Ecological Inventory of Melda's Marsh

Seal Bay Park, Comox Valley Regional District

2012

Prepared By

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ACKNOWLEDGMENTS

Funding for Wendy Kotilla and the youth was provided by Ministry of Children and Family Development. Funding for Ian Moul was provided by the Comox Valley Regional District, Community Services Branch.

Melda's Marsh was named in memory of Melda Buchanan who died in 2004. Melda contributed countless hours in her efforts to protect this area and in building trails to allow the public to experience the natural beauty of the marsh and surrounding forest.

We very much appreciate Art Martel and Maj Birch for sharing their knowledge of the birds found in the forest and wetlands of Seal Bay Nature Park and Melda's Marsh.

I INTRODUCTION

I-A Background

This report documents information collected during an ecological inventory of Melda's Marsh in Seal Bay Nature Park with the Youth and Ecological Restoration Program (YER) on the 23rd 24th and 25th of July 2012. YER provides work experience, training and support for youth under the age of nineteen (YER 2012). Through studying local watersheds with community members youth gain a sense of worth, belonging and place. The focus of YER, Phase I is to work one on one with youth conducting ecological restoration activities with a variety of environmental organizations; YER, Phase II has two youth and two adults concentrating on a specific project to further develop teamwork, research techniques and communication skills.

The four ecological inventory contributors were YER coordinator, Wendy Kotilla; Registered Professional Biologist, Ian Moul; and two youth participants, Trisstin Oddy and Tyler Maltais (Photograph 1). This is a citizen science project with a goal of using scientific methods in ways that are interesting to the youth, helping them gain a more in-depth understanding of what makes up a functioning ecosystem, while documenting meaningful information for the Regional District. The first three days of this program included habitat assessment, on days four and five the focus is on the preparation and presentation of a public tour of the study site, by the youth.

Photograph 1:
Youth and Environmental Restoration Team for the Ecological Inventory of Melda's Marsh, 2012
(from left to right) Ian Moul, Trisstin Oddy, Wendy Kotilla and Tyler Maltais

I-B Purpose of Study

The purpose of this study is twofold:

1) To further the understanding of natural habitat at this study site as a baseline living laboratory for Melda's Marsh.
2) To develop a methodology for an educational experience that is scientifically sound yet is interesting, hands on and understandable by youth that may or may not have experience working, or even spending time in the natural world.

I-C Location

Map 1: Melda's Marsh is located within Seal Bay Nature Park, in Electoral Area B of the Comox Valley Regional District. The overall park area is 652ha (1,610 acres) primarily made up of mature second growth forest. The area of Melda's Marsh is 8.9ha. The two study plots were positioned at each of the public viewing platforms

II METHODS

Wetland conservation methods were discussed based on the Wetlandkeepers Handbook (Southam and Curran 1996) and the Wetlands of British Columbia (MacKenzie and Moran 2004). The forested ecosystem inventory method used in study plots at the transition between the wetland and forest was an abbreviated reconnaissance form of the Biogeoclimatic Ecosystem Classification described in MOELP (1998) and Green and Klinka (1994). As the wetland and nearby forest contains delicate vegetation it was decided to work as much as possible along existing trails. Two study plots were established using the viewing platforms. A 10m wide by 40m deep plot was measured and marked with temporary flagging tape starting at each of the viewing platforms, and then moving inland with the trail running approximately along the centre. The study plots were divided into four 10m x 10m quadrants for inventory of the plant community transition from the open wetland into the forest. An additional 10m x 10m study area was projected into the open marsh from the viewing platforms.

The position of the trail and the wet boundary of the marsh were recorded on graph paper maps. All trees were identified by species, plotted on the graph paper and measured for diameter at breast height (Appendix 1). Plant species within each quadrant were inventoried and scored based on relative abundance in each of the forest layers of: Moss/Lichen; Herb; Shrub; and Tree. We assigned quantities of vegetation based on looking at the quadrants and the various plants and worked together to determine relative percentages of vegetation through mutual discussion that resulted in a general consensus of what we were seeing. Birds were not systematically inventoried, though incidental observations were recorded.

The use and function of global positioning (GPS) devices and laser rangefinders was demonstrated but kept to a minimum. It was decided that hands on measuring by the youth was more engaging than the use of electronic instruments. To avoid trigonometry and still teach the use of handheld compasses we made measurements based on magnetic north. Fixed points were measured with a Trimble GeoXH GPS and differentially corrected using the CANSEL base station in Courtenay.

Following the field exercises, the collected data was compiled and digital maps were produced by Ian Moul. The sketch map of the trail route and water boundary was imported into ArcMap 10 and geo-referenced based on the known fixed points of each study plot.

