July 12, 2016

Powell River Regional District
#202-4675 Marine Avenue
Powell River, B.C.
V8A 2L2

Attn: Mike Wall, Manager of Community Services

Subject: Intertidal Assessment for an Existing Barge Ramp
Savary Island, B.C.

Dear Mr. Wall:

The following document details the results of an intertidal assessment conducted at an existing barge ramp location on Savary Island, B.C. (Figure 1). This assessment was conducted by M.C. Wright and Associates Ltd. on May 12, 2016, and is intended to provide supplemental information relevant to the Powell River Regional District's (PRRD's) barge management plan. The objectives of this assessment were as follows:

- Evaluate the current impacts and / or potential threats to the marine environment from operation of the existing barge ramp;
- Based on these impacts and / or threats, provide environmental recommendations to be incorporated into an operational management plan; and
- Evaluate alternative barge ramp locations and provide advice relevant to their suitability as a barge ramp location.

Background

Savary Island is located approximately 14km northwest of Powell River, B.C. (Figure 1). The island is approximately 8.0km long and 0.5km wide, and is almost entirely private property with minimal crown land consisting of road allowances, coastal strips, and small lots throughout the private lands. The population grows from approximately 70 permanent residents in the winter to upwards of 3,000 residents during the summer months (Hay & Company Consultants, 2009). Access to Savary Island is limited to private boat, water taxi, or barge. Facilities servicing access on and off the island include a government wharf and a barge ramp (Figure 1).

The Savary Island barge ramp has been operational for decades, and consists of a designated and unsurfaced section of the beach where barges are permitted to load and off-load equipment (including vehicles) (Appendix 1). PRRD is currently in the process of

renewing its foreshore tenure with the Ministry of Forests, Lands, and Natural Resource Operations (MoFLNRO) for this facility. As part of the renewal process, the PRRD is required to provide a barge management plan, which is to include recommendations to mitigate potential impacts to fish and fish habitat. This assessment is intended to provide the framework for these recommendations.

Methods

Assessment of the existing barge ramp consisted of an intertidal visual assessment conducted by a Registered Professional Biologist (R.P.Bio). The assessment was timed to coincide with an off-load operation and a 2.1m low tide where representative photographs of the barge ramp and adjacent habitats were collected (Appendix 1, photos 1 - 18). The barge ramp location was georeferenced with a Trimble GeoXH differential GPS unit; data was post-processed and mapped in ArcGIS upon return from the field.

Alternative locations (Mermaid Beach, Indian Point, Sunset Beach, and Duck Bay) were also assessed as potential locations to re-locate the barge ramp, should the current ramp be determined to be causing significant impacts to fish and fish habitat. These locations were also assessed visually by an R.P.Bio and evidenced via representative photographs (Appendix 1, photos 23 - 44).

Existing Barge Ramp: Physical and Biological Description

The existing barge ramp location was situated along the northeastern shoreline of Savary Island, along the seaward side of Malaspina Promenade (Figure 1). The ramp surface consisted of a moderately sloped cobble and gravel beach within the upper and middle intertidal zones, which transitioned to sand within the lower intertidal zones (Appendix 1, photos 1 – 4 and photos 12 - 18). Based on bathymetric data collected by Accurate Location Surveys, barge ramp gradients ranged between -12% and -45%. Lesser gradients were observed throughout the majority of the intertidal zone (i.e. between 12% and 14%) and steeper gradients were observed in the upper subtidal zone (i.e. between -18% and -45%) (Appendix 2).

Low biological productivity levels were observed both within the footprint of the barge ramp and in adjacent intertidal habitats with little to no encrusting or mobile organisms observed (Appendix 1, photos 1 – 4 and photos 12 - 18), with the exception of sea lettuce (*Ulva fenestra*) observed within the lower intertidal zone. A subtidal marine survey of the site conducted in 2006 identified biological life to be sparse in the vicinity of the ramp, likely due to the sandy substrates and relatively strong currents and wave action in the area (Hay & Company Consultants, 2006). A recent high tide debris line

consisting of coarse woody debris, which appeared to have originated from a log handling facility, was observed in the upper intertidal zone (Appendix 1, photo 12).

