Western Painted Turtle Surveys and Stewardship Activities on Vancouver Island in 2010

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Executive Summary

Background

The Pacific Coast Population of the Western Painted Turtle is listed as Endangered federally and is on the provincial Red List of species at risk in British Columbia. The distribution of these turtles encompasses the southwestern part of the province, where their habitats are threatened by urban development, forestry, and other human activities that alter wetlands or associated terrestrial habitats. Even populations in protected areas are not necessarily safe, unless human activities are managed to take into account the species' needs.

This project builds on work that started in 2008, since then we have carried out surveys and stewardship activities for the Western Painted Turtle on Vancouver Island and southern Gulf Islands. Here we report results for the 2010 field season. This year the objectives were to (1) conduct surveys for the Western Painted Turtle to clarify its distribution and to assess threats within the Capital Regional District (CRD) and Alberni Valley on Vancouver Island; (2) monitor known nesting areas and engage in nesting habitat enhancement and restoration; (3) enhance aquatic habitats by installation of basking logs; (4) initiate studies to obtain information on movements and important seasonal habitats through telemetry and on population size, trends, and demography through mark-recapture; (5) develop management guidelines for landowners and managers; and (6) conduct outreach and involve private landowners and land managers in stewardship activities.

Surveys

Of 32 water bodies surveyed on Vancouver Island in 2010, we found the Western Painted Turtle at 11 sites, four of which represent new distribution records for the species: Turnbull Lake in the Ash River drainage in Alberni Valley; Florence and Glen Lakes in Langford, CRD; and Kemp Lake near Sooke, CRD. The Alberni Valley record is within forestry lands in a backcountry setting, whereas the CRD records are amidst urban or rural areas. Road mortality was assessed as a main threat at many sites, as turtles would have to cross roads or move across urban/rural landscape on migrations between nesting sites and water bodies. Other threats included logging and unauthorized recreational activities in the Alberni Valley and housing developments and urban activities, such as landscaping and disturbance of nesting turtles by people and pets, in the CRD. Red-eared Sliders, Bullfrogs, and/or other introduced species were present at many sites where the Western Painted Turtle occurred, particularly in CRD.

Nest site Improvement and Monitoring

Intensive monitoring of Western Painted Turtle nesting areas in Elk/Beaver Lake Regional Park from 2008 to 2010 revealed that hatchlings emerge from mid-March to late May after over-wintering in the nests, and females lay their eggs from the end of May to mid-July. In 2010 hatchling emergence was slightly earlier than in 2009, and egg-laying continued somewhat later into the summer than in previous years, probably reflecting weather conditions. Nest success, as indicated by the proportion of known

emerged nests, was relatively high (50% in 2009; 79% in 2010) with little evidence of predation at a communal turtle nesting ground. Inadvertent disturbance of nesting turtles by park users and over-growth of nesting grounds with grass and weeds were deemed to be threats at this site.

Nesting ground restoration/ enhancement was undertaken in Elk/Beaver Lake Regional Park and in Swan Lake and Christmas Hill Nature Sanctuary. The activities consisted of exposing bare ground by weeding and turning over soil and/or adding sand and garden soil in different proportions to small (1 m^2) experimental plots. The treatments were carried out as controlled experiments allowing us to evaluate the effectiveness of the treatments. The most successful treatment(s) will then later be expanded. At Elk/Beaver Lake, we found 12 completed nests on the experimental plots. Turtles preferentially nested on the turned-over and weeded plots when compared to the unmodified control plots and to plots that had produced hatchlings in spring from the previous year's nests. At Swan Lake, the activities were completed late in the egg-laying season (end of June), and only two turtles nested at the restored site, both at plots with a high proportion of added sand (60% sand; 40% soil). In Alberni Valley, we found emerged nests from late April to late May and nesting females from late May to late June at previously identified turtle nesting sites. At this site, we found evidence of numerous nesting attempts both in 2009 and 2010, but nesting success was low as evidenced by few emerged nests. The turtles appear to be nesting on less than optimal hard-packed gravel substrates, and adults and hatchlings are potentially exposed to road mortality.

Aquatic Habitat Improvement

In June 2010, we installed basking logs at four water bodies, where turtles were deemed to benefit from this action: two ponds at Elk/Beaver Lake Regional Park; Swan Lake, and a pond within a rural area in Saanich. Mill-end slabs (2.5 m to 3.8 m in length; average of 31 cm wide), installed perpendicular to the shoreline and secured to the bottom substrate or shoreline vegetation at one end, were readily used by basking turtles and provided a logistically feasible method for basking site enhancement. At the ponds in Elk/Beaver Lake Regional Park and at Swan Lake, Western Painted Turtles adopted the slabs almost immediately and used them regularly, suggesting that basking sites indeed were in short supply. An installed large log with a root mass attached also provided a suitable basking site for turtles at Swan Lake. In contrast, turtles appeared not to use floating boards anchored to the bottom about 5 m from the shore but that were not secured to the shoreline.

Population and Telemetry Study

A mark-recapture study was initiated at Swan Lake to obtain information on population size and demography. A total of 18 Western Painted Turtles, including adults and juveniles, were marked in August 2010 during two trapping sessions. Six adults were tracked with radio-telemetry from August to December. The tagged turtles used most of the lake in late summer – early fall and were most often found near the shoreline. From November on, they hibernated on the floodplain under the shrubs in water depths less than 125 cm. Four of the six turtles hibernated close together within a small area.

Outreach and Private Land Stewardship
In 2010, we helped plan and implement stewardship actions for three large landowners/managers with Western Painted Turtle populations on their properties: Island Timberlands; Swan Lake and Christmas Hill Nature Sanctuary; and CRD Regional Parks. The activities consisted of threat assessment and recommendation of mitigation measures in response to proposed activities on forestry lands; mitigating threats to nesting turtles on within multi-use areas; and restoring/enhancing nesting habitat and adding basking logs to improve aquatic habitat. More complete turtle habitat guidelines for CRD Regional Parks and Swan Lake Nature Sanctuary are to be prepared as longer-term results of nesting habitat restoration experiments, basking log study, and the telemetry studies become available. In addition, we assessed the effectiveness of road signs installed by the Saanich Municipality at a previously identified problem area for turtle road kill.

In 2010, HAT continued public outreach and landowner contact services. Outreach activities included: water body monitoring, engaging media to solicit reports and contacts, following up on reports from the public, presentations and workshops to local groups and municipalities, and contacting landowners to provide management prescriptions for turtle habitat on private lands. Staff visited fourteen landowners with suitable turtle habitat in six different watersheds in 2010. As a result of resident reports, the Western Painted Turtle was located in three new watersheds in Central Saanich, Metchosin, and Sooke Municipalities.

Recommendations
Recommendations for actions during the 2011 field season include the following:

CRD Regional Parks:

- At Elk/Beaver Lake Regional Park, continue monitoring and enhancing known nesting areas, including experimentally enhanced plots, for hatchling emergence and nesting females from spring to summer 2011; conduct weeding on the experimental plots, as deemed necessary to maintain suitable habitat.
- Enhance nesting habitat in the riding ring area and undertake actions to mitigate threats to turtles and nesting areas as per agreement with Elk-Beaver Lake Equestrian Society and CRD Parks in August 2010.
- Monitor basking log use and condition in response to water level fluctuations; make adjustments if deemed necessary.
- Initiate a mark-recapture study to obtain information on population size, trends, demography, and habitat use.

Swan Lake and Christmas Hill Nature Sanctuary:

- Continue nesting habitat restoration and monitoring of enhanced nesting area and other known nest sites from 2010, including those of the Red-eared Slider, for hatchling emergence and use by nesting females in 2011.
- Monitor basking log use and condition in response to water level fluctuations; document water level fluctuations and water temperature; make adjustments to installed basking logs if deemed necessary.

- Continue initiated mark-recapture study to determine the population size, trends, and demography.
- Continue initiated telemetry study to determine hibernation and nesting sites and seasonal movements at and away from the lake; incorporate results into a management plan for the lake.

Other areas on Vancouver Island:

- Conduct surveys for turtles in potentially suitable water bodies where significant data gaps exist, including much of the east coast north of CRD on Vancouver Island.
- Monitor roads for mortality of adults and hatchlings in identified problem areas within CRD and Alberni Valley. Reinstall road signs on Beaver Lake Road, Saanich, for the March – July breeding period.
- In Alberni Valley, engage in nesting habitat enhancement at safe sites and monitor effectiveness of the actions.
- Continue and expand the outreach program targeting land managers, landowners, and the public to engage them in protecting the Western Painted Turtle through stewardship actions.

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Cover photo: Western Painted Turtle, Alberni Valley, Vancouver Island (May 2010). Photo by K. Ovaska.

Introduction

The Pacific Coast Population of the Western Painted Turtle was designated as Endangered in Canada in 2006 (COSEWIC 2006). The range of this population overlaps with a densely populated and modified southwestern part of British Columbia, where urban development, drainage of wetlands, forestry, road building, and other human activities threaten turtle populations. Incomplete knowledge of the distribution, habitat use, and threat mitigation techniques applicable to the species in this area hinders recovery efforts. Much of the distribution of the turtles is on private lands, and stewardship by landowners and managers is essential to conserve the species.

Here we present the results of surveys, habitat enhancement, and stewardship activities carried out on Vancouver Island during the 2010 field season. This study represents continuation of efforts begun in 2008, building on results obtained in previous years (Engelstoft and Ovaska 2008, Ovaska and Engelstoft 2009, 2010). This report is organized in semi-independent chapters that address the following topics: distribution and threat assessment; nesting ground monitoring and enhancement; aquatic habitat enhancement; telemetry and mark-recapture study; management recommendations; and outreach and stewardship.

This study was conducted in collaboration with Capital Regional District (CRD) Regional Parks, Swan Lake and Christmas Hill Nature Sanctuary, Island Timberlands, and other private landowners/managers. Camosun College Environmental Technology Program contributed tags to the telemetry study, and a group of students worked on their end-of-program project on the turtles with assistance from HAT biologists.

Objectives

The goal of the project is to contribute information on the distribution, habitat use, and threats for the Western Painted Turtle (Pacific Coast Population), so that populations and habitats can be protected through stewardship and other recovery activities.

The objectives in year 2010 were as follows:

1. Conduct surveys for the Western Painted Turtle to clarify its distribution and to assess threats in focal areas within the CRD and Alberni Valley.
2. Monitor known nesting areas and engage in nesting habitat enhancement/ restoration.
3. Enhance aquatic habitats by installation of basking logs.
4. Obtain information on movements and important seasonal habitats through telemetry and on population size, trends, and demography through mark-recapture.
5. Develop management guidelines for landowners and managers

6. Conduct outreach to the public and involve private landowners and land managers in stewardship activities

Chapter 1: Distribution and Threats

Corresponding Objective

Objective 1. Conduct surveys for the Western Painted Turtle to clarify its distribution and to assess threats in focal areas within CRD and Alberni Valley.

Rationale

Distribution of the Western Painted Turtle on Vancouver Island is relatively poorly known. The focus of the surveys in 2010 was to fill in data gaps identified in previous years and to assess threats at occupied sites. Adequate knowledge of the distribution of a species is an essential first step towards conservation.

Approach & Methods

We surveyed water bodies for turtles using similar methods as in previous years (Ovaska and Engelstoft 2010). Basically, one or more observers visually searched for turtles either from canoe or from vantage points on the shore using binoculars and/or a spotting scope, as appropriate. We timed each survey to quantify the search effort and collected information on weather conditions (such as air and water temperature, percentage of cloud cover, and precipitation). At sites where turtles were found, we examined potentially suitable terrestrial habitats for signs of nesting activity (see Ovaska and Engelstoft 2010 for details). The surveys took place mostly on warm days in spring and early summer when turtles are most easy to detect while basking (Ovaska and Engelstoft 2009.

During the first visit to each site, we conducted a habitat assessment (Ovaska and Engelstoft 2010). The habitat features described included landscape context (backcountry, rural, urban); upland habitat (coniferous, deciduous, mix-forest, other); wetland type (lake, pond, marsh, other) with modifications noted (dug-out, dams, beaver maintained); percentage cover of littoral zone with emergent and when possible submerged vegetation; percentage cover of riparian zone along the perimeter of the water body (forest, shrubs, grass-herbs, development, or other); availability of basking logs (none, low, moderate, high); availability of nesting sites (confirmed, potential, not identified), including a description of identified sites.

At each site where the species was found, we assessed potential threats from the following sources: roads (paved or unpaved); recreation (motorized or non-motorized); pets; exotic species (bullfrogs and alien turtle species); residential development; other urban development; agriculture; forestry; grazing; water withdrawal; other sources.

Results & Discussion

Distribution

From April to June 2010, we surveyed a total of 32 water bodies on Vancouver Island for turtles; an additional survey took place in October in response to reports by the public (Table 1). Most sites were surveyed once, while others were surveyed repeatedly (2 – 6 times), based on the availability of suitable habitat, logistics, and additional objectives for particular sites. Of the 32 sites, 12 were surveyed for the first time in 2010, while the remaining surveys represented revisits to sites surveyed in 2008 – 2009.