III RESULTS and DISCUSSION

III-A Study Plot 1

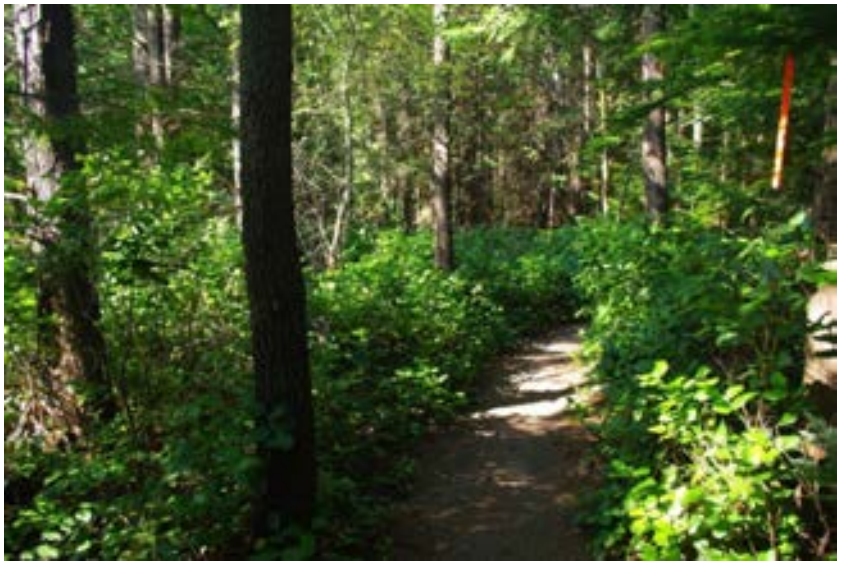
The centre line Study Plot 1 was measured from the fixed point at the north-east corner of the viewing platform railing. The centre line of the plot was established in a direct line with railing at a bearing of 241.5° Magnetic North. A tape was laid out and the plot was marked temporarily by flagged in 10m square grids (Map 2). Vegetation plots typically used to inventory plant communities are 400m^2. Plots may be of any convenient dimension but are often either a 20 x 20m square or an 11.3m radius circle established in what appears to be a homogeneous patch of forest. For this study we chose a long narrow plot of 10 x 40m (400m^2) of mainly terrestrial plants, plus an additional 10 x 10m square within the open wetland area. Our goal was to document the transition between the forest and the wetland. Working together we discussed the various components of the site and how they interrelate (Table IIIA 1).

Table IIIA 1: Site description for Study Plot 1

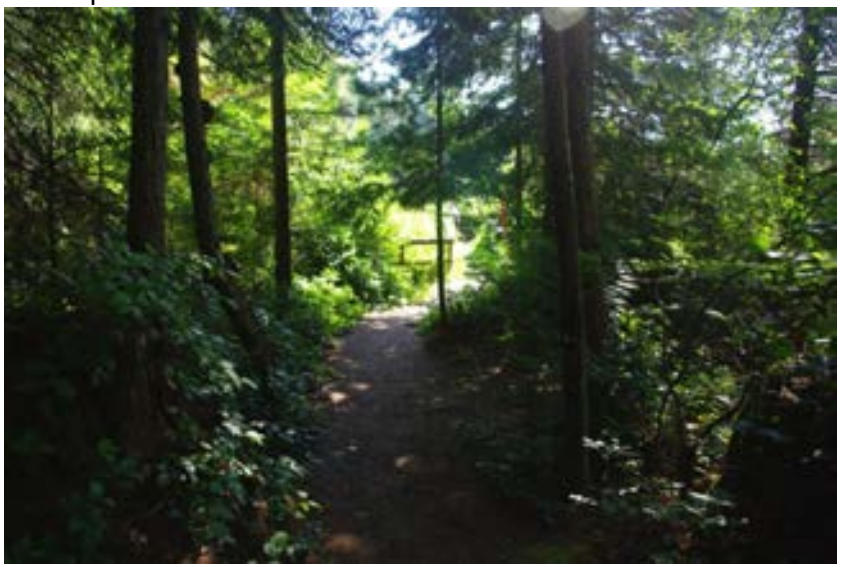
General Location: At the public viewing platform near the west edge of Melda's Marsh, Seal Bay Park				
Fixed point of study plot coordinates at the north-east corner of the viewing platform		UTM Zone: 10	Easting: 357626.01 Northing: 5551395.76	Horizontal precision: +/- 0.1m
Elevation: 68m above sea level		Slope: Flat - <1%		Aspect: Open towards the east
Moisture Regime: Water is received both from precipitation and from seepage. Water is removed slowly enough to keep the soil wet for most of the growing season				
Succession and Structural Stage: Young maturing forest of between 20 to 50 years. Self thinning where the forest canopy has begun to differentiate into distinct layers. The wetland has both open water and patches of dense vegetation so falls into the classification of a marsh.				
Substrate (%)	Organic Matter: 50	Rocks: 0	Decomposing wood: 20	
	Mineral Soil: 0	Bedrock: 0	Water: 30	

Photographs of Melda's Marsh and the nearby forest in association with Study Plot 1.