The off-load of one van and one small truck was observed during the intertidal assessment of the barge ramp at a tide height of approximately 2.3m (chart datum) (Appendix 1, photos 5 - 11), where vehicles were required to drive approximately 20m up the beach to access the road.

While propeller wash occurred during the barge landing, no major sedimentation issues were observed that indicated significant scouring was occurring during operations. A post-field analysis of the bathymetry of the barge ramp identified gradients steep enough to prevent significant sedimentation during lower tide barge landings (Figure 1 and Appendix 2).

Note that the eastern half of Savary Island has been classified by Fisheries and Oceans Canada as an important herring zone (http://pacgis01.dfo-mpo.gc.ca/Mapster30/#/SilverMapster), and operations will need to be made aware of special considerations should herring and / or herring spawn (typically between the months of February and April) be observed in the area.

Alternative Barge Ramp Locations

The alternative barge ramp locations (Mermaid Beach, Indian Point, Sunset Beach, and Duck Bay) were assessed for physical and biological suitability (Figure 1). All four of these locations were located within lower gradient and higher productivity zones (Appendix 1, photos 23 - 44), and in most cases, would require significant infrastructure (i.e. new roads, longer intertidal access ramps, and possible dredging) resulting in new impacts to fish and fish habitat. All four of these locations were identified as unsuitable based on site characteristics, productivity levels, and the introduction of new impacts to fish and fish habitat.

Discussion

In general, barge ramps pose little risk to the environment in comparison to other coastal facilities (i.e. log dumps, marinas, etc.) (M.C. Wright and Associates, in-field observations). Based on the evaluation of the existing barge ramp at Savary Island and the alternative barge ramp locations, the existing facility is the preferred location for operations. This facility has been in operation for decades and habitat both within the existing footprint and in the adjacent, natural habitat demonstrated the lowest productivity levels in comparison to the only potential alternative locations.

While no significant environmental impacts were observed during the May 2016 assessment (i.e. sedimentation and / or destruction of habitat), the operation of vehicles and machinery in the intertidal zone does present the risk of fuel spills in the

marine environment. Additional risks observed included vehicles becoming immobilized in loose beach material, which increases the exposure of marine habitats to the introduction of deleterious substances (i.e. fuel, oil, etc.).

Recommended Mitigative Measures

In order to reduce the exposure of the marine environment to potential fuel and other deleterious substances spills, a minimum operating tide of +1.0m (chart datum) is recommended for this facility. This will minimize the distance of the beach vehicles will be required to travel across to access the public road on Savary Island (Malaspina Promenade), and thereby reduce the exposure of the intertidal zone to vehicle traffic.

In the event of a fuel and / or other deleterious substance spill, all barges and other landing craft utilizing the barge ramp must be equipped with adequate spill kits, with enough oil boom on board to completely surround the vessel. Additional spill supplies must be stored on shore at the entrance to the barge ramp in a locked and water tight container.

If herring spawn is observed within the footprint of the barge ramp, operation of the ramp must be ceased until the eggs have hatched (typically around 21 days following the spawn event). Other foraging fish (i.e. surf smelt and pacific sand lance) may exist in the area year-round (http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/Fact-Sheet-21-Forage-Fish.pdf); should these be observed, care must be taken to avoid operating in close vicinity to these fish.

In order to address the issue of vehicles becoming immobilized in loose beach material and the overall usability of the site, the proponent may want to consider hardening the running surface of the ramp by pouring a concrete ramp. Based on the observed productivity levels and under the current Fisheries Act, this infrastructure will not result in serious harm to fish and fish habitat, and may improve overall conditions by reducing the time vehicles spend on the beach. Permanent infrastructure such as a concrete ramp will also allow for use of the ramp at all matching tides and prevent the constant disturbance of native beach materials.

The historical loss of marine riparian habitat along the northern shoreline of Savary Island through residential development has resulted in a net loss of dune grass (*Leymus mollis*) habitat (Appendix 1, photos 21 - 22). Should habitat offsetting be required for the construction of a concrete ramp, restoration of a small green space identified adjacent to the barge ramp could be considered (Appendix 1, photos 19 - 20). This space could be contoured to an elevation that would support *L. mollis* and then transplanted with shoots from adjacent areas in an effort to re-establish lost marine riparian habitat.

