Information Centre on Ecosystems (ICE). Specifically, it will facilitate reporting on ICE project measures for 'CSE Vegetation Structure (CoRe)' (target = <5% cover of trees/shrubs) and 'Habitat Improvement for SAR (CoRe)' (target = >15% cover of bare sand). Monitoring after the first year of project implementation, in addition to after project completion, will allow for adaptive management if necessary.

Monitoring of species at risk populations for contorted-pod evening-primrose, silky beach pea and common nighthawk will be conducted in spring/summer of both 2017 and 2018. For comparison, pre-restoration data have been collected in 2016 and previous years for these species. Monitoring will include counting number of individuals (for contorted-pod evening-primrose), clusters of shoots (for silky beach pea) and active nests (for common nighthawk), as well as mapping locations of occupancy. Regular monitoring will facilitate early detection of any impacts to these populations (positive or negative) and allow for adaptive management if necessary.

Effort, including number of person hours used and biovolume removed for each target invasive species within each target management area, will also be monitored. This will facilitate accurate recording of resource invested and revision of removal rates and time estimates to improve planning at this and other similar restoration sites in the future.

Finally, during revegetation and augmentation efforts, number of seeds sown or plugs planted will be recorded and locations mapped. Follow-up monitoring at these locations will be used to track success of the augmentation or revegetation efforts.