2) Melda's Marsh looking east from the public viewing platform



3) Vegetation Study Plot 1, looking west into the forest



4) Vegetation Study Plot 1, looking east towards the public viewing platform

Moving through each of the marked quadrants, from the open wetland into the forest, we considered the mix of plant species within various vegetation classes and how this changed in relation to light levels (Table IIIA 2).

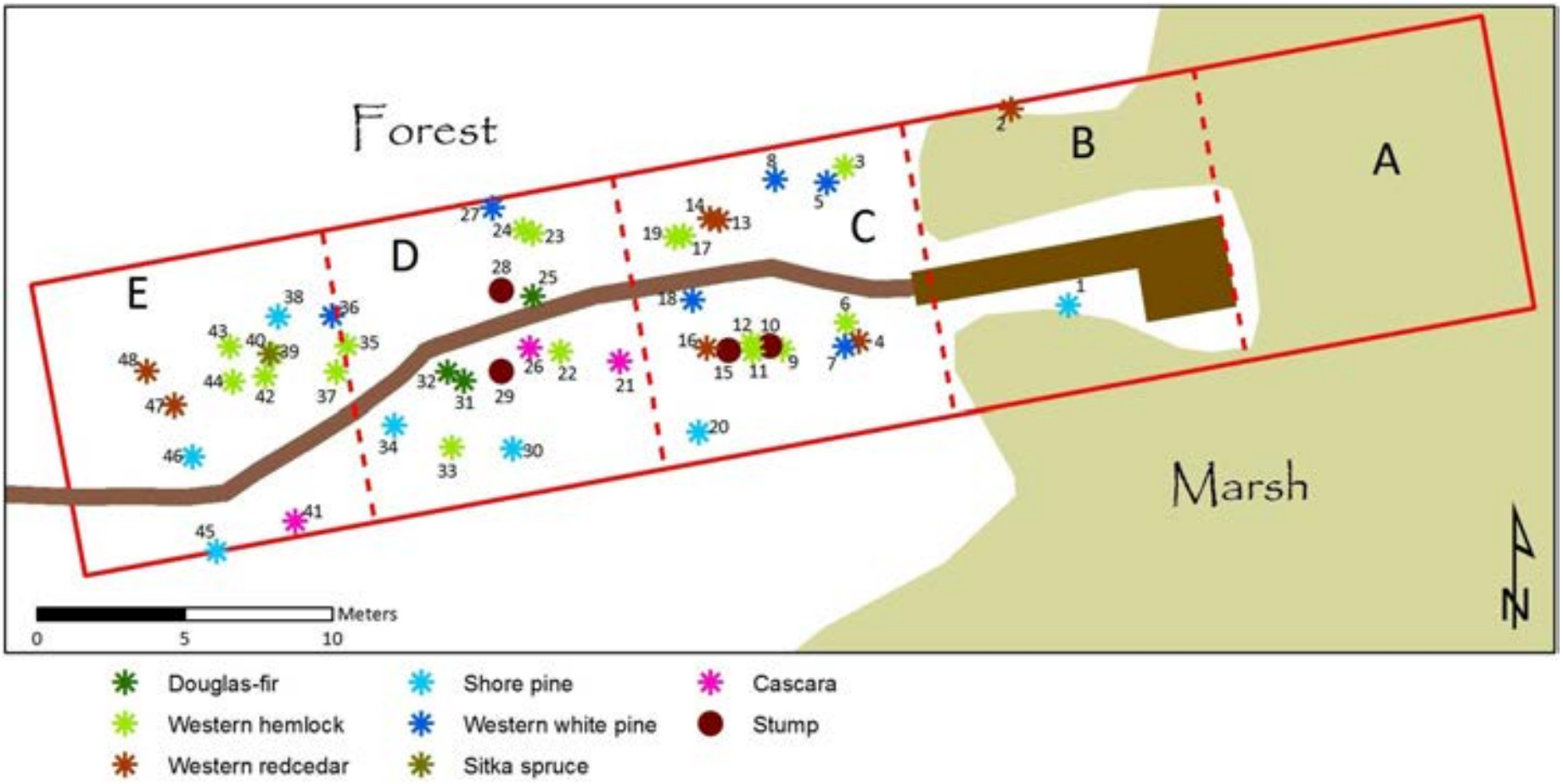
Table IIIA 2: Vegetation in Study Plot 1, % cover by Layer (the bare ground of the trail was not counted)