Table 1. Summary of water bodies searched for turtles on Vancouver Island in 2010.

Area	# sites surveyed	# surveys	Survey time (p-hour)
Alberni Valley	12	14	20.2
Capital Region District	19	29	49.6
Shawnigan	1	1	1.0
TOTAL	32	44	69.7

We found the Western Painted Turtle at 11 water bodies, three in the Alberni Valley and eight within Capital Region District (CRD) (Table 2). Four of the observations represent new distribution records for the species: Turnbull Lake in the Ash River drainage in Alberni Valley; Florence and Glen Lakes in Langford, CRD; and Kemp Lake near Sooke, CRD. At Turnbull Lake, we found five turtles of various sizes basking on logs in quiet backwaters of the lake (Table 2). This observation is significant, because it shows that the species is widespread in relatively remote, wilderness areas of the valley and that the turtles appear to be reproducing successfully (Figure 1). The new records from CRD are from amidst populated urban/rural areas and represent 1 – 3 individuals per site (Table 2).

Table 2. Conditions and results of surveys conducted from April to June 2010.

Site name[1]	Date	Time (start)	Search time (p-min)[2]	Air temp.	% cloud cover	Survey method	# WPT[3]	# RESL[4]	# Unknown[5]
Alberni Valley, Vancouver Island:									
Airport Wetlands	21-Apr-10	11:05	260	16	40	Foot	22	0	0
Airport Wetlands	25-May-10	15:40	160	16	95	Canoe	44	1	0
Ash Main, Pond 1	21-Jun-10	11:35	60	19	80	Foot	0	0	0
Ashley Lake	21-Jun-10	13:50	100	20	95	Foot	0	0	0
Beaver Pond W of Turtle Lake	21-Jun-10	18:15	80	19	30	Foot	0	0	0
Devil's Den Lake	21-Apr-10	14:42	116	23	10	Foot	8	0	0
Dickson Lake, SE end	21-Jun-10	12:16	40	21	90	Foot	0	0	0
Little Turtle Lake	21-Apr-10	10:31	30	16	60	Foot	0	0	2

Site name[1]	Date	Time (start)	Search time (p-min)[2]	Air temp.	% cloud cover	Survey method	# WPT[3]	# RESL[4]	# Unknown[5]
Little Turtle Lake	25-May-10	11:15	30	14	100	Foot	0	0	0
Lois Lake	21-Jun-10	15:10	40	20	50	Foot	0	0	0
Lowry Lake	21-Jun-10	17:00	60	23	60	Foot	0	0	0
McLauglin Lake	21-Jun-10	14:40	60	20	90	Foot	0	0	0
Turnbull Lake	21-Jun-10	12:43	128	20	90	Foot	5	0	0
Turtle Lake	21-Apr-10	13:42	46	19	20	Foot	0	0	0
CRD, Vancouver Island:									
Beaver Lake (RP)	14-Apr-10	13:50	250	14	30	Canoe	29	13	3
Beaver Lake (RP)	17-May-10	13:08	254	20	100	Canoe	13	10	3
Beaver Lake (RP)	8-Jun-10	10:20	260	17	0	Canoe	18	19	0
Eagle Lake	25-Jun10	16:29	16	18	50	Foot	0	0	0
Florence Lake	30-Apr-10	12:20	20		60	Foot	0	0	0
Florence Lake	6-May-10	11:19	86	13	80	Canoe	1	1	0
Glen Lake	12-May-10	12:20	90	16	50	Foot	3	7	0
Grass Lake (RP)	13-May-10	13:38	186	20	20	Foot	0	0	0
South Valley Park	12-May-10	13:40	45	21	80	Foot	0	2	0
South Valley Park	23-Apr-10	12:15	30	15	100	Foot	0	0	0
Kemp Lake	11-May-10	10:41	142	18	0	Canoe	1	2	1
King's Pond	13 Oct-10	15:45	66	14	50	Foot	0	2	1
Langford Lake	7-May-10	10:15	200	13	50	Canoe	27	5	1
Little Maltby Lake	22-May-10	17:10	10	16	95	Foot	0	0	0
Matheson Lake	11-May-10	14:18	152	16	0	Canoe	1	5	0
McKenzie Lake (RP)	23-Apr-10	11:30	30	15	100	Foot	0	0	0
Poirier Lake (RP)	11-May-10	12:30	10	18	0	Foot	0	0	0
Sheild Lake (RP)	13-May-10	11:30	180	14	30	Foot	0	0	0
Swan Lake	29-Apr-10	14:30	102	13	75	Canoe	10	0	2
Swan Lake	19-May-10	12:50	120	17	95	Foot	4	4	2
Swan Lake	5-Jun-10	14:03	174	21	10	Canoe	9	3	4
Swan Lake	18-Jun-10	15:08	156	23	5	Canoe	11	1	0
Swan Lake	28-Jun-10	15:52	102		98	Canoe	6	3	6
Swan Lake, west bay	15-Jun-10	14:40	40		70	Foot	4	0	2
Thetis Lake (Upper; RP)	8-Apr-10	13:10	65	12	40	Foot	0	6	1
Trevlac Pond	22-May-10	17:30	15	16	95	Foot	0	0	0
Trevlac Pond	25-Jun10	16:00	12	18	50	Foot	0	0	1
Viaduct Pond	22-May-10	13:00	60	15	90	Foot	0	0	0
Young Lake (RP)	11-May-10	12:55	42	16	0	Canoe	0	0	0
Shawnigan, Vancouver Island:									
Devereaux Lake	14-Jun-10	12:20	50	15	40	Foot	0	0	0

[1]RP - part of CRD Regional Parks & Trails System; NP - within Gulf Islands National Park
[2]Survey time in person-minutes; [3]WPT – Western Painted Turtle; [4]RESL – Red-eared Slider; [5]Unidentified turtle

We found the introduced Red-eared Slider at ten of the sites surveyed (Table 2). This turtle appeared to be uncommon in the Alberni Valley. We encountered it at only one of the sites surveyed there in 2010, whereas we found it at nine of the sites surveyed within CRD. The Red-eared Slider co-occurred with the Western Painted Turtle at each site where the latter species was found within CRD. In the Alberni Valley, on the other

hand, the Western Painted Turtle was found either alone or greatly out-numbered the Red-eared Slider at the one site where we found it during the 2010 surveys.

Since 2008, we have surveyed 95 water bodies for turtles on Vancouver Island and southern Gulf Islands and have found the Western Painted Turtle at 14 sites (Figure 2, Table 3). The species' presence has been confirmed at two additional water bodies shown in Table 3, based on photos or other documentation by residents. There are a small number of additional records of turtles crossing roads and from small ponds within residential areas of CRD. Our surveys have mainly focused on CRD and Alberni Valley. Significant data gaps in survey coverage exist along the east coast of Vancouver Island, from where there are unconfirmed or isolated records of turtles.

Figure 1: Western Painted Turtle habitat in backwaters of Turnbull Lake, Alberni Valley.

Figure 2: Survey sites and locations where the Western Painted Turtle was found on southern Vancouver Island and southern Gulf Islands, 2008 – 2010.

Red point – Western Painted Turtle found
Yellow point – Western Painted Turtle NOT found

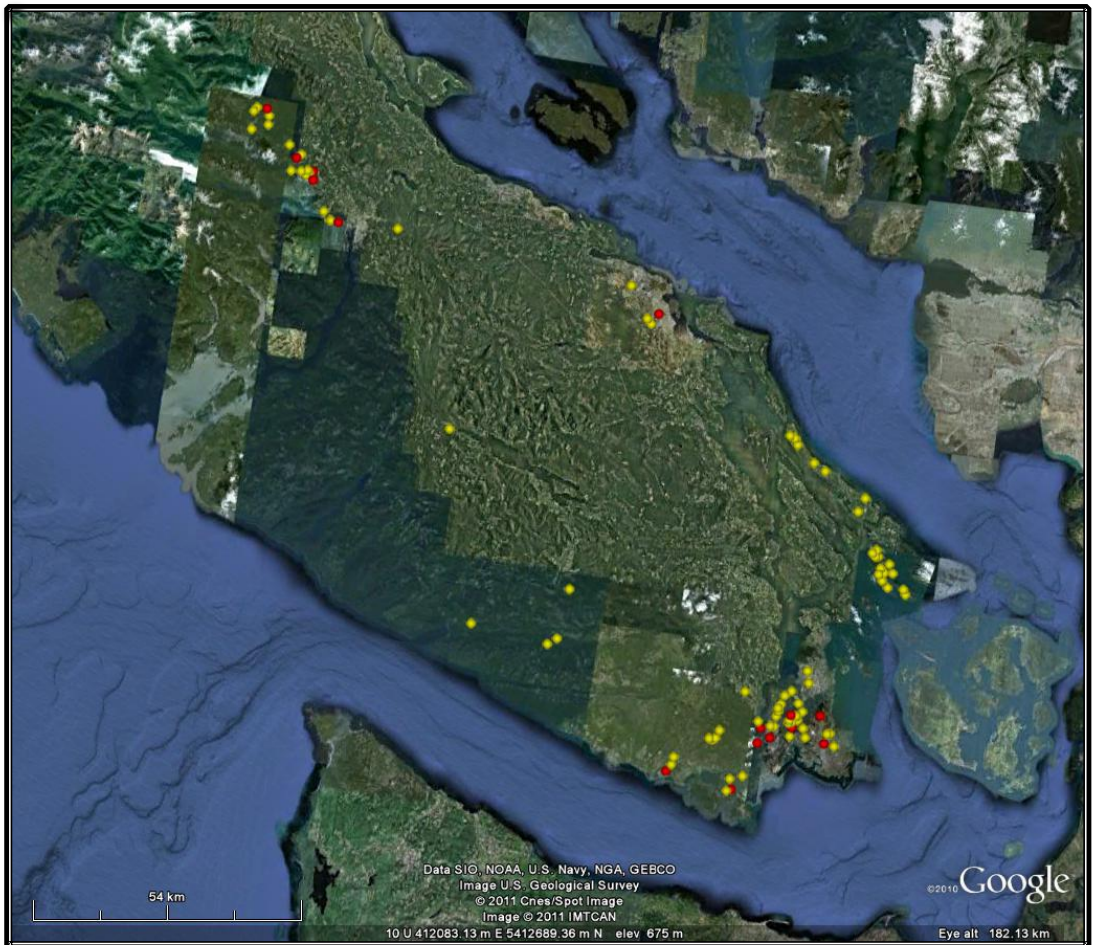


Table 3. Summary of water bodies surveys on Vancouver Island and southern Gulf Islands, 2008 - 2010.

X – Species found; X- new record in 2010; R – species not found during surveys but presence confirmed from residents' observations.

Location	Area	Year surveyed	No. years[1]	WPT[2] found	RESL[3] found	Other[4]
Airport wetlands	Alberni	2008, 2009, 2010	3	X	X	
Ash Main, at 6 km	Alberni	2008	1			
Ash Main, Pond 1	Alberni	2010	1			
Ashley Lake	Alberni	2010	1			
Beaver Pond W of Turtle Lake	Alberni	2010	1			
Boot Lagoon	Alberni	2009	1			
Devil's Den Lake	Alberni	2008, 2009, 2010	3	X		
Dickson Lake, SE end	Alberni	2010	1			
Great Central Lake	Alberni	2008	1			
Little Turtle Lake	Alberni	2008, 2009, 2010	3	X		
Lois Lake	Alberni	2010	1			
Loon Lake	Alberni	2008	1		X	
Lowry Lake	Alberni	2008, 2010	2			
McLauglin Lake	Alberni	2010	1			
Moran Lake	Alberni	2008	1			
Patterson Lake	Alberni	2008, 2009	2	X		
Sumner Lake	Alberni	2008, 2009	1			
Turnbull Lake (backwaters)	Alberni	2010	1	X		
Turtle Lake	Alberni	2008, 2010	2			
Tyler Rd Pond	Alberni	2008, 2009	2			
Wetland west of Turtle Lake	Alberni	2008	1			
Beckwith Park	CRD, VI[5]	2008	1		X	
Blenkhorn Lake	CRD, VI	2009	1			
Blenkinshop Lake	CRD, VI	2008	1			
Crabapple Lake	CRD, VI	2008	1			
Dimple Lake	CRD, VI	2008	1			
Durrance Lake	CRD, VI	2008, 2009	2		X	
Eagle Lake	CRD, VI	2008, 2010	2	R		
Elk/Beaver Lake	CRD, VI	2008, 2009, 2010	3	X	X	
Fairy Lake	CRD, VI	2009	1			
First Lake	CRD, VI	2008	1			
Florence Lake	CRD, VI	2008, 2010	2	X	X	
Fork Lake	CRD, VI	2008	1			
Glen Lake	CRD, VI	2008, 2010	2	X	X	