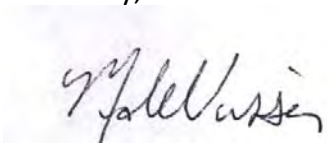
Conclusion and Recommendations:

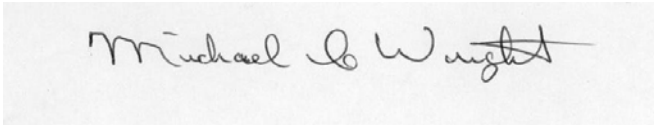
Based on the results of the May 2016 assessment, operation of the Savary Island barge ramp is not negatively impacting fish and fish habitat. However, several operational mitigative measures must be incorporated into the barge management plan to ensure the facility is used appropriately and in a manner that mitigates the environmental risk to the surrounding environment. These measures include:

1. Operating the ramp at a tide height of ≥1.0m (chart datum);
2. Requiring all barges and / or landing crafts using the ramp to be equipped with appropriate spill kits, including enough oil boom to surround the vessel should a spill occur;
3. Storing an additional spill kit in a locked and watertight container, at the foreshore of the barge ramp; and
4. Ceasing operations if herring, herring spawn, and / or other foraging fish (i.e. surf smelt) are observed. If herring spawn is noted, operations must be ceased until the eggs have hatched (typically 21 days after spawning).

Should you have any questions or require further information with respect to this assessment, please do not hesitate to contact the undersigned at (250) 753-1055.

Sincerely,





Miranda deVisser, B.Sc., A.D.GIS, R.P.Bio
miranda.devisser@mcwrightonline.com

Michael Wright, B.Sc., R.P.Bio
mike.wright@mcwrightonline.com

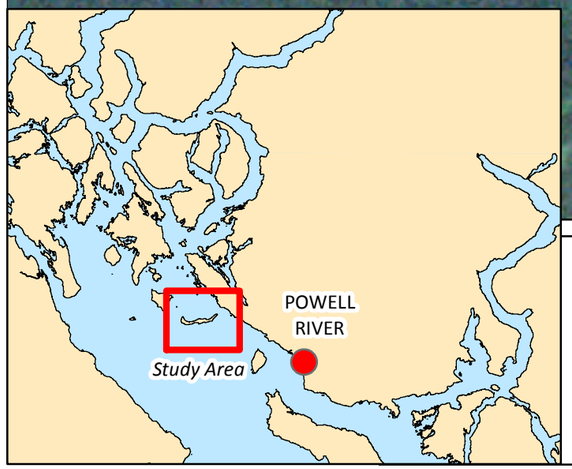
M.C. Wright and Associates Ltd.
2231 Neil Drive
Nanaimo, B.C. V9R 6T5
(250) 753-1055 or (250) 591-1056
www.mcwrightonline.com

REFERENCES

Hay & Company Consultants. (2006). *Savary Island Barge Landing Site Study.* Vancouver: Unpublished report for the Powell River Regional District.

Hay & Company Consultants. (2009). *Savary Island Dock - Dredging Feasibility Report.* Vancouver: Unpublished report prepared for the Powell River Regional District.

Personal Communications:
Wall, Mike. May 2016. Powell River Regional District. Powell River, B.C.



M. C. Wright and Associates Ltd.
Biological Consultants

NCompas
Software Development

0 5 10 20 30 40 Meters

Scale: 1:1,000

Legend

- Barge Ramp
- Alternative Barge Ramp Location
- Bathymetry (2m)

N W E S

Survey Datum:
NAD 83, UTM Z10N

Proposed barge ramp location recorded with a TRIMBLE GeoXH dGPS. Bathymetry provided by Accurate Location Surveys.