Quadrant	Tree	Shrub	Herb	Moss/Lichen	Bare ground	Open Water
A	0	15	45	0	0	40
B	0	35	15	0	0	50
C	10	85	Trace	Trace	5	0
D	10	70	Trace	<5	15	0
E	10	90	0	0	0	0

All trees were mapped based on the distance from the centre line tape (Map 2). Forty-four trees and four stumps were measured for diameter at breast height (DBH), or as high as possible if we were measuring a stump (Appendix 1). We had seven tree species in Study Plot 1 (Table IIIA 3), with western hemlock being the most common. The relatively small size of the trees compared with trees further into the nearby forest speaks of how over time wetlands will fill in and younger trees are found along the edges.

Table IIIA 3: Summary of Trees measured in Study Plot 1

Species	Number of trees	Average DBH (cm)	Range in DBH (cm)
Western hemlock	17	20.2	6.5 to 38.2
Western red cedar	7	17.9	7.0 to 32.2
Shore pine	7	26.7	5.6 to 46.0
White pine	6	19.1	8.2 to 39.0
Douglas-fir	3	17.0	10.7 to 21.6
Cascara	3	8.1	5.0 to 11.2
Sitka spruce	1	26.2	
Stumps from veteran trees	4	122.5	110.0 to 140.0



Map 2: Layout of Study Plot 1 showing the locations of the trail, the viewing platform, the edge of the marsh. Details on the individual trees may be found in Appendix 1.

An inventory of the shrub and herb layers helped us to understand the competition for light between the tree canopy and the forest floor.

Table 4: Inventory of shrub and herb layers in Study Plot 1

Quadrant	Species of shrubs	% coverage[1.]	Species of herbs	% coverage[1.]
A	Hardhack	15		
			Pondweed	20
			Lilies	15
			Rushes	10
B	Salmonberry	5	Rushes	5
	Hardhack	30	Sedges	5
	Salal	Trace	Grasses	5
			Bracken	Trace
C	Salal	75	Bracken	Trace
	Red huckleberry	5	Sedges	Trace
	Hardhack	5		
D	Salal	50	Ferns	Trace
	Red huckleberry	20	Trailing blackberry	Trace
	Cascara	Trace	Hardhack	Trace
E	Salal	90	Bracken	Trace
	Hardhack	Trace	Trailing blackberry	Trace

1. % coverage is based on the amounts presented in Table 2. Trace represents less than 5%

III-B Study Plot 2

The centre line Study Plot 2 was measured from the fixed point at the corner of the viewing platform at the top of the stairs (Map3). The centre line of the plot was established at a bearing of 173° Magnetic North. The study plot was marked and flagged using the same methods as in Study Plot 1. This site was dryer than Study Plot 1 and has more of the character of a fen than a marsh (Table IIIB-1). While there were no open areas of water at Study Plot 2, there were patches of saturated ground just into the wetland.

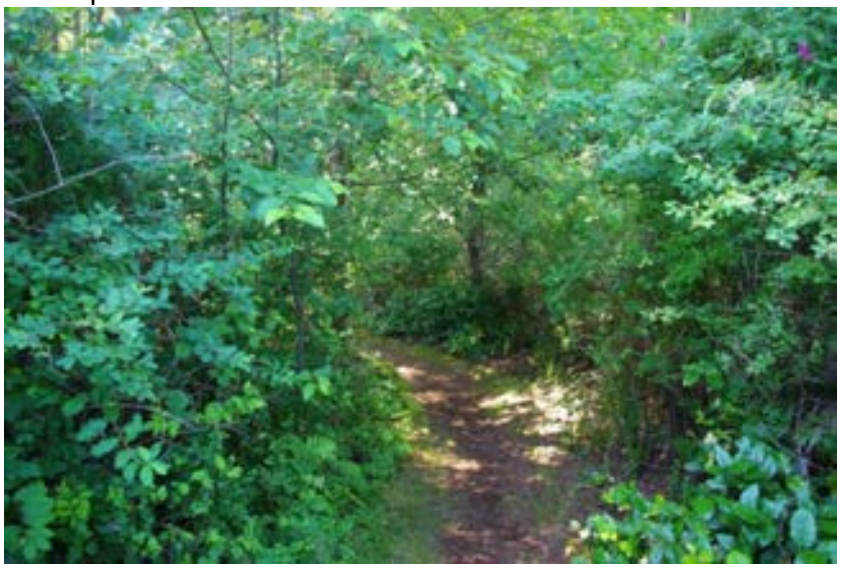
Table IIIB-1: Site description for Study Plot 2