Location	Area	Year surveyed	No. years[1]	WPT[2] found	RESL[3] found	Other[4]
Grass Lake	CRD, VI	2008, 2010	2			
Hagan Creek Pond 1	CRD, VI	2008	1			
Hovey Rd Pond	CRD, VI	2008	1		X	
Hydro Pond, Munn's Rd	CRD, VI	2008	1			
Interuban Rd wetland	CRD, VI	2010	1		X	
Kemp Lake	CRD, VI	2009, 2010	2	X	X	
King's Pond	CRD, VI	2010	1		X	X
Kettle Pond (just north of Langford Lake)	CRD, VI	2008	1			
Killarney Lake	CRD, VI	2008	1			
Kissinger Lake	CRD, VI	2008	1			
LaBonne Road Pond	CRD, VI	2009	1			
Langford Lake	CRD, VI	2008, 2009, 2010	3	X	X	
Little Maltby Lake	CRD, VI	2010	1			
Lizard Lake	CRD, VI	2009	1			
Maltby Lake	CRD, VI	2008	1	R		
Matheson Lake	CRD, VI	2008, 2009, 2010	3	X	X	
Matson Lake	CRD, VI	2008	1		X	
McKenzie Lake	CRD, VI	2008, 2010	2	X		
Mt Mattheson Road, Pond 1	CRD, VI	2009	1			
Munn's Road Pond 1 (Rolla)	CRD, VI	2008	1			
Otter Bay Rd Pond 1	CRD, VI	2008	1			
Otter Bay Rd Pond 2	CRD, VI	2008	1			
Pease Lake	CRD, VI	2008, 2009	2		X	
Pixie Lake	CRD, VI	2008, 2009	2			
Poirier Lake	CRD, VI	2009, 2010	2			
Pond btw Shields & Grass Lake	CRD, VI	2008	1			
Prior Lake	CRD, VI	2008	1			
Prospect Lake	CRD, VI	2008	1		X	
Prospect Lake Rd Pond 1	CRD, VI	2008	1		X	
Second Lake	CRD, VI	2008	1			
Sheild Lake	CRD, VI	2008, 2010	2			
Swan Lake	CRD, VI	2008, 2010	2	X	X	
Teanook Lake	CRD, VI	2008	1			
Thetis Lake	CRD, VI	2008, 2009, 2010	3		X	FLC?
Third Lake	CRD, VI	2008	1			
Trevlac Pond	CRD, VI	2008, 2010	2			X
Viaduct Pond	CRD, VI	2010	1			
Young Lake	CRD, VI	2009, 2010	2			
Devereaux Lake	Shawnigan, VI	2010	1			

Location	Area	Year surveyed	No. years[1]	WPT[2] found	RESL[3] found	Other[4]
Brannen Lake	Nanaimo, VI	2009	1			
Buttertubs Marsh	Nanaimo, VI	2008	1	X	X	
Morrell Lake	Nanaimo, VI	2008	1			
Westwood Lake	Nanaimo, VI	2008, 2009	2		X	
Buck Lake	North Pender	2008	1			
Canal Main, 2 km	North Pender	2008	1			
Clam Bay Rd	North Pender	2008	1			
Corbett Rd	North Pender	2008	1		X	
Gardom Pond	North Pender	2008	1		X	
Liberto Rd	North Pender	2008	1			
Magic Lake	North Pender	2008	1			
Pond at Hamilton Beach	North Pender	2008	1			
Ponds off Shark Road	North Pender	2008	1			
Tindle Wood Estate	North Pender	2008	1		X	
Greenburn Lake	South Pender	2010 (March)	1			EPT
Cook Rd wetland	Galiano	2008, 2009	2			
Devina Dr. Ponds	Galiano	2008, 2009	2			
Ecological Reserve 128, beaver ponds along road	Galiano	2008	1			
Findlay Lake	Galiano	2008	1			
Great Beaver Swamp	Galiano	2008, 2009	2			
Laughlin Lake	Galiano	2008, 2009	2		X	
Therah ponds	Galiano	2008	1			

[1]Number of years with surveys; [2]WPT – Western Painted Turtle; [3]RESL – Red-eared Slider; [4]OTHER: EPT – Eastern Painted Turtle (found in March 2010 & not included in Tables 1 & 2); FLC – Florida Cooter; X-unidentified turtle; [5]VI – Vancouver Island

Habitat Assessment

Foraging habitat, as indicated by emergent/floating vegetation along perimeter of water bodies, was abundant at most sites where the species was found, with the exception of some urban/rural sites within CRD (Table 4). The Western Painted Turtle was often found in sheltered areas with emergent and floating aquatic vegetation. Beaver-maintained shallow wetlands with convoluted shorelines, prevalent in the Alberni Valley, provide ample of such habitat, whereas foraging opportunities are more limited within larger and/or deeper lakes.

Turtles were often found basking on logs, floating rhizome mats, or along the shoreline. Basking sites are important for turtles and appeared to be in short supply at several sites where we found the Western Painted Turtle, particularly within the CRD (Table 4).

Confirmed and potential nesting areas were mostly in human-modified sites, such as sides of logging roads and an abandoned gravel pit in the Alberni Valley and recreational sites and lawns in CRD (Table 4). Nesting sites in the natural habitat were

within pockets of deeper soil at the base or on rocky shoreline bluffs, as also documented in previous years (Engelstoft and Ovaska 2008, Ovaska and Engelstoft 2009, 2010). Similar to other freshwater turtles, populations of the Western Painted Turtle are often limited by the availability of nesting areas (COSEWIC 2006), and this appears to be the case on our study sites. On the Pacific Coast where forest cover frequently extends to the shoreline, suitable warm sites with sandy soils and exposure to the sun preferred by the turtles for nesting are often lacking, probably restricting the distribution of the species.

Table 4: Habitat assessment for sites where the Western Painted Turtle was found in 2010.

Site name	Regional district	Appr. elev. (m)	Land-scape context	% emergent vegetation[1]	Availability of basking sites[2]	Availability of nesting sites[3]
Airport wetlands	Alberni-Clayoquot	90	Back-country	80	High: many logs	Confirmed: Gravel pit, road sides & old spur road in SW corner of wetland
Devil's Den Lake	Alberni-Clayoquot	70	Back-country	80	Low: few logs	Confirmed: 2 areas near base and on bluff in natural opening, adjacent to shallow weedy bay
Little Turtle Lake	Alberni-Clayoquot	90	Back-country	50	High	None identified
Turnbull Lake (backwaters)	Alberni-Clayoquot	270	Back-country	80	High: many logs (7+) of different sizes, some moss-covered	Potential: Bluff across road from wetland (within 30 m); gravel road sides
Beaver Lake	CRD: Saanich	70	Rural	10	High; many logs in sheltered bays; rhizome mats	Confirmed: away from lake at ponds; potential sites close to lake on exposed bluffs but heavily used for recreation; gravel road sides & parking lots
Florence Lake	CRD: Langford	70	Urban	10	Low: 6-7 logs in bay at north end	Potential: Lawns (but densely vegetated)
Glen Lake	CRD: Langford	70	Urban	5	Low: Logs, rocks, rhizome mats	Potential: Lawns (but densely vegetated)
Kemp Lake	CRD: Sooke	30	Rural	10	Low: Logs; possibly shoreline banks	Potential: Day-use recreational site; lawns & driveways
Langford Lake	CRD: Langford	70	Urban	10	Low	Confirmed: Banks of developed side of lake in people's yards (landowner reports & photos); mostly close to lake
Matheson Lake	CRD: Metchosin	30	Rural	<50	High	Confirmed: Sparsely vegetated hillside on small island (species of turtle unknown)

Site name	Regional district	Appr. elev. (m)	Land-scape context	% emergent vegetation[1]	Availability of basking sites[2]	Availability of nesting sites[3]
Swan Lake	CRD: Saanich	30	Urban	85	Low	Confirmed: Slopes between nature house & lake in sparsely vegetated patches of ground

[1]Indicator of forage habitat quality; visually estimated within 30 m from shoreline

[2]High, moderate, low, none

[3]Confirmed (turtle diggings, egg shells, or emerged nests found); potential; none identified

Threat Assessment

At most sites occupied by the Western Painted Turtle, roads were identified as a threat to turtles that are exposed to traffic mortality when migrating to and from nesting grounds (Table 5). In the Alberni Valley, logging roads are located next to several occupied water bodies. At one site (Airport Wetlands), we observed adult turtles and hatchlings on or immediately adjacent to a busy logging road during the nesting season in 2010. Nests located on roads or road shoulders at this site could also be crushed by vehicles.

Within urban/rural areas in CRD, turtles are also exposed to road mortality during migrations to and from nesting grounds. Hatchling turtles have been found dead on the road leading to Elk/Beaver Lake Regional Park each spring since 2008 (Engelstoft and Ovaska 2008, Ovaska and Engelstoft 2009). On 31 March, 2010, five dead hatchling turtles were found along the same section of the by D. & C. Copley. Frequent monitoring of this section of the road and the surrounding habitat for nesting turtles and emerging nests from March to July failed to reveal adults or additional emerged nests, suggesting that only a few turtles nest in this area, making it difficult to develop effective mitigation (see Chapter 5: Management Guidelines for traffic sign installation at this site).

Other threats include forestry and unauthorized recreational activities in the Alberni Valley and housing developments and urban activities, such as landscaping and disturbance by people and pets, in CRD (Table 5). Red-eared Sliders, Bullfrogs, and/or other introduced species were present at most of the sites where the Western Painted Turtle occurred. The effects of these species on native turtle populations and their habitats are largely unknown but are potentially deleterious.

Conclusion and Recommendations

Of 32 water bodies surveyed on Vancouver Island in 2010, we found the Western Painted Turtle at 11 sites, four of which represent new distribution records for the species: Turnbull Lake in the Ash River drainage in Alberni Valley; Florence and Glen Lakes in Langford, CRD; and Kemp Lake near Sooke, CRD. The Alberni Valley record is within forestry lands in a backcountry setting, whereas the CRD records are amidst urban or rural areas. Road mortality was assessed as a main threat at many sites, as

turtles would have to cross roads or move across urban/rural landscape on migrations between nesting sites and water bodies. Other threats included logging and unauthorized recreational activities in the Alberni Valley and housing developments and urban activities, such as landscaping and disturbance of nesting turtles by people and pets, in CRD. Red-eared Sliders, Bullfrogs, and/or other introduced species were present at many sites where the Western Painted Turtle occurred, particularly in CRD.

Recommendations:

- Conduct surveys for turtles in potentially suitable water bodies where significant data gaps exist, including much of the east coast north of CRD on Vancouver Island.
- Document locations and characteristics of nesting, hibernation, and other important seasonal habitats of the Western Painted Turtle.
- Monitor roads for mortality of migrating adults and hatchlings in identified problem areas.
- Clarify threats from introduced species, including Bullfrogs and Red-eared Slider.

Table 5. Threat assessment for sites where the Western Painted was found in 2010.

N – Negligible; L – Low; M – Moderate; H - High

Site name	Regional district	Ownership1	Roads - paved	Roads - unpaved	Recreation (motorized)	Recreation (non-motorized)	Pets	Exotic species2	Housing/ industrial dev.	Urban activities	Forestry	Water use/ control	Comments
Airport wetlands	Alberni-Clayoquot	Forestry-Private	N	M	H3	H3	N	Yes	N	N	L-M	L	Evidence of shooting practice in gravel pit with nests; vehicular traffic & ATVs a threat to nesting grounds & migrating turtles; evidence of nest predation
Devil's Den Lake	Alberni-Clayoquot	Forestry-Private & BC Crown	N	N	N	L	N	Yes	N	N	L-M	L	Bullfrogs present; degree & type of recreational use unknown; access limited through overgrown paths & bushwacking
Little Turtle Lake	Alberni-Clayoquot	Forestry-Private	N	L	N	L	N	Yes	N	N	L-M	?	Beaver control in area
Turnbull Lake (backwaters)	Alberni-Clayoquot	Forestry-Private	N	M-H	N	N	N	?	N	N	L-M	?	Road grading could disturb nests; potential for road mortality during migrations & nesting
Beaver Lake	CRD: Saanich	CRD Regional Park	M	M-H	N	H	H	Yes	N	L	N	L	Road mortality of hatchlings observed repeatedly along access road; heavily used recreational area for swimming, boating,fishing,& dog walking; bullfrogs and sliders present
Florence Lake	CRD: Langford	Municipal?/ Private	H	N	?	M	L-M	Yes	L	M	N	?	Lake partially surrounded by residential areas and roads
Glen Lake	CRD: Langford	Municipal?/ Private	L	L	N	H	L-M	Yes	L	M	N	?	Entire lake surrounded by residential development; little additional development

Site name	Regional district	Ownership1	Roads - paved	Roads - unpaved	Recreation (motorized)	Recreation (non-motorized)	Pets	Exotic species2	Housing/ industrial dev.	Urban activities	Forestry	Water use/ control	Comments
Kemp Lake	CRD: Sooke	Municipal?/ Private	N	L	N	M	L	Yes	L	L	N	M	Water reservoir for municipal water
Langford Lake	CRD: Langford	Municipal?/ Private	M	N	L-M	H	L-M	Yes	H	H	N	?	Residential development ongoing in the area; turtles caught during aquatic weed clearing in harvester; retaining walls along shoreline on many properties preventing turtle access to shore & nesting areas
Matheson Lake	CRD: Metchosin	CRD Regional Park	L	L	N	H	L-M	Yes	N	N	N	N	Nesting ground on island heavily used recreational day use area; boat access only
Swan Lake	CRD: Saanich	Municipal (Saanich)	M	L	N	L	L	Yes	N	M	N	N	Heavy recreational use of site; turtles seen during nesting period within adjacent urban areas

[1]Includes water body and surrounding terrestrial habitat

[2]Introduced Red-eared Slider; American Bullfrog

[3]On terrestrial nesting grounds

Chapter 2: Nesting Ground Monitoring and Restoration

Corresponding Objective

Objective 2: Monitor known nesting areas and engage in nesting habitat enhancement/ restoration.