Savary Island
Existing Barge Ramp

Figure 1: Location Map

Prepared By:
M.C. Wright and Associates Ltd.
July 5, 2016

Prepared For:
Mike Wall
Powell River Regional District

Appendix 1:
NCompas Media Photo Report

Savary Island Government Wharf and Barge Ramp Photos

Project: Savary Island Government Wharf and Barge Ramp
Site: Barge Ramp
Phase Type: Assessment 2016

Photo: 1
Looking up the barge ramp from the 3m (chart datum) tide mark.
(Date Taken: May-12-16 12:13:46 PM, Latitude: 49°56'58.06'', Longitude: -124°46'15.18'')

Photo: 2
Depressions on the beach from a barge landing earlier this morning.
(Date Taken: May-12-16 12:14:25 PM, Latitude: 49°56'58.18'', Longitude: -124°46'14.97'')

Photo: 3
Beach and typical habitat adjacent to the barge ramp (to the east).
(Date Taken: May-12-16 12:14:56 PM, Latitude: 49°56'58.21'', Longitude: -124°46'14.80'')

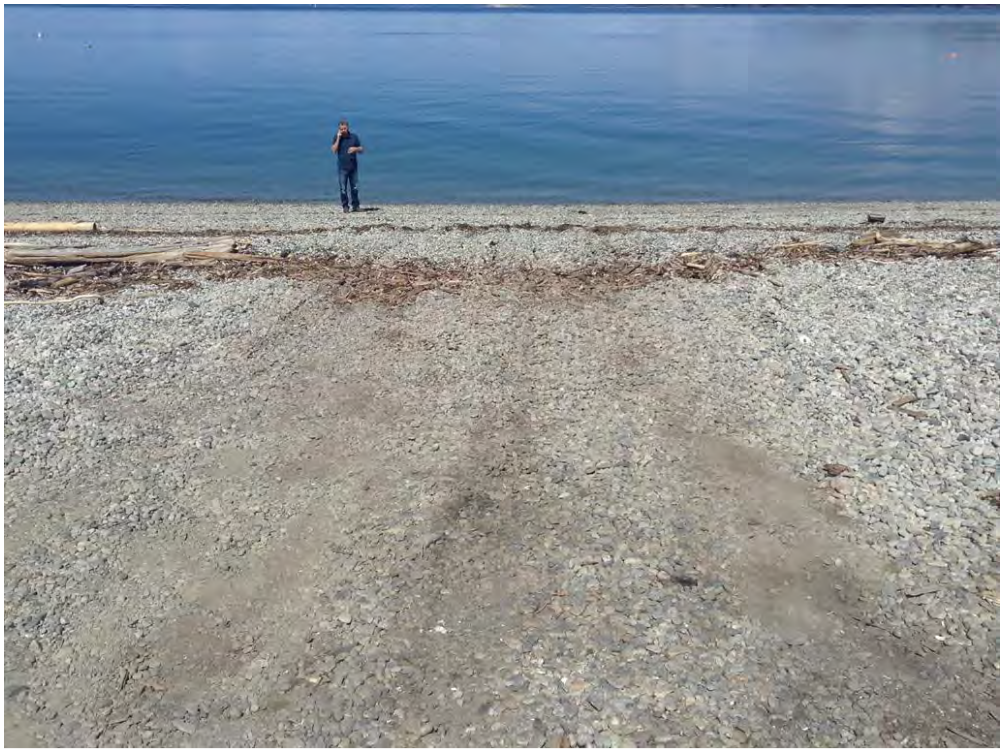


Photo: 4
Looking down the barge ramp from the high water mark.
(Date Taken: May-12-16 12:15:46 PM, Latitude: 49°56'57.74'', Longitude: -124°46'14.43'')

Photo: 5
Barge landing at the ramp.
(Date Taken: May-12-16 12:17:27 PM, Latitude: 49°56'57.60'', Longitude: -124°46'15.85'')

Photo: 6
Barge landing at the ramp.
(Date Taken: May-12-16 12:18:02 PM, Latitude: 49°56'57.64'', Longitude: -124°46'15.99'')

Photo: 7
Barge landing at the ramp.
(Date Taken: May-12-16 12:18:21 PM, Latitude: 49°56'57.63'', Longitude: -124°46'15.90'')

Photo: 8
Vehicle off-loading at the ramp.
(Date Taken: May-12-16 12:18:39 PM, Latitude: 49°56'57.70'', Longitude: -124°46'15.84'')

Photo: 9
Vehicle off-loading at the ramp. Note vehicle became stuck in loose gravel.
(Date Taken: May-12-16 12:19:30 PM, Latitude: 49°56'57.52'', Longitude: -124°46'15.29'')