General Location: At the public viewing platform near the south edge of Melda's Marsh, Seal Bay Park				
Fixed point of study plot coordinates at the north-east corner of the viewing platform		UTM Zone: 10	Easting: 357971.0 Northing: 5512989.8	Horizontal precision: +/- 0.5m
Elevation: 68m above sea level		Slope: Flat - <1%		Aspect: Open towards the north-east
Moisture Regime: Water is received both from precipitation and from seepage. Water is removed slowly enough to keep the soil wet for most of the growing season				
Succession and Structural Stage: Young maturing forest of between 30 to 60 years. Self thinning where the forest canopy has begun to differentiate into distinct layers. The lack of open water and patches of dense vegetation puts this site into the classification of a fen.				
Substrate (%)	Organic Matter: 80		Rocks: 0	Decomposing wood: 20
	Mineral Soil: 0		Bedrock: 0	Water: 0

Photographs of Melda's Marsh and the nearby forest in association with Study Plot 2.

5) Melda's Marsh looking east from the public viewing platform

6) Vegetation Study Plot 1, looking south-west into the forest



7) Vegetation Study Plot 1, looking north-east with the public viewing platform just around the corner

Looking at the vegetation classes as we moved into the forest we could see the overall effect of shade from the large canopy forest to the south (Table IIIB-2).

Table IIIB-2: Vegetation in Study Plot 2, % cover by Layer (the bare ground of the trail was not counted)

Quadrant	Tree	Shrub	Herb	Moss/Lichen	Bare ground	Open Water
A	0	95	5	0	0	0
B	5	90	5	Trace	0	0
C	5	90	5	Trace	0	0
D	10	85	5	Trace	0	0
E	10	50	30	10	Trace	0

Of the 21 trees measured the majority were Douglas-fir in the fifty year plus age range.

Table IIIB 3: Summary of Trees measured in Study Plot 2

Species	Number of trees	Average DBH (cm)	Range in DBH (cm)
Douglas-fir	9	31.4	7.4 to 82.8
Shore pine	3	57.2	43.1 to 66.5
Red alder	3	24.8	16.3 to 32.0
Western hemlock	2	20.8	18.4 to 23.0
English Holly	2	0.3	0.3 to 0.3
Grand fir	1	74.0	
Crab-apple	1	14.1	

Map 3: Layout of Study Plot 2 showing the locations of the trail, the viewing platform, the edge of the marsh. Details on the individual trees may be found in Appendix 2