Rationale

Availability of suitable safe nesting areas is a limiting resource for Western Painted Turtle populations in many areas, including the Pacific Coast. Relatively little is known of nesting ecology of the Pacific Coast Population that inhabits an environment very different from interior B.C. and other areas where the species occurs. Information on the timing of nesting, nesting success, habitat characteristics, and other aspects of nesting ecology is needed to develop and implement effective management and threat mitigation measures. Nesting habitat restoration/ enhancement within CRD was undertaken at selected sites that were previously identified as benefitting from such actions.

Approach & Methods

Nesting area monitoring and habitat restoration/ enhancement activities focused on Elk/Beaver Lake Regional Park and Swan Lake and Christmas Hill Nature Sanctuary. In Elk/Beaver Lake Regional Park several nesting areas, including a communal nesting ground, have been identified and monitored previously (Engelstoft and Ovaska 2008, Ovaska and Engelstoft 2009). In addition, we inspected nest sites reported to us at Capital City Allotment Gardens. This area is immediately adjacent to Swan Lake along the outlet stream of the lake, but a busy highway intersects the two areas. We also inspected an artificial turtle nesting area that was created by a landowner near Eagle Lake according to management guidelines developed in 2009 by us.

To obtain information on nesting ecology, we conducted frequent visits to nesting areas during periods in spring and summer when hatchlings were expected to emerge and egg-laying was expected to take place. We identified emerged nests by the size and rectangular shape of the exit hole; hatchlings could often be seen in the nest chamber. To locate new nests, we usually visited nesting areas at dusk when females were most likely to come ashore, and observed them digging nests. We located additional recent nests during morning visits, based on characteristic sign (circular, flattened patch of ground with a wet spot) (see Ovaska and Engelstoft 2009 for details). We also followed up on nesting observations reported to us by residents and the public and inspected these sites. To map the location of each nest for later reference, we measured the distance from the nest to two designated markers and triangulated the nest position.

Nesting area enhancement/ restoration consisted of developing a detailed plan and implementing activities accordingly. We set up the enhancement and restoration projects as replicated experiments with a control and one or more treatments, with the intention of expanding those treatments that prove most successful in the coming years.

The treatments consisted of removing vegetation and exposing bare soil at one site and adding sand and soil in different proportions at another site.

Results & Discussion

Elk/Beaver Lake Regional Park

A. Nesting area monitoring

In 2010, with help from volunteers, we made a total of 117 visits on 79 days to known nesting areas near Beaver Lake, focusing on a previously identified communal nesting ground by a pond (referred to as East Pond) and nearby areas, which included another pond (West Pond), riding ring grounds, and gravel access road and associated driveways. The monitoring efforts were most intense from mid-March to mid-July, which encompasses the period of hatchling emergence from nests, followed by egg-laying by females. During the peak egg-laying period in June, we visited the site at least once a day and often twice a day (morning and evening). During the visits, we took care to minimize disturbance to the turtles and the habitat. There were two visits in January – February to monitor possible early emergence of hatchlings and one visit in fall (on 26 Oct) to investigate whether any emergence of hatchlings from eggs laid the same year had taken place.

At the East Pond communal nesting area, we found a total of 15 emerged nests, 14 of which emerged from 18 March to 17 May (Table 6; see next section for nesting habitat restoration/enhancement that took place at this site). One additional emerged nest was found on 11 July, but it had probably emerged earlier and gone undetected. Hatchlings began emerging somewhat earlier in spring 2010 than in 2009, probably due to mild conditions (Figure 3). Hatchlings over-wintered in the nests, and we found no evidence of fall emergence in either year. The number of emerged nests was very similar in both 2009 and 2010 (Table 6). In 2008, there was no spring monitoring of the site; hence the number of emerged nests is an underestimate. Nest success, as indicated by the proportion of emerged known nests, was relatively high in both years: 50% in 2009 and 78% in 2010 (Table 6).

Table 6. Summary of emerged nests at East Beaver Pond, 2009 - 2010.

Note: Emergence occurs in spring of the year following egg-laying; follow shaded cells for nest success.

Year	# new nests found[1]	# emerged nests known from previous year	% nests emerged	Total # emerged nests found
2008	10	NA	NA	4[2]
2009	9	5	50.0	14
2010	19[3]	7	77.8	15

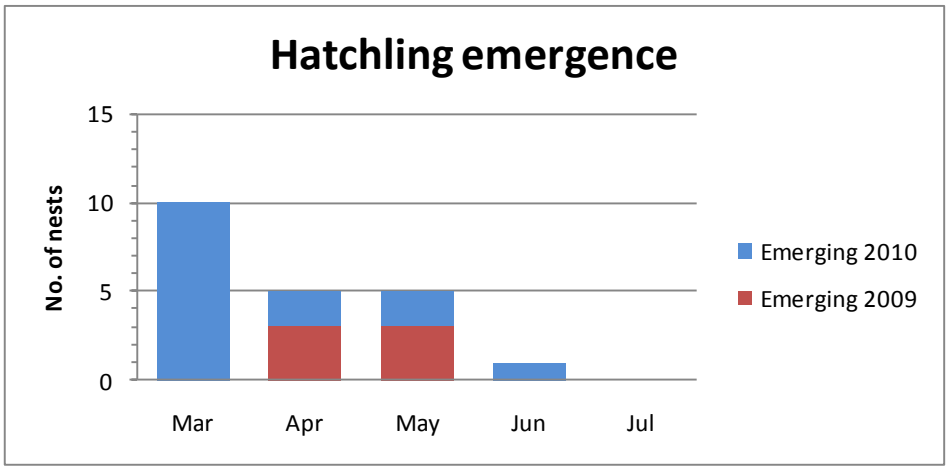
[1]New nests refer to nests identified by an observation of a female digging and completing a nest and/or sign of recent nesting (circular, flat wet spot) detected the day after egg-laying.
[2]Underestimate; monitoring began in June after emergence was completed.
[3]Excludes 1 nest by unknown species in July and 1 nest of Red-eared Slider in July

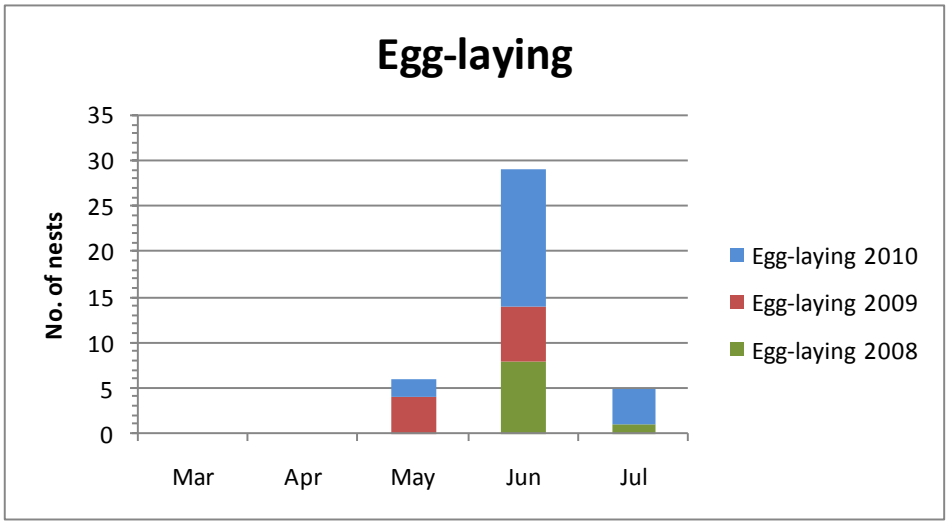
As in previous years, we found new nests and frequently observed females milling on land by East Pond and in nearby areas from late May to early July. We found two new nests and one emerged nest by the West Pond, two new nests at the riding ring grounds, one new nest along a driveway off the access road, and 21 new nests, including one Red-eared Slider nest, at the East Pond communal nesting grounds. In 2010, the first new nest was found on 31 May. Nesting activity peaked from 4 – 26 June and, after a hiatus of about one week, resumed with the onset of a heat wave in early July. The last Western Painted Turtle nest was found on 10 July. Nesting in 2010 continued somewhat later than in 2009 (Figure 3).

We observed one Red-eared Slider nesting at the East Pond communal nesting ground (on 3 July). Turtles nest very close together within a small area at this site. While digging, this female disturbed a previous nest exposing the eggs, which resulted in their desiccation. We also received reports of Red-eared Slider nests and observations of adults on land throughout July. We suspect that this species begins nesting later in the summer than the Western Painted Turtle and only nests when the weather is relatively hot.

High rates of nest predation are a frequently identified problem for freshwater turtles (COSEWIC 2006). At the Beaver Ponds, we found no evidence of nest predation but on several occasions did find new complete nests, sometimes with eggs, that were left uncovered. The female had probably been disturbed by people or pets before completing nesting in this heavily used recreational area.

Figure 3. Timing of hatchling emergence and egg-laying at Elk/Beaver Lake Regional Park, based on data from a communal nesting area and nearby sites.





B. Nesting area restoration/ enhancement

Disturbance of emerging and nesting turtles and encroachment of grass and weeds were identified as the main problems for turtle nesting grounds at both East and West Ponds. To reduce disturbance from humans and dogs, we erected a temporary enclosure around the East Pond nesting ground, an area approximately 10 m x 12 m, and demarked it with flagging tape and an "ecologically sensitive area" sign. The enclosure was initially deployed to exclude this area from a dog training event, but it effectively protected it from inadvertent disturbance by recreational users and their pets, and so was left in place after the event.

Within the enclosure at East Pond, we carried out an experiment, in which small (1 m^2) circular plots were weeded and turned over to expose bare soil, while other similar-sized, unmodified areas served as controls. An additional treatment consisted of plots where one or more nests had successfully emerged in spring 2010 (Table 1). The plots were arranged in four rows of three plots (Figure 4, Figure 5). At each row, the location of the weeded treatment and control plots were randomly assigned in relation to the location of the plot with previously emerged nests, which was fixed. The experiment was set up on 27 May at East Pond. An additional set of three plots was established at West Pond on 7 June 2010. We then monitored the use of the plots by turtles.

Table 7. Experimental set up for nesting area restoration/ enhancement at Elk/Beaver Lake Regional Park.

Treatment & control plots	# plots (East Pond)	# plots (West Pond)	Total
A. Weeded & turned over	4	1	5
B. Successful emerged nests in spring 2010	4	1	5
Control: unmanipulated/ not used in previous year by turtles	4	1	5

At East Pond, in June – July 2010, we found 21 turtle nests, of which ten were within the experimental plots and 11 were within the enclosure but outside the plots (Figure 4). There were two additional nests at the experimental plots at West Pond. Turtles preferentially used the recently weeded and turned-over plots (Table 8; Figure 6). The experiment documented that turtles readily used recently turned-over ground for nesting and that simply exposing small areas of bare ground at strategic locations is an effective methods for habitat restoration/enhancement. The results also suggest that encroachment of vegetation indeed is a problem for nesting turtles at the site. We will continue monitoring the site in spring 2011 to examine whether nest emergence from the experimental plots is successful and whether the treatment results in increased number of successful nests when compared to two previous years.

Figure 4. Set-up of experimental plots and their use by nesting turtles at East Pond in June – July 2010.

Disturbed nest refers to events where a complete but uncovered nest was found.
New nests refer to completed, covered nests; they include one Red-eared Slider nest and one nest found in July for which species of turtle is uncertain.