Photo: 10
Vehicle off-loading at barge ramp. Note vehicle became stuck in loose gravel.
(Date Taken: May-12-16 12:22:01 PM, Latitude: 49°56'57.61'', Longitude: -124°46'15.29'')

Photo: 11
Vehicle off-loading at the ramp.
(Date Taken: May-12-16 12:23:35 PM, Latitude: 49°56'57.61'', Longitude: -124°46'15.35'')

Photo: 12
Existing barge ramp at a 2.25m tide (chart datum).
(Date Taken: May-12-16 2:51:34 PM, Latitude: 49°56'57.75'', Longitude: -124°46'14.20'')

Photo: 13
Existing barge ramp at a 2.25m tide (chart datum).
(Date Taken: May-12-16 2:52:38 PM, Latitude: 49°56'58.32'', Longitude: -124°46'15.15'')

Photo: 14
Existing barge ramp at a 2.25m tide (chart datum).
(Date Taken: May-12-16 2:53:02 PM, Latitude: 49°56'58.44'', Longitude: -124°46'15.18'')

Photo: 15
Beach and typical habitat adjacent to the barge ramp.
(Date Taken: May-12-16 2:53:32 PM, Latitude: 49°56'58.19'', Longitude: -124°46'14.88'')

Photo: 16
Beach and typical habitat adjacent to the barge ramp.
(Date Taken: May-12-16 2:54:10 PM, Latitude: 49°56'57.87'', Longitude: -124°46'14.76'')

Photo: 17
Barge ramp from the water at a 2.2m tide (chart datum).
(Date Taken: May-12-16 3:09:18 PM, Latitude: 49°56'59.71'', Longitude: -124°46'16.81'')

Photo: 18
Barge ramp from the water at a 2.2m tide (chart datum).
(Date Taken: May-12-16 3:09:45 PM, Latitude: 49°56'58.86'', Longitude: -124°46'15.22'')

Photo: 19
Unused green space located southeast of the barge ramp. Note that this site could be explored for future restoration initiatives (i.e. the creation of additional dunegrass habitat).
(Date Taken: May-12-16 12:43:49 PM, Latitude: 49°56'57.21'', Longitude: -124°46'13.97'')

Photo: 20
Unused green space located southeast of the barge ramp. Note that this site could be explored for future restoration initiatives (i.e. the creation of additional dunegrass habitat).
(Date Taken: May-12-16 2:54:38 PM, Latitude: 49°56'57.54'', Longitude: -124°46'13.93'')

Photo: 21
Example of loss of marine foreshore through residential development.
(Date Taken: May-12-16 12:48:54 PM, Latitude: 49°56'57.42'', Longitude: -124°46'15.76'')

Photo: 22
Example of loss of marine foreshore through residential development.
(Date Taken: May-12-16 12:54:54 PM, Latitude: 49°56'53.42'', Longitude: -124°46'22.24'')

Photo: 23
Mermaid beach, location proposed as a potential alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:24:18 PM, Latitude: 49°56'23.51'', Longitude: -124°49'57.03'')

Photo: 24
Mermaid beach, location proposed as a potential alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:27:24 PM, Latitude: 49°56'24.72'', Longitude: -124°49'54.25'')

Photo: 25
Seagrass observed at the Mermaid Beach alternative barge ramp location, a location proposed by some Savary Island residents.
(Date Taken: May-12-16 1:28:08 PM, Latitude: 49°56'25.44'', Longitude: -124°49'54.23'')

Photo: 26
Mermaid beach, location proposed as a potential alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:28:49 PM, Latitude: 49°56'25.43'', Longitude: -124°49'53.96'')

Photo: 27
Mermaid beach, location proposed as a potential alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:29:19 PM, Latitude: 49°56'25.18'', Longitude: -124°49'53.75'')

Photo: 28
Mermaid beach, location proposed as a potential alternative barge ramp location by some Savary Island residents. Note access to this site would require difficult road building down unstable slope with existing tension cracks, with additional road building required within the upper intertidal zone to access depths suitable for landing a barge.
(Date Taken: May-12-16 1:29:53 PM, Latitude: 49°56'24.01'', Longitude: -124°49'53.82'')