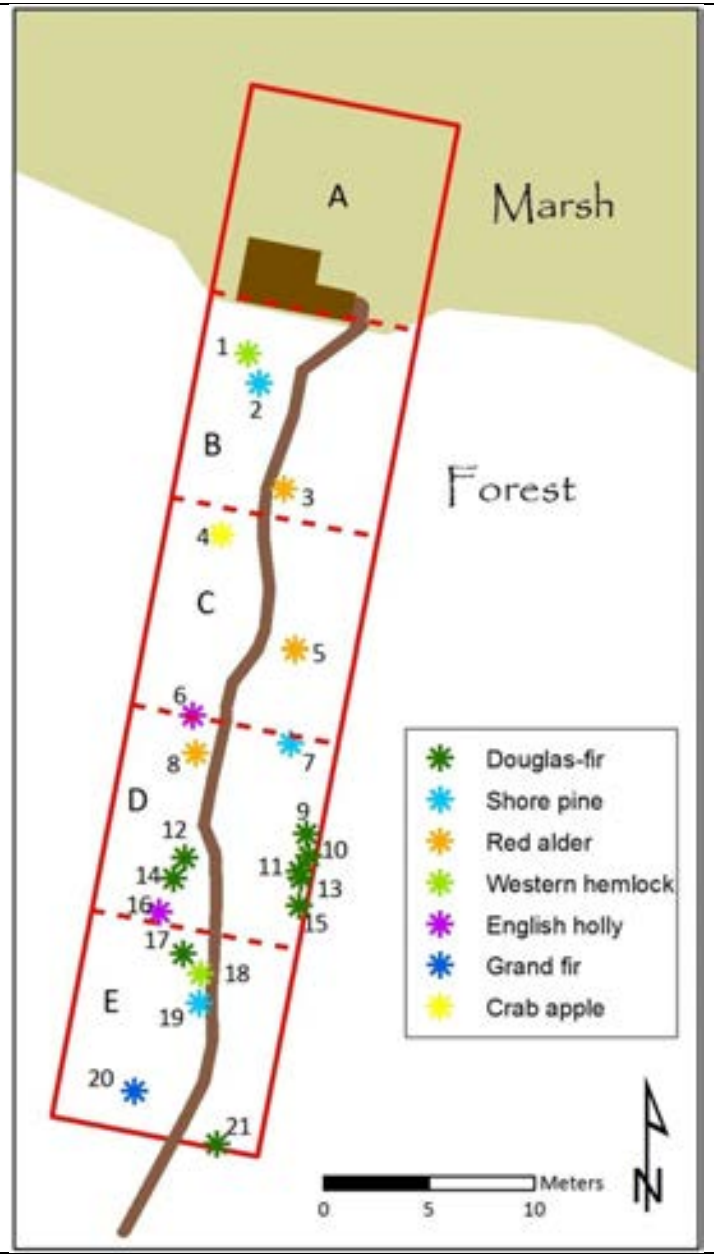


Table IIIB 4: Inventory of shrub and herb layers in Study Plot 2				
Quadrant	**Species of shrubs**	**% coverage[1.]**	**Species of herbs**	**% coverage[1.]**
A	Hardhack	95	Sedges	5
	Cascara	Trace		
	Willow	Trace		
B	Hardhack	75	Ladyfern	Trace
	Red huckleberry	15	Swordfern	Trace
	Red alder	Trace	Deerfern	Trace
	Salmonberry	Trace	Foamflower	Trace
	Salal	Trace	Sedges	Trace
C	Salal	40	Swordfern	Trace
	Salmonberry	25	Deerfern	Trace
	Hardhack	20	Sedges	Trace
	English holly	5	Himalayan blackberry	Trace
	Red huckleberry	Trace		
	Pacific crab-apple	Trace		
D	Salal	50	Swordfern	Trace
	Salmonberry	30	Bracken	Trace
	Red huckleberry	5	Trailing blackberry	Trace
	Oceanspray	Trace	Vanilla leaf	Trace
	English holly	Trace		
E	Salal	20	Oregon grape	15
	Red huckleberry	20	Vanilla leaf	5
	Oceanspray	5	Trailing blackberry	5
	English Holly	5	Swordfern, Bracken	Trace
	Bald hip rose	Trace	Foamflower, Cleavers	Trace

1. % coverage is based on the amounts presented in Table 2. Trace represents less than 5%

III-C Observations of Birds

The timing of this study during the week of July 23rd was past the breeding season for most birds in the Comox Valley and we found fewer birds than we might have in mid spring. In total, fourteen species of birds were observed (Table IIIC-1). Most dramatic was near Study Plot One, where for two days we observed a Sharp-shinned Hawk and a Merlin engaged in defining the boundary of their territories. Also near Study Plot One we observed a female Mallard and eleven chicks. On the second day of the study we were very fortunate to have Art Martel and Maj Birch join us to discuss birds, bird habitat, and to point out the sounds and behaviours of illusive species both in both the forest and the marsh. The Barred Owl, Pacific Wren, Golden-crowned Kinglet, Western Tanager and Song Sparrow were identified by their calls and were not actually seen.

Table IIIC 1: Birds observed in Malda's Marsh and the Forest of Seal Bay Park

	Habitat where the bird was observed	
Species	**Forest**	**Marsh**
Mallard		X
Bald Eagle		X
Sharp-shinned Hawk		X
Merlin		X
Barred Owl	X	
Pacific-slope Flycatcher		X
Steller's Jay	X	
Common Raven	X	X
Pacific Wren	X	
Golden-crowned Kinglet	X	
Swainson's Thrush	X	
Western Tanager	X	
Song Sparrow	X	
Red Crossbill	X	

III-C The Importance of Wetlands

The public tour presented by the youth participants of this program drew 29 very interested local residents. That this number of people would show up is quick confirmation on the importance of this park in the minds of local residents. With growing public awareness of the natural world we have collectively changed our view of wetlands from places to be drained and turned into other uses to places of natural beauty and important environmental function.

In the book Wetlands of British Columbia (MacKenzie and Moran 2004), wetlands are defined as: *Areas where soils are water saturated for a sufficient length of time such that excess water and resulting low soil oxygen levels are principle determinants of soil development*. The life cycle of wetlands typically begins with a shallow water lake in a water catchment basin that over time will gradually fill with decaying vegetation to become either a raised bog or a forest. Melda's Marsh is particularly interesting in that we can see various stages in the evolution of wetlands. Study Plot 1 is at a location that would be classed as a "marsh" with both open water and emergent vegetation supported by nutrient rich soils (Southam and Curran 1996). Study Plot 2 is an example of a later stage wetland called a "fen", with little or no open water, slightly acidic soils, and a thick cover of sedges and shrubs. At the north-east edge, near a weir and the start of a creek, the area might best be classified as "shallow water wetland."