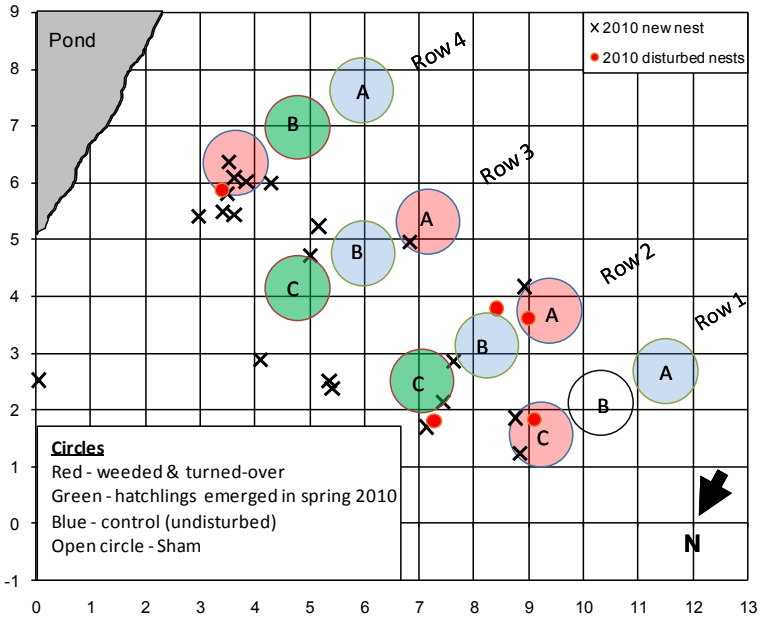
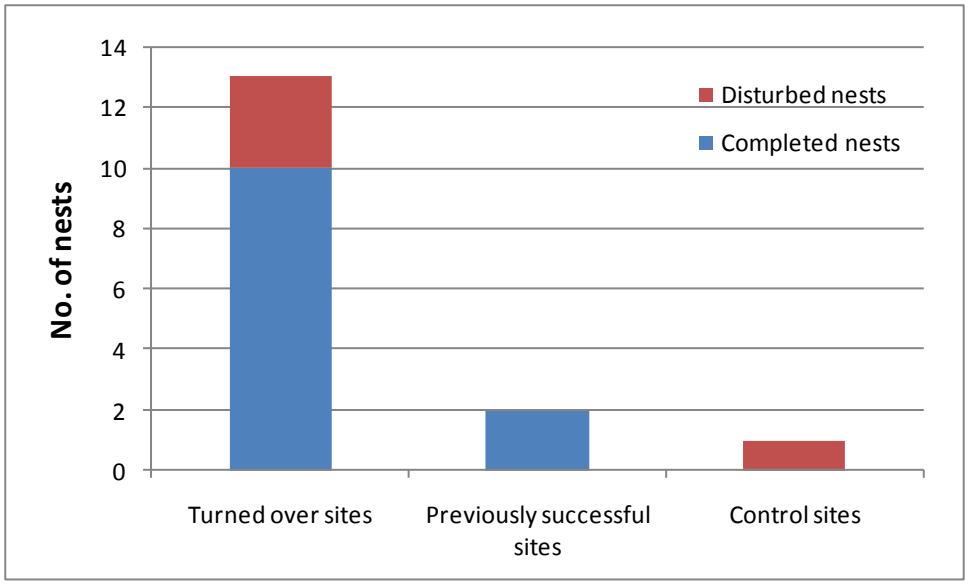


Figure 5. Communal turtle nesting area at Elk/Beaver Lake Regional Park, showing enclosure and experimental plots with exposed soil.

Table 8.Number of nests on experimental plots at East and West Pond nesting areas, June - July 2010.

Treatment	East Pond		West Pond	
	Completed nests	Disturbed nests	Completed nests	Total
Turned over sites	8	3	2	13
Previously successful sites	2	0	0	2
Control sites	0	1	0	1
Other	11	1	0	12
Total	21	5	2	28

Figure 6. Use of experimental plots by nesting turtles at Beaver Ponds in June - July 2011.



Swan Lake and Christmas Hill Nature Sanctuary

A. Nesting area monitoring

A total of 11 turtle nests were found in June – July 2010, most of them by Swan Lake/ Christmas Hill Nature Sanctuary staff or visitors, who reported observations of turtles digging nests or laying eggs. We inspected each of the nest sites, usually within a day of the observation. Three nests were confirmed to belong to the Western Painted Turtle (eggs laid on 11 and 17 June and 6 July) and four to the Red-eared Slider (eggs laid on 5, 6, 8, and 20 July); the identity of the turtle species could not be confirmed for four nests (eggs laid on 11 and 23 June and on 12 and 29 July). All the confirmed Red-eared Slider nests were from July, suggesting that this species nests relatively late in the season. All but one nest were on a south or south-east facing slope within approximately 30 m from the lake shore, and all were in areas where the soil had been either recently disturbed due to construction activities or habitat restoration, or where it was exposed on paths or in a tended native plant garden. One of the Red-eared Slider

nests was found on the lawn north of the Nature House. Both species of turtles were frequently seen in the lake, and two turtle nests, including a confirmed Western Painted Turtle nest, were previously found on the same slope (Ovaska and Engelstoft 2010).

B. Nesting area restoration/ enhancement

Turtle nests in the native plant garden and construction areas were vulnerable to inadvertent disturbance. Therefore, we recommended that a turtle nesting area be created on the lower slope below the native plant garden and close to the lake. A detailed plan was provided to Swan Lake Nature Sanctuary, including site selection and methods (Appendix 1). The site chosen for the nesting ground was vegetated with mostly introduced grasses and weeds. The nesting ground construction took place on 24 June at this site and on 30 June at another nearby site. The second site was established by the field office where the caretaker had frequently seen turtles milling on land in previous years. The first step was clearing the ground of vegetation at both sites. During weeding, old, shriveled turtle eggs were found at the main site, indicating that it had been used sometime in the past by nesting turtles, so changing the activity from nesting site creation to restoration. As at Elk/Beaver Lake, we set up the activities as an experiment, so that the effects could be monitored and successful treatments expanded in the future (Table 9).

Table 9. Experimental treatments at restored nesting sites at Swan Lake Nature Sanctuary.

Treatment	# plots (main site)	# plots (secondary site)	Total
A. Existing substrate weeded & turned over	4	1	5
B. Sand and garden soil added in ratio of 60%:40% (SAND)	4	1	5
C. Sand and garden soil added in ratio of 40:60% (SOIL)	4	1	5

Because of the establishment of the nesting areas late in the season, we did not expect results in the same year. However, a turtle of unknown species nested at the main site immediately after it was weeded and the soil turned over, but before the treatments were applied on 23 June. A Western Painted Turtle, caught on surveillance camera on 6 July, laid eggs in the SAND treatment. We also found sign of a recent turtle nest, species unknown, on 12 July, also in the SAND treatment (see Figure 7 for the restored site and location of turtle nests). We plan to continue monitoring the site both for emerging nests and for new nests in 2011.

Figure 7. Restored nesting area at Swan Lake-Christmas Hill Nature Sanctuary, showing the site before and after restoration.

Capital City Allotment Gardens

To solicit observations of nesting turtles, we distributed outreach materials and visited the Capital City Allotment Gardens where turtles have been found nesting in garden beds on several occasions in the past (Ovaska and Engelstoft 2010). This site is connected to Swan Lake along Swan Creek, but a major highway separates the two areas. Turtles may use the culvert under the highway to travel between the gardens and the lake, but whether the culvert is currently passable is questionable. On 28 July 2010, a gardener inadvertently unearthed turtle eggs while turning over soil. We inspected the site and the eggs on the same day. There were a total of 11 eggs (length: 30.0 - 33.5 mm; width: 20.3 - 21.6 mm; some were dented and partially dehydrated). We reburied the eggs at the nearest safe spot at the edge of the garden plot, about 5 m from the original location. The gardener will monitor the nest for emerging hatchlings in spring 2011.

Matheson Lake Regional Park

We visited a previously identified turtle nesting area on 11 May 2010 but found no sign of emerged nests. In 2008, we found several turtle nests on a sparsely vegetated slope of a small island in Matheson Lake (Engelstoft and Ovaska 2008), but the nests suffered from heavy predation over the winter, probably by mink or otter (Ovaska and Engelstoft 2009). We have no evidence of successful emergence of nests at this site in either 2009 or 2010. The Western Painted Turtle population in the lake appears to be small (only a few individuals ever sighted per survey) and may not be self-sustaining.

Eagle Lake area

On 29 June 2010, we visited a landowner in the Eagle Lake area, who had previously received nesting habitat enhancement plans as part of this project (Ovaska and Engelstoft 2010). The landowner was in the process of constructing turtle nesting habitat along the side of the driveway according to the plan (Figure 8). He had previously observed turtles in the small pond and lawns of the property. The nesting ground was constructed late in the season and will be available to turtles in 2011.

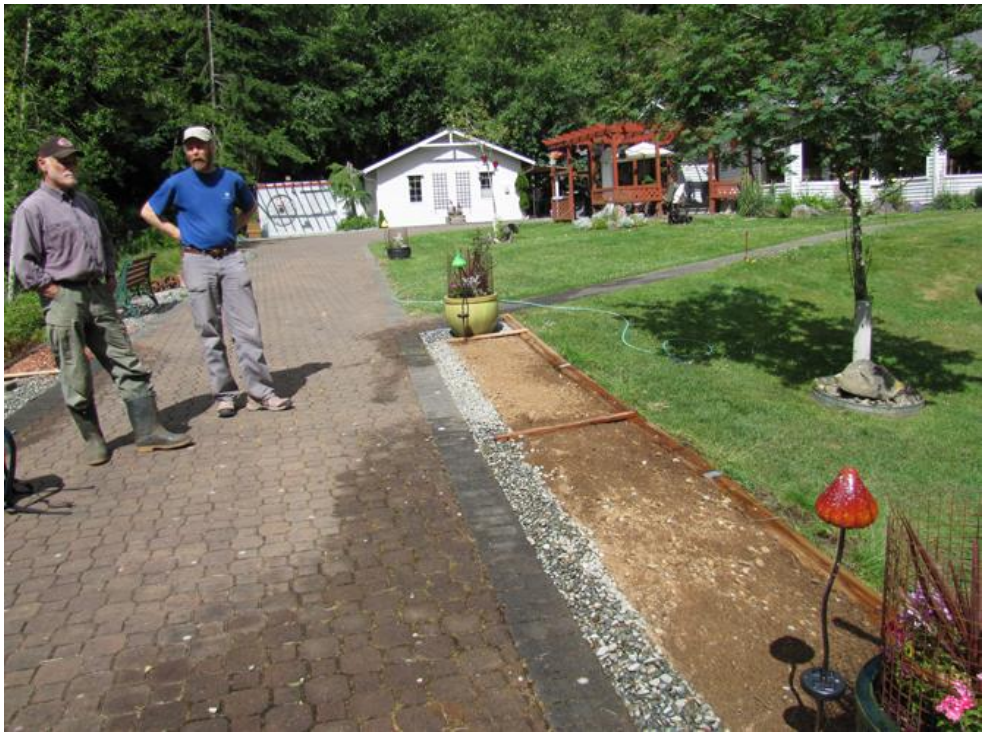
Alberni Valley

We inspected previously identified nesting areas at the Airport Wetlands site in spring – early summer in 2010 (on 21 April, 25 May, and 11 and 21 June). Turtles nest in an abandoned gravel pit, along an old spur road, and along the shoulders the main logging road near the northwest end of the wetland (Engelstoft and Ovaska 2008, Ovaska and Engelstoft 2010). On 21 April, we found two emerged nests and one apparently depredated nest in the gravel pit. This site had numerous nests and nesting attempts in summer of 2009, but apparently only a few nests were successful. We found two new nests and several test holes at this site on subsequent visits during the egg-laying period, and observed an adult female there on two occasions, on 25 May and 21 June. At the spur road site, about 100 m from the gravel pit, we found an emerging nest with at least two hatchlings still in the nest and one nearby on the surface on 25 May 2010.

On this visit, we also observed test holes and an adult female crossing the road towards the nesting site, indicating that there is overlap in the timing of hatchling emergence and egg-laying. On 21 June, we found 86 test holes, five new nests, and an adult female in the process of digging a nest at the spur road. To access the site from the wetland, turtles must cross a main logging road.

A visit to previously identified nesting sites at Devil's Den Lake on 21 April resulted in no observations of emerged nests. Turtles nest within pockets of deeper soil on rocky bluffs at this site (Engelstoft and Ovaska 2008).

Figure 8. Nesting habitat constructed by a landowner according to site-specific plans for this property.



Conclusion and Recommendations

Intensive monitoring of Western Painted Turtle nesting areas in Elk/Beaver Lake Regional Park from 2008 to 2010 revealed that hatchlings emerge from mid-March to late May after over-wintering in the nests, and females lay their eggs from end of May to mid-July. In 2010 hatchling emergence was slightly earlier than in 2009, and egg-laying continued somewhat later into summer than in previous years, probably reflecting weather conditions. Nest success, as indicated by the proportion of emerged nests, was relatively high (50% in 2009; 79% in 2010) with little evidence of predation at a communal turtle nesting ground. Inadvertent disturbance of nesting turtles by park users and over-growth of nesting grounds with grass and weeds were deemed to be threats to this site.