Photo: 29
Mermaid beach, location proposed as a potential alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:31:27 PM, Latitude: 49°56'23.96'', Longitude: -124°49'54.76'')

Photo: 30
Access point down the bank for the Mermaid Beach barge ramp location.
(Date Taken: May-12-16 1:32:20 PM, Latitude: 49°56'24.05'', Longitude: -124°49'55.22'')

Photo: 31
Indian Point boat ramp, proposed as an alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:49:58 PM, Latitude: 49°56'52.69'', Longitude: -124°51'34.53'')

Photo: 32
Indian Point boat ramp, proposed as an alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:51:34 PM, Latitude: 49°56'52.66'', Longitude: -124°51'33.67'')

Photo: 33
Indian Point boat ramp, proposed as an alternative barge ramp location by some Savary Island residents. This site would require dredging, and additional survey work (i.e. intertidal clam assessment) would be required prior to applying for DFO approval.
(Date Taken: May-12-16 1:52:38 PM, Latitude: 49°56'53.07'', Longitude: -124°51'33.02'')

Photo: 34
Indian Point boat ramp, proposed as an alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:53:07 PM, Latitude: 49°56'53.31'', Longitude: -124°51'32.30'')

Photo: 35
Indian Point boat ramp, proposed as an alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:53:48 PM, Latitude: 49°56'53.33'', Longitude: -124°51'32.04'')

Photo: 36
Indian Point boat ramp, proposed as an alternative barge ramp location by some Savary Island residents.
(Date Taken: May-12-16 1:56:10 PM, Latitude: 49°56'53.44'', Longitude: -124°51'32.25'')

Photo: 37
Corner of sunset trail and Johnson's Lane, and location proposed as an alterative barge ramp site by some Savary Island residents. Note that shallow depths exist between Savary Island and Hernando Island and are not conducive to a barge ramp facility.
(Date Taken: May-12-16 2:05:18 PM, Latitude: 49°56'43.98'', Longitude: -124°51'51.02'')

Photo: 38
Corner of sunset trail and Johnson's Lane, and location proposed as an alterative barge ramp site by some Savary Island residents. Note that shallow depths exist between Savary Island and Hernando Island and are not conducive to a barge ramp facility.
(Date Taken: May-12-16 2:05:36 PM, Latitude: 49°56'43.88'', Longitude: -124°51'50.97'')

Photo: 39
Corner of sunset trail and Johnson's Lane, and location proposed as an alterative barge ramp site by some Savary Island residents. Note that shallow depths exist between Savary Island and Hernando Island and are not conducive to a barge ramp facility.
(Date Taken: May-12-16 2:06:47 PM, Latitude: 49°56'43.84'', Longitude: -124°51'51.06'')

Photo: 40
Corner of sunset trail and Johnson's Lane, and location proposed as an alterative barge ramp site by some Savary Island residents. Note that shallow depths exist between Savary Island and Hernando Island and are not conducive to a barge ramp facility.
(Date Taken: May-12-16 2:07:11 PM, Latitude: 49°56'43.93'', Longitude: -124°51'50.38'')

Photo: 41
Duck Bay; alternative barge ramp location proposed by some Savary Island residents.
(Date Taken: May-12-16 2:32:17 PM, Latitude: 49°56'12.78'', Longitude: -124°47'56.65'')

Photo: 42
Duck Bay; alternative barge ramp location proposed by some Savary Island residents.
(Date Taken: May-12-16 2:32:39 PM, Latitude: 49°56'12.84'', Longitude: -124°47'56.51'')

Photo: 43
Duck Bay; alternative barge ramp location proposed by some Savary Island residents.
(Date Taken: May-12-16 2:32:57 PM, Latitude: 49°56'12.84'', Longitude: -124°47'56.51'')

Photo: 44
Duck Bay; alternative barge ramp location proposed by some Savary Island residents.
(Date Taken: May-12-16 2:33:18 PM, Latitude: 49°56'12.89'', Longitude: -124°47'56.48'')

Appendix 2:
BARGE RAMP CENTERLINE PROFILE

Savary Island Barge Ramp:
Centerline Profile

Legend	
Barge Ramp Centerline	Minimum Operating Depth
High Water Mark	Low Water Mark