The Ministry of Environment website (MOE 2012) tells us that:

> *Wetlands are one of the most important life support systems on earth. Currently comprising about 5.6% or 5.28 million hectares of British Columbia, they provide critical habitat for fish, birds, and other wildlife. Most wildlife in the province use wetland habitat at some point in their life cycle, and many red- and blue-listed species are wetland-dependent. The functional contribution of wetlands in helping to minimize or remediate environmental problems is substantial. Wetlands absorb and filter sediments, pollutants, and excess nutrients; recharge groundwater; maintain stream flows; control runoff; store flood waters; reduce erosion; stabilize shorelines; and help regulate atmospheric gases and climate cycles. In short, wetlands absorb water quickly and release it slowly with an improvement in quality.*

As a living classroom, Melda's Marsh is valuable showcase on various types of wetlands and rich mosaic of the plants and animals that are supported by this environment.

IV RECOMMENDATIONS

Melda's Marsh within the surrounding Seal Bay Nature Park is an important living classroom for residents of the Comox Valley. While there are reasons to leave the marsh and wetland area to naturally evolve, we suggest the value of the site, both for local residents and for greater goals of biodiversity may be best achieved by active management of the site. This management could include periodic excavating of portions of the wetland to maintain living examples of all stages of wetland classes ranging from the more dry bogs, through fens, marshes and the open water of swamps.

Throughout the Comox Valley invasive species are common. Invasive plants are detrimental to natural plants and animals when they become dominant, alter the soil hydrology or chemistry and do not provide the nutrients that other species depend upon. The removal of invasive plants such as the English Holly observed at Study Plot II and in any other locations within Seal Bay Nature Park will help maintain the natural plant and wildlife community.

V REFERENCES

Green, R.N. and K. Klinka 1994. A field guide to site identification and interpretation for the Vancouver Forest Region. Land Management Handbook No. 28. BC Ministry of Forests, Victoria BC

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MOE 2012. http://www.env.gov.bc.ca/wld/wetlands.html

MOELP 1998. Field manual for describing terrestrial ecosystems. Land Management Handbook No. 25. BC Ministry of Environment, Lands and Parks and BC Ministry of Forests, Victoria BC

Southam, T. And E.A. Curran (eds) 1996. The Wetlandkeepers Handbook: a practical guide to wetland care. BC Wildlife Federation, Surrey, BC and Environment Canada, Delta, BC

Appendix 1: Tree measurements in Study Plot 1.

Study Plot	Quadrant	Tree #	Species	DBH (cm)	Measurement along centre line (m)	Measurement from centre line (m)	UTM coordinates (Zone 10)	
							East	North
1	B	1	Shore-pine	5.6	5.6	-2.1	357620.88	5513192.68
1	B	2	Cedar	26.0	6.3	4.8	357618.94	5513199.33
1	C	3	Hemlock	15.4	12.2	3.9	357613.30	5513197.37
1	C	4	Cedar	25.6	12.8	-2.0	357613.79	5513191.46
1	C	5	White pine	18.1	12.9	3.5	357612.69	5513196.85
1	C	6	Hemlock	13.2	13.1	-1.3	357613.36	5513192.10
1	C	7	White pine	39.0	13.3	-2.1	357613.31	5513191.27
1	C	8	White pine	13.1	14.6	3.9	357610.94	5513196.94
1	C	9	Hemlock	18.0	15.4	-1.8	357611.19	5513191.18
1	C	10	Stump	120.0	15.8	-1.6	357610.76	5513191.31
1	C	11	Hemlock	8.2	16.4	-1.7	357610.19	5513191.10
1	C	12	Hemlock	35.0	16.4	-1.4	357610.14	5513191.40
1	C	13	Cedar	7.0	16.7	2.9	357609.06	5513195.57
1	C	14	Cedar	7.2	17.0	3.0	357608.74	5513195.61
1	C	15	Stump	120.0	17.2	-1.5	357609.37	5513191.15
1	C	16	Cedar	32.2	17.9	-1.3	357608.64	5513191.22
1	C	17	Hemlock	21.5	18.0	2.6	357607.83	5513195.04
1	C	18	White pine	8.2	18.1	0.4	357608.14	5513192.86
1	C	19	Hemlock	22.1	18.3	2.6	357607.54	5513194.98
1	C	20	Shore-pine	27.5	18.7	-4.0	357608.35	5513188.42
1	D	21	Cascara	5.0	20.9	-1.2	357605.68	5513190.77
1	D	22	Hemlock	24.4	22.8	-0.5	357603.68	5513191.11
1	D	23	Hemlock	27.3	23.0	3.6	357602.74	5513195.11
1	D	24	Hemlock	38.2	23.3	3.8	357602.40	5513195.25
1	D	25	Douglas-fir	10.7	23.4	1.5	357602.73	5513192.97

Appendix 1: Tree measurements in Study Plot 1 continued...