Nesting ground restoration/ enhancement was undertaken in Elk/Beaver Lake Regional Park and in Swan Lake and Christmas Hill Nature Sanctuary. The activities consisted of exposing bare ground by weeding and turning over soil and/or adding sand and garden soil in different proportions to small (1 m^2) experimental plots. The treatments were carried out as controlled experiments, so that their effectiveness can be evaluated and most successful treatments expanded. At Elk/Beaver Lake, we found 12 completed nests on the experimental plots. Turtles preferentially nested on the turned-over and weeded plots when compared to the unmodified control plots and to plots that had produced hatchlings in spring from the previous year's nests. At Swan Lake, the activities were completed late in the egg-laying season (end of June), and only two turtles nested at the restored site, both at plots with a high proportion of added sand (60% sand; 40% soil).

In Alberni Valley, we found emerged nests from late April to late May and nesting females from late May to late June at previously identified turtle nesting sites. At this site, we found evidence of numerous nesting attempts both in 2009 and 2010, but nesting success was low as evidenced by few emerged nests. The turtles appear to be nesting on less than optimal hard-packed gravel substrates, and adults and hatchlings are potentially exposed to road mortality.

Recommendations:

- At Elk/Beaver Lake Regional Park, continue monitoring and enhancing known nesting areas, including experimentally enhanced plots, for hatchling emergence and nesting females from spring to summer 2011; conduct weeding on the experimental plots, as deemed necessary to maintain suitable habitat.
- At Swan Lake and Christmas Hill Nature Sanctuary continue nesting habitat restoration and monitoring of enhanced nesting area and other known nest sites from 2010, including those of the Red-eared Slider, for hatchling emergence and use by nesting females in 2011.
- In Alberni Valley, engage in nesting habitat enhancement at safe sites and monitor the effectiveness.

Chapter 3: Enhancement of Aquatic Habitat

Corresponding Objective

Objective 3: Enhance aquatic habitats by installation of basking logs.

Rationale

Suitable basking sites are important for freshwater turtles. Elevated body temperatures attained during basking aid digestion and other vital processes (COSEWIC 2006). Habitat assessment indicated that basking sites appear to be in short supply at several sites occupied by the Western Painted Turtle within CRD (Ovaska and Engelstoft 2009, 2010).

Approach & Methods

We augmented basking sites by adding logs to four water bodies at three sites within CRD on southern Vancouver Island: two ponds at Elk/Beaver Lake Regional Park, Swan Lake within Swan Lake/ Christmas Hill Nature Sanctuary, and a private pond in Saanich (referred to as Trevlac Pond). At one of the ponds in Elk/Beaver Lake Regional Park, logs where turtles were seen basking in previous years had become water-logged and had sunk. The other pond in the park lacked logs, and turtles were seen basking along the shoreline, where they were subject to disturbance. Both Swan Lake and Trevlac Pond had only a few logs and were deemed to benefit from additional basking sites.

For basking sites, we initially used boards and available logs or sections of logs from newly felled trees. Subsequently, mill-end slabs from trees that had been processed for lumber became our preferred source for basking logs; the slabs were relatively easy to handle, could be obtained economically in large quantities, and could be anchored to the shore or emergent vegetation with ease. The slabs had bark on one side, while the other side was flat and milled. The slabs that we used ranged from 2.5 m to 3.8 m in length and were, on the average, 31 cm wide and 7 cm deep at the end jutting out into the water. The slabs were generously donated by Malahat Eco Forest Products Limited for this project.

We monitored the use of the installed logs by turtles and other wildlife. We also monitored the condition of the installed logs over time to evaluate the effectiveness of the methods used.

Results & Discussion

Elk/Beaver Lake Regional Park

On 2 June 2010, we installed four basking logs to a pond (referred to as East Pond) near sites where we had previously seen basking turtles. Two of the logs were mill-end slabs, as described in **Approach & Methods**, which we placed perpendicular to the shoreline with the bark side facing up. We drilled a hole near one end of each slab and

anchored them to the bottom substrate at the shoreline with a sturdy stick pushed through the hole. One basking log consisted of an existing, water-logged log that we elevated above the water surface by placing a piece of wood underneath it, secured in place with nails. Another basking log consisted of a large, recently fallen log that had been cut into sections and left on the site. We anchored the log in the water parallel to and against the shoreline with rope and nailed a board onto it to form a ramp, allowing access to turtles. A previously installed floating board was removed and used as the ramp.

On 18 June 2010, we installed four slabs at another pond (referred to as West Pond). We used a refined method for anchoring the slabs, which consisted of pushing a 5' length of 0.5" diameter rebar through a hole drilled at one end of the slab and into the bottom mud or matted shoreline vegetation. The end of the rebar was bent at a 90° angle at the top end to maintain a firm grip of the slab. A previously installed floating board, anchored to the bottom with a rock tied to a rope, was left in place (Ovaska and Engelstoft 2009), and a slab was installed next to it to compare their use by turtles. We checked the installed basking logs on 15 days in 3 June – 11 July 2010 at East Pond and on ten days in 22 June – 11 July at West Pond.

At East Pond, Western Painted Turtles frequently used two of the logs (Log A – mill-end slab and Log B – existing, elevated log), but were seen only once on Log C and never on Log D (Table 10). The placement of the logs most likely accounted for the difference; Logs A and B were in the sunniest locations. First turtles were seen on the logs the day after their installation (Figure 9). Other animals observed on the logs were Great Blue Heron, Wood Duck, and American Bullfrog.

At West Pond, both Western Painted Turtles and Red-eared Sliders used all four installed logs (Table 10). A turtle was seen on the logs on 22 June during the first check, four days after the installation of the logs. Other animals observed on the logs were Hooded Merganser, Wood Duck, Mallard, and Common Gartersnake. In contrast to the slabs anchored to the shoreline, no turtles were observed on the floating board either in 2010 or 2009 or on a similar floating board in East Pond in 2009 (Ovaska and Engelstoft 2009).

Table 10. Use of installed basking logs by turtles and other wildlife in Elk/Beaver Lake Regional Park. Checks with no animal observations excluded.

A. Beaver Pond, East:

Log A - mill-end slab; Log B - existing log, elevated; Log C - Large log with ramp; Log D - mill-end slab

Date	Time	Log ID	Air temp, °C	% cloud	Species	No. seen
3-Jun-2010	14:00	A	14	80	Western Painted Turtle	1
4-Jun-2010	13:30	A	16	60	Western Painted Turtle	4
7-Jun-2010	11:22	A	15	30	Great Blue Heron	1
7-Jun-2010	12:36	A	17	40	Western Painted Turtle	2
11-Jun-2010	11:43	A	14	100	Western Painted Turtle	1

Date	Time	Log ID	Air temp, °C	% cloud	Species	No. seen
13-Jun-2010	17:10	A	22	0	Western Painted Turtle	3
15-Jun-2010	13:20	A	15	80	Western Painted Turtle	3
18-Jun-2010	14:11	A	18	50	Great Blue Heron	1
3-Jun-2010	14:00	B	14	80	Western Painted Turtle	1
4-Jun-2010	13:30	B	16	60	Western Painted Turtle	1
5-Jun-2010	19:35	B	18	30	Western Painted Turtle	1
18-Jun-2010	18:45	B		10	Western Painted Turtle	2
22-Jun-2010	10:50	B	20	40	American Bullfrog	1
15-Jun-2010	13:20	C	15	80	Western Painted Turtle	1
3-Jul-2010	13:10	C	19	60	American Bullfrog	2
18-Jun-2010	14:11	D	18		Wood duck (female with 3 chicks)	4
B. Beaver Pond, West:						
Log A - D: mill-end slabs						
22-Jun-2010	11:08	A	20	40	Red-eared Slider	1
22-Jun-2010	11:08	A	20	40	Western Painted Turtle	1
24-Jun-2010	9:50	A	21	80	Western Painted Turtle	1
24-Jun-2010	9:50	A	21	80	Red-eared Slider	1
24-Jun-2010	9:15	A	21	95	Western Painted Turtle	1
26-Jun-2010	9:33	A	14.2	90	Western Painted Turtle	1
24-Jun-2010	9:50	B	21	80	Western Painted Turtle	1
11-Jul-2010	12:06	B	22.7	5	Red-eared Slider	1
22-Jun-2010	11:08	C	20	40	Wood duck (chick)	1
24-Jun-2010	9:50	C	21	80	Wood duck (brood)	3
24-Jun-2010	9:50	C	21	80	Common Gartersnake	1
26-Jun-2010	9:33	C	14.2	90	Hooded Merganser	1
3-Jul-2010	13:20	C	19	60	Wood duck (brood)	3
7-Jul-2010	8:36	C	19.6	0	Hooded Merganser	1
7-Jul-2010	8:36	C	19.6	0	Western Painted Turtle	2
8-Jul-2010	9:26	C	22.8	0	Western Painted Turtle	2
9-Jul-2010	10:10	C	23.2	0	Western Painted Turtle	2
10-Jul-2010	10:29	C	20.8	0	Western Painted Turtle	2
11-Jul-2010	9:41	C	19.2	0	Western Painted Turtle	2
11-Jul-2010	12:06	C	22.7	5	Western Painted Turtle	1
24-Jun-2010	9:50	D	21	80	Red-eared Slider	1
24-Jun-2010	9:50	D	21	80	Wood Duck	1
24-Jun-2010	9:15	D	21	95	Red-eared Slider	1
26-Jun-2010	9:33	D	14.2	90	Mallard	1
3-Jul-2010	13:20	D	19	60	Red-eared Slider	1
7-Jul-2010	8:36	D	19.6	0	Wood Duck	4
7-Jul-2010	8:36	D	19.6	0	Western Painted Turtle	1
8-Jul-2010	9:26	D	22.8	0	Red-eared Slider	1
9-Jul-2010	10:10	D	23.2	0	Red-eared Slider	1
11-Jul-2010	12:06	D	22.7	5	Red-eared Slider	1
27-Jun-2010	9:15	Floating board	15	100	Wood Duck (chick)	1

Date	Time	Log ID	Air temp, °C	% cloud	Species	No. seen
3-Jul-2010	13:20	Floating board	19	60	Wood Duck (chicks)	3

Figure 9. Western Painted Turtles on installed basking logs at Swan Lake (top) and Beaver Ponds (bottom) shortly after installment of the logs in 2010.

Swan Lake and Christmas Hill Nature Sanctuary

On 15 – 16 June 2010, we installed 12 basking logs (mill-end slabs) in Swan Lake, distributed in sunny locations along the north side from the west to east end of the lake. The slabs were placed perpendicular to the shoreline and anchored at one end to the shoreline vegetation with a rebar, as described for West Pond at Elk/Beaver Lake Regional Park (Figure 10). Two of the slabs were paired with existing floating boards, installed by the sanctuary staff in previous years, for comparisons with the anchored slabs. In addition to the slabs, on 2 June the sanctuary staff placed a large, dead fallen tree with a root mass attached into the lake to augment basking and loafing sites for wildlife. We monitored the installed slabs and the two floating boards for use by turtles on 5 days from 17 June to 25 August 2010 and the large log on two additional days in June.

The Western Painted Turtle was observed using all but four of the slabs and also used the big log (Table 11). Additionally, the nature sanctuary staff reported regularly observing turtles on the slabs and the big log throughout the summer. We saw the first turtle, a small juvenile, clambering onto a slab within ½ h of its installation on 16 June, while we were still in the process of installing the remaining logs (Figure 9). We never observed turtles on the two floating boards, although the boards were readily accessible to turtles and only a few metres from the shoreline next to the slabs. In addition to the Western Painted Turtle, other wildlife observed on the basking logs included Red-eared Slider, Great Blue Heron, and Mallard (Table 11).

During an inspection of the installed logs on 25 August, we noted that three of the slabs were under water and not useful for basking. The slabs seemed have been weighed down by overgrown vegetation. This possibility needs to be taken into consideration when slabs are installed.

Figure 10. Installation of basking logs (mill-end slabs) at Swan Lake.

Table 11. Use of installed basking logs by turtles and other wildlife in Swan Lake and Christmas Hill Nature Sanctuary. Checks with no animal observations are not shown.

Installed logs 1 – 13 were mill-end slabs with the exception of Log 12, which was a large round log with the roots.