Study Plot	Quadrant	Tree #	Species	DBH (cm)	Measurement along centre line (m)	Measurement from centre line (m)	UTM coordinates (Zone 10)	
							East	East
1	D	26	Cascara	11.2	23.8	-0.2	357602.64	5513191.23
1	D	27	White pine	17.7	24.2	4.7	357601.36	5513195.97
1	D	28	Stump	110.0	24.4	1.9	357601.67	5513193.18
1	D	29	Stump	140.0	24.9	-0.8	357601.67	5513190.44
1	D	30	Shore-pine	46.0	25.0	-3.4	357602.05	5513187.86
1	D	31	Douglas-fir	18.6	26.2	-0.9	357600.41	5513190.10
1	D	32	Douglas-fir	21.6	26.7	-0.5	357599.85	5513190.40
1	D	33	Hemlock	17.8	27.0	-3.0	357600.01	5513187.89
1	D	34	Shore-pine	23.6	28.8	-1.9	357598.04	5513188.64
1	D	35	Hemlock	10.0	29.9	1.0	357596.43	5513191.30
1	E	36	White pine - dead	18.6	30.2	2.1	357595.93	5513192.32
1	E	37	Hemlock	24.8	30.4	0.2	357596.08	5513190.42
1	E	38	Shore-pine	25.8	32.0	2.4	357594.11	5513192.29
1	E	39	Hemlock	6.5	32.4	1.2	357593.93	5513191.04
1	E	40	Spruce	26.2	32.5	1.2	357593.83	5513191.02
1	E	41	Cascara	8.0	32.7	-4.5	357594.67	5513185.38
1	E	42	Hemlock	11.1	32.8	0.5	357593.67	5513190.28
1	E	43	Hemlock	25.2	33.8	1.7	357592.46	5513191.27
1	E	44	Hemlock	24.0	33.9	0.5	357592.58	5513190.07
1	E	45	Shore-pine	28.0	35.5	-5.0	357592.01	5513184.38
1	E	46	Shore-pine	30.4	35.7	-1.7	357591.21	5513187.58
1	E	47	Cedar	11.2	36.0	0.1	357590.59	5513189.30
1	E	48	Cedar	10.5	36.7	1.4	357589.67	5513190.45

Appendix 2: Tree measurements in Study Plot 2

Study Plot	Quadrant	Tree #	Species	DBH (cm)	Measurement along centre line (m)	Measurement from centre line (m)	UTM coordinates (Zone 10)	
							East	North
2	B	1	Hemlock	18.6	2.6	2.7	357967.81	5512987.76
2	B	2	Shore-pine	62.0	3.9	1.9	357968.34	5512986.34
2	B	3	Alder	26.0	8.6	-0.2	357969.51	5512981.32
2	C	4	Crab Apple	14.1	11.3	2.3	357966.54	5512979.15
2	C	5	Alder	16.3	16.0	-2.2	357970.06	5512973.68
2	C	6	Holly	0.3	20.0	2.0	357965.17	5512970.55
2	D	7	Shore-pine	43.1	20.4	-2.8	357969.81	5512969.24
2	D	8	Alder	32.0	21.7	1.5	357965.34	5512968.79
2	D	9	Douglas-fir	33.0	24.5	-4.4	357970.60	5512964.91
2	D	10	Douglas-fir	49.7	25.5	-4.7	357970.70	5512963.87
2	D	11	Douglas-fir	12.5	26.3	-4.4	357970.25	5512963.15
2	D	12	Douglas-fir	7.4	26.6	-4.5	357970.29	5512962.83
2	D	13	Douglas-fir	13.1	26.7	1.1	357964.78	5512963.80
2	D	14	Douglas-fir	82.8	27.8	1.4	357964.27	5512962.78
2	D	15	Douglas-fir	23.0	27.9	-4.7	357970.24	5512961.52
2	D	16	Holly	0.3	29.5	1.8	357963.56	5512961.19
2	E	17	Douglas-fir	35.0	31.2	0.3	357964.70	5512959.23
2	E	18	Hemlock	23.0	32.0	-0.7	357965.53	5512958.26
2	E	19	Shore-pine	66.5	33.4	-0.9	357965.46	5512956.84
2	E	20	Grand-fir	74.0	38.1	1.3	357962.41	5512952.65
2	E	21	Douglas-fir	26.5	39.8	-3.0	357966.30	5512950.16