Date	Time	Log ID	Air temp, °C	% cloud	Species	No.
28-Jun-2010	15:52	1		98	Western Painted Turtle	1
17-Jun-2010	15:00	2			Western Painted Turtle	1
18-Jun-2010	15:00	2	23	5	Western Painted Turtle	2
28-Jun-2010	15:52	2		98	Mallard, brood	3
17-Jun-2010	15:00	3			Western Painted Turtle	1
18-Jun-2010	15:00	3	23	5	Red-eared Slider	1
28-Jun-2010	15:52	3		98	Western Painted Turtle	1
28-Jun-2010	15:52	4		98	Western Painted Turtle	1
17-Jun-2010	15:00	5			Western Painted Turtle	2
28-Jun-2010	15:52	5		98	Western Painted Turtle	1
18-Jun-2010	15:00	6	23	5	Mallard hen with chicks	6
16-Jun-2010	12:57	8			Western Painted Turtle	1
18-Jun-2010	15:00	8	23	5	Western Painted Turtle	1
24-Jun-2010	11:30	8	20		Red-eared Slider	1
28-Jun-2010	15:52	8		98	Red-eared Slider	1
28-Jun-2010	15:52	8			Western Painted Turtle	1
18-Jun-2010	15:00	9	23	5	Western Painted Turtle	1
18-Jun-2010	15:00	11	23	5	Western Painted Turtle	1
15-Jun-2010	17:30	12		70	Western Painted Turtle	1
15-Jun-2010	17:30	12		70	Red-eared Slider	1
16-Jun-2010	13:09	12			Western Painted Turtle	1
18-Jun-2010	15:00	12	23	5	Great Blue Heron	1
18-Jun-2010	15:00	13	23	5	Mallard hen with chicks	5
28-Jun-2010	15:52	Floating board 4b		98	Mallard, chick	1
28-Jun-2010	15:52	Floating board 5b		98	Mallard, adult	3
18-Jun-2010	15:00	Floating board 5b	23	5	Mallard, brood	3

Trevlac Pond

The Western Painted Turtle has been confirmed from the nearby Maltby Lake (Engelstoft and Ovaska 2008), and it probably also uses this pond. At the request of the property managers, we installed five basking logs (mill-end slabs) to the pond on 17 June 2010, distributed at locations deemed optimal for basking turtles and that were readily visible from the shore. As at Swan Lake and West Pond in Elk/Beaver Lake Regional Park, the slabs were placed perpendicular to the shoreline and anchored at one end to the shoreline vegetation with a rebar. There were two previously installed floating boards in the pond. We inspected the slabs and boards twice, on 22 and 24 June, but found no turtles using them during the visits. A Red-eared Slider was on the

bank immediately adjacent to one slab on 24 June, and two Wood Duck chicks were on another slab on 22 June.

Conclusion and Recommendations

In June 2010, we installed basking logs to four water bodies, where turtles were deemed to benefit from this action: two ponds at Elk/Beaver Lake Regional Park, Swan Lake, and a pond within a rural area in Saanich (Trevlac Pond). Mill-end slabs (2.5 m to 3.8 m in length; average of 31 cm wide), installed perpendicular to the shoreline and secured to the bottom substrate or shoreline vegetation at one end, were readily used by basking turtles and provided a logistically feasible method for basking site enhancement. At the ponds in Elk/Beaver Lake Regional Park and at Swan Lake, Western Painted Turtles adopted the slabs almost immediately and used them regularly, suggesting that basking sites indeed were in short supply. An installed large log with a root mass attached also provided a suitable basking site for turtles at Swan Lake. In contrast, turtles appeared not to use floating boards anchored to the bottom about 5 m from the shore but that were not secured to the shoreline.

Recommendations:

- Monitor condition of all installed basking logs from spring to fall 2011 in response to water level fluctuations; ensure that all logs are available to turtles and optimally exposed above the water level.
- Continue monitoring the use of installed logs by turtles, especially at Trevlac Pond where there was little monitoring in 2010; encourage residents by Trevlac Pond and staff at Swan Lake and Christmas Hill Nature Sanctuary to engage in this activity and keep records of their observations.

Chapter 4: Telemetry and Mark-recapture Study

Corresponding Objective

Objective 4: Obtain information on movements and important seasonal habitats through telemetry and on population size, trends, and demography through mark-recapture.

Rationale

Detailed information on movements of turtles is needed to identify the location and characteristics of important habitats, such as nesting, hibernation, and foraging areas, and migration routes. Estimates of population size, trends, age-structure and survivorship can be obtained through mark-recapture studies. All the above information helps with appropriate management of habitats and developing mitigation measures for problem areas.

Approach & Methods

Telemetry and mark-recapture studies of the Western Painted Turtle were carried out at Swan Lake within Swan Lake-Christmas Hill Nature Sanctuary with help and support

from the nature sanctuary grounds manager and staff. This site was chosen because it supports an apparently self-sufficient population of the Western Painted Turtle and because of specific information is needed for the site, where a management plan for the lake is currently under development. Furthermore, a busy highway intersects turtle habitats at the outlet stream of Swan Lake, and information is needed on seasonal migration routes to mitigate possible road mortality. Information on how the Western Painted Turtle uses the lake and surrounding areas will help the Swan Lake and Christmas Hill Nature Sanctuary management team to implement plans to enhance, create and protect nesting, basking, and hibernation sites, and in restoring the lake to its natural state. It is hoped that the information collected at this site can be extended to other similar habitats within the CRD.

Turtles were captured using hoop nets (182 cm or 6' long; with 90 cm or 2.5' diameter hoops with mesh size of 2.54 cm or 1", and a funnel entry; Memphis Net and Twine Co. Ltd.). The hoop nets were attached to shoreline vegetation or logs in areas where we had seen turtles, and they were baited with sardines. The traps were checked in the morning before 9:00 h and in the afternoon after 15:00 h. Turtles caught were transported in plastic totes for processing in the lab.

All turtles captured were measured, photographed, and their sex and the reproductive condition of females were noted. Measurements and notching scheme for individual identification follow provincial RISC standards (Resource Inventory Standard Committee 1998a). We took the following measurements: carapace length (straight line rather than curved), width and height; plastron length and width (straight line); left and right middle claw length on both front feet; and tail length, width at shell and cloaca, and the length from shell to cloaca. We used a 30 cm electronic caliber with 6.3 cm jaws (Jet, Model # JEDC-12) for measurements. Sex was determined by a combination of characters, including front feet claw length (longer in males), carapace height (higher in females), tail length (longer in males) and curvature of the plastron (more concave in males). The following photographs were taken of each turtle: carapace, plastron, both front feet, head pattern, and any abnormalities. In an attempt to determine if mature females had undeposited eggs in the body cavity, we gently felt with index fingers the body cavity from front of the hind legs.

Each turtle was individually marked by filing a unique combination of notches on scutes at the carapace edge (Resource Inventory Standard Committee 1998a). We filed notches in the middle edge of the peripheral scutes using a triangular file (15 cm long; 0.7 cm wide). The small scute at front center and three middle edge scutes (0, 4, 5, and 6 counted form the front) were not used. The scutes that were used were numbered right or left 1, 2, 3, 4, 5, and 6. The first scute on the left (L1) was notched in all turtles from Swan Lake as a location identifier. If a turtle had distinct damage to the peripheral scutes, this was used in identification. We disinfected the notches with Stanhexidine® (4% chlorhexidin gluconate solution with 4% isopropyl alcohol).

We attached a radio transmitter to the first three males and three females caught that were heavy enough to ensure that the weight of the attachments was well below 5% of

the animal's mass (Resource Inventory Standard Committee 1998b). We used two sizes of transmitters (Holohill AI-2F; frequency: 149 – 151 MHz; antenna length: 25.4 cm; total weight of tag: 23 g or 30 g). The smaller tags were used for two smaller males and have a battery life of 30 months; the larger tags were used for the remaining four larger turtles and have a battery life of 36 months. We attached the transmitter with nuts and bolts to scutes (7^{th} and 9^{th}) at the right posterior edge of the carapace. We first disinfected the attachment site and all equipment and materials used with 70% isopropyl rubbing alcohol. Materials used included stainless steel washers (6, 3 mm or #6), bolts (#4, 2.77 mm or 7/64" wide and 12.7 mm or ½" long), bolts with nylon lock (#4) used for attaching the tag, and a drill bit (2.77 mm or 7/64") used to drill two holes. Before starting the procedure, we ensured that the transmitter functioned properly. While the turtle was firmly held on the edge of a counter by one person, the other positioned the tag, marked the place, and drilled the first hole. The drill site was disinfected again before a clean bolt with a washer was inserted from below through the hole and transmitter flange. Another washer was added, and the nut was screwed onto the bolt. With the transmitter attached loosely at one end, a second hole was marked and drilled, and then bolted in place. Both bolts were tightened so that they held the transmitter securely in place but not so tight that they would damage the scutes. After the tag was attached, we applied water-resistant silicon sealer to cover up the bolt ends and any gaps to minimize the possibility of entanglement of the turtle in vegetation or submerged branches. When the silicon was firm, the turtle was released in the lake close to where it was captured.

The turtles outfitted with a transmitter were located with a receiver (Communication Specialist® R1000) attached with a cable to a foldable Yagi® antenna, both tuned to the tag frequencies. The turtles were located either from a canoe or on foot from land. For locations obtained from a canoe, we recorded coordinates with a hand held GPS (Garmin® Map60c) as close to the source of the signal as possible. For locations obtained from land, we triangulated the position from floating walk ways, wharfs, or from the shoreline. The center line was drawn unto a sketch map. The point where the lines intersected was used as the location of the turtle. Each estimated point was rated as having a small, moderate or large error. Data were entered onto field data sheets and later transferred into an online Google® Document spreadsheet. The results reported here are preliminary. More complete analyses will be conducted after a full year of study.

Results & Discussion

Mark-recapture

There were two trapping periods, on 5 – 7 and 23 – 27 August 2010, after the breeding season. We used four traps during the first trapping period and four to six traps during the second period for a total of 22.5 trapping days and 49 checks of traps. The first trapping period was cut short, when we realized that the radio tags (not yet attached to turtles) were not functioning properly.

A total of 18 individual Western Painted Turtles were captured during the two trapping periods (Table 12). There was one capture of a Red-eared Slider. Eight of the 14 Western Painted Turtles from the first period were recaptured during the second period. Most individuals were captured repeatedly; four individuals were captured only once. The relatively high recapture rate suggests either that the population in Swan Lake is small or that the capture probability is uneven with several "trap-happy" individuals. We anticipate collecting more data through mark-recapture in 2011, which should permit the estimation of population size and demographic parameters.

Most captures (63%, n=32) during the day, although only 34% of the trapping effort was during day-light hours. Most turtles were captured in the afternoon, suggesting that they were feeding during the day. All turtles were captured along the north shore of the lake, but capture success varied with trap location. One trap, located east of the wharf by the nature house, trapped 38% (n=33) of all turtles (large white diamond in Figure 11).

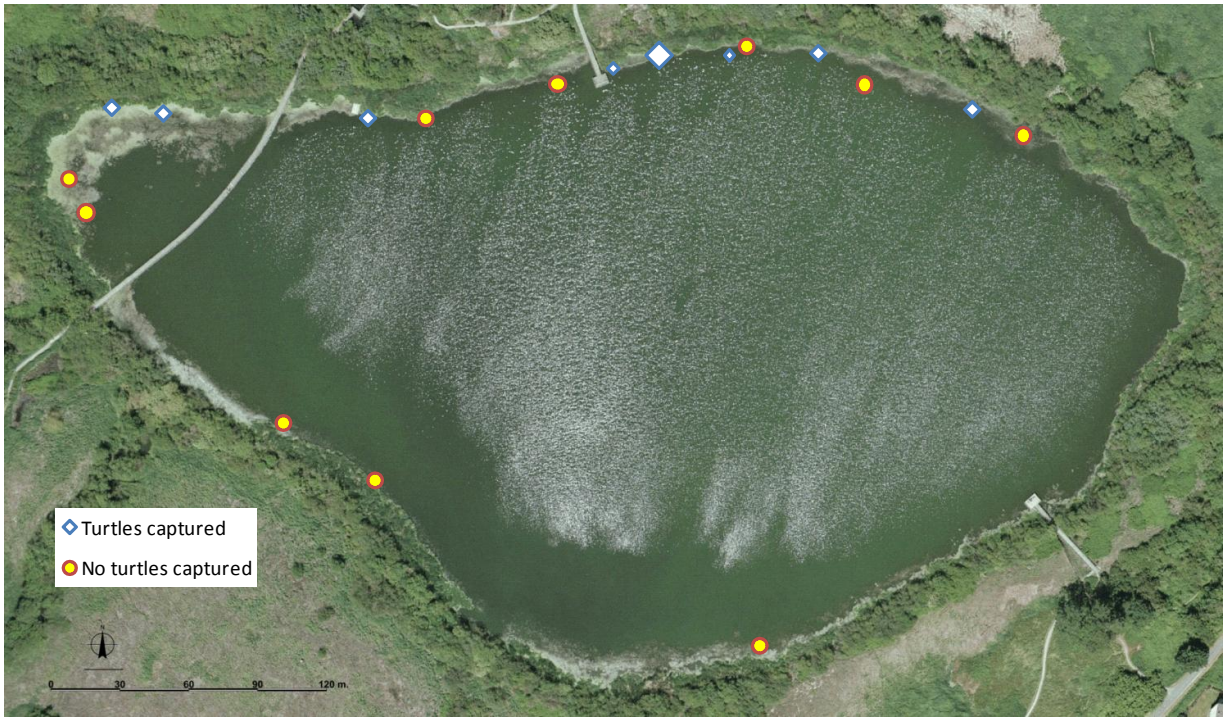
Table 12. Summary of turtles caught at Swan Lake in August 2010.

Turtle ID[1]	Sex or rel. age[2]	Mass (g)	Carapace length (mm)	Date of 1st capture	Other capture dates	Total # captures
L.1.2.4	J	351	132	06-Aug		1
L.1.2.5	J	377	141	06-Aug	26-Aug	2
L.1.2.6	M	392	145	06-Aug	25-Aug	2
L.1.2.7	J	146	101	06-Aug		1
L.1.2.8	F	1451	222	07-Aug	27-Aug	2
L.1.2.9 -Luisa	M	391	145	07-Aug	24-Aug	2
L.1.3.4	J	158	102	07-Aug		1
L.1.3.5	F	1184	202	26-Aug		1
L.1.3.6	M	789	179	26-Aug		1
L.1.3.7 -Johanna	F	1104	197	26-Aug	27-Aug	2
L.1.3	J			26-Aug		1
L.1.4	J	416	144	06-Aug	07-Aug	2
L.1.5	M	330	132	06-Aug	24, 27 Aug	3
L.1.6 -Ted	M	660	181	06-Aug	24, 27 Aug	4
L.1.7	F	724	172	06-Aug		1
L.1.9	M	934	197	07-Aug	24-Aug	2
L4&5	F	802	189	06-Aug	24, 27 Aug	3
R2&3	F	745	181	06-Aug	same day	2
Total						**33**

[1]Notch numbering system; three turtles were named by students of Camosun College Environmental Technology Program, who contributed the tags.

[2]J-juvenile; F-adult female; M-adult male

Figure 11. Trap locations and where turtles were captured in Swan Lake, August 2010.



Telemetry

Of the Western Painted Turtles captured at Swan Lake in August 2010, three males and three females were large enough to safely carry a radio-transmitter. The first three turtles were tagged and released on 24 August and the remaining three on 27 August.

From 30 August to 17 December 2010, we located the tagged turtles 30 times; three additional attempts had to be aborted due to either icy condition or equipment failure. The turtles were located approximately once a week, nine times from a canoe and 24 times on foot.

In August – September 2010, the tagged turtles used much of the lake (Figure 12). However, we found no tagged turtles along a relatively long stretch at the south-west corner of the lake. From the canoe surveys, the most accurate method, we found that most tagged turtles were close to the shoreline. From the beginning of November on, the tagged turtles tended to remain stationary, and by December the fixes were from approximately the same location (within about 5 m) week after week. Five of the turtles were in the south east corner and one was in the west end of the lake. At this time, all turtles were found on the flood plain under willows and other shrubs in water depths of 30 – 125 cm.

Detailed movements of one turtle (L1.6 – Ted) are shown as an example (Figure 13). This turtle spent most his time at the east end of the lake in August – September but on

two occasions was found swimming in the middle of the lake. In November – December, he hibernated with three other tagged turtles in the southeast end of the lake.

Figure 12: Main areas used by six Western Painted Turtles tagged for radio-telemetry at Swan Lake in 2010.

August – October (blue polygons); November – December (white polygons: small – 1 turtle; large – 4 turtles).

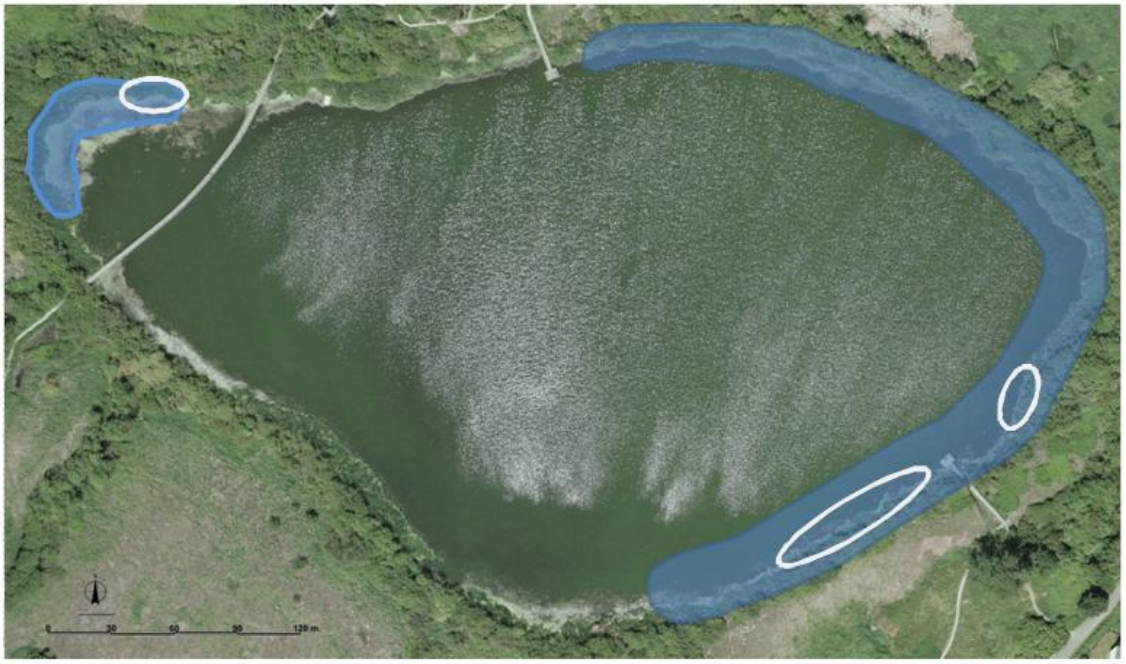
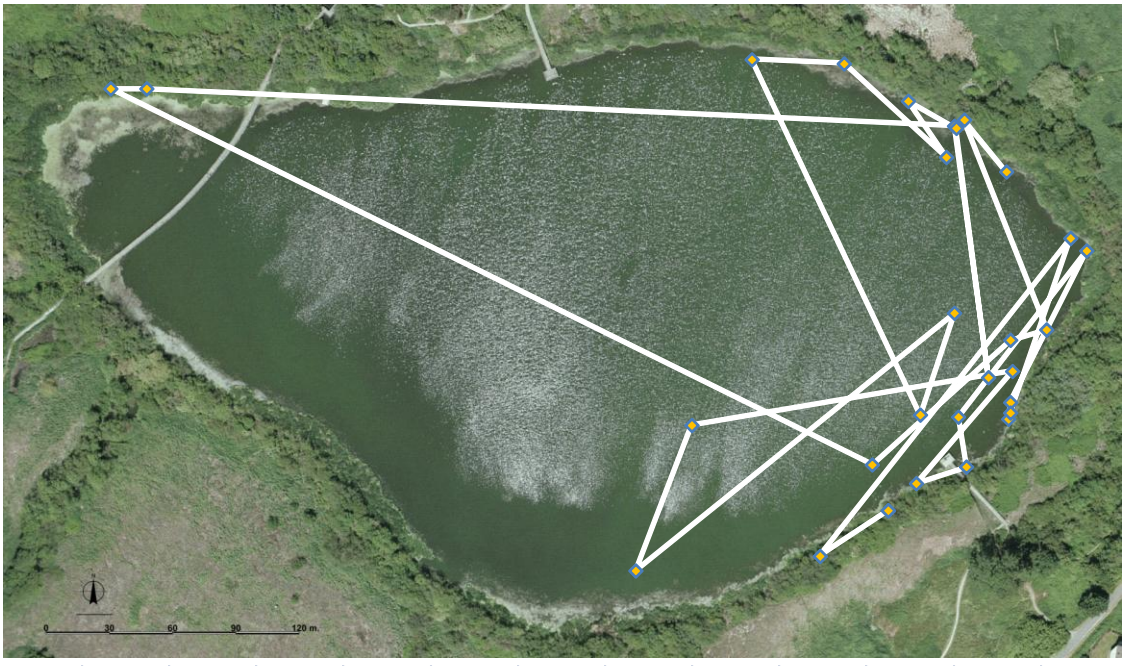


Figure 13. Movement pattern of a male Western Painted Turtle (L1.6-Ted) located with telemetry 30 times at Swan Lake from August to December 2010.



Conclusion and Recommendations

A mark-recapture study was initiated at Swan Lake to obtain information on population size and demography. A total of 18 Western Painted Turtles, including adults and juveniles, were marked in August 2010 during two trapping sessions. Six adults were tracked with radio-telemetry from August to December. The tagged turtles used most of the lake in late summer – early fall and were most often found near the shoreline. From November on, they hibernated on the floodplain under the shrubs in water depths less than 125 cm. Four of the six turtles hibernated close together within a small area.

Recommendations:

- Continue the initiated mark and recapture study to determine the population size, trends, and demography.
- Continue the initiated telemetry study at Swan Lake and Christmas Hill Nature Sanctuary to determine hibernation and nesting sites and seasonal movements of turtles at and away from the lake; tag additional turtles as deemed necessary; incorporate results into management plan for the lake
- Initiate comparable mark-recapture and telemetry studies at additional sites

Chapter 5: Management Guidelines

Corresponding Objective

Objective 5: Develop management guidelines for landowners and managers.

Rationale

Stewardship by landowners/managers is essential for the protection and recovery of Western Painted Turtle populations within areas that are largely privately owned. Even populations within parks and other protected areas are not necessarily safe, unless human activities are managed taking into account the needs of the species.

Approach and Methods

Using survey, habitat use, and other information on the Western Painted Turtle collected as part of this project in 2008 – 2010, we provided management guidelines for landowners/managers with populations of this species on their lands. The objective was to provide land managers with tools to mitigate specific threats to turtle populations and habitats using best available information. The guidelines included the following: evaluation of threats and recommendation of mitigation measures for specific activities on forestry lands (for Island Timberlands in Alberni Valley); development of plans and implementation of nesting and aquatic habitat enhancement (for Swan Lake and ChristmasHill Nature Sanctuary and CRD Regional Parks); development of measures for mitigating threats to nesting turtles on lands collectively managed by Elk-Beaver Lake Equestrian Society and CRD Regional Parks; and mitigating and monitoring for road mortality of turtles at an identified problem area in the Municipality of Saanich.

Results & Discussion

Island Timberlands

The Western Painted Turtle occurs at several water bodies within private forestry lands in the Alberni Valley. We were requested by Island Timberlands to assess habitat in the vicinity of a culvert replacement site and proposed cutblocks near wetlands occupied by turtles. Based on a site visit on 25 May 2010 and our previous surveys in the area, we prepared a report that contained a detailed threat assessment of the proposed activities and guidelines to mitigate impacts on turtles (Engelstoft and Ovaska 2010).

We provided the following recommendations regarding culvert replacement:

- Conduct culvert replacement in the summer, as proposed, to avoid disturbing hibernating turtles.
- Prior to construction, lower the water level gradually, as proposed.
- During construction, ensure that the intersection and spur road just north of the site is not used to turn around vehicles and machinery or to temporarily store construction materials. Such materials could be stored along either side of the road at least 20 m south of the intersection.
- Ensure that the construction crew is aware of turtles in the area and their possible presence on roads.
- Install a water level measuring scale, so that the water level can be monitored after the culvert is replaced; manage water levels to ensure that ample open water areas remain even in drought years.

We provided the following recommendations regarding logging activities near occupied wetlands:

- Cutblock A: We identified no specific features important for turtles in the area examined but recommend that the forest between the two bluffs be retained or selectively logged. This action would increase the buffer zone along the wetland, protect it against wind-throw, and also provide habitat for amphibians, including the blue-listed Northern Red-legged Frog.

- Cutblock B: We identified no specific features important for turtles, but they may travel through the forest while moving between wetlands. We recommend that the forest be retained or selectively logged. This action would also benefit amphibians.

- Cutblock C: We identified no specific features important for turtles but recommend that the forest southeast of the road be retained or selectively logged. This action would help buffer the wetland, reduce wind-throw, and also provide habitat for amphibians.

- Cutblock D: The proposed retention area provides protection to potential turtle nesting areas on the bluff and to travel routes to the bluff from the lake. We identified no habitat features important for turtles within the area slated for logging.

In addition, we emphasized an opportunity to enhance a previously identified turtle nesting area. We recommend creating mounds, composed of finer sand/loam mixture at this site and closing an old road and a dead end spur to vehicle traffic to prevent disturbance of nesting turtles.

In summer 2010, Island Timberlands personnel replaced the culvert. Subsequently, they blocked vehicular access to both identified nest sites: a berm and trench prevent access to the road leading to the gravel pit site; a line of boulders at the entrance to the spur road prevent vehicle access and its use as a turn-around site (R. Christie, pers. comm., January 2011).

CRD Regional Parks

Since 2008, we have collaborated with CRD Regional Parks with the aim of improving knowledge of the Western Painted Turtle, so that threats can be reduced and populations protected more effectively within parks that experience heavy visitor use. Much of the work has focused on Elk/Beaver Lake Regional Park, which supports a relatively large Western Painted Turtle population (Ovaska and Engelstoft 2009). Areas where turtles nest are under co-management by Elk-Beaver Lake Equestrian Society (riding ring area) or Vancouver Island Retriever Club (fields and ponds) with CRD Regional Parks. Turtles nesting, attempting to nest, and milling around in the riding ring area were observed in June – July 2010. We also observed an inadvertent disturbance of nests by maintenance activities. This prompted an on-the-site meeting on 13 August 2010. The meeting was attended by Elk-Beaver Lake Equestrian Society representatives, CRD Regional Parks headquarters, grounds maintenance, and volunteer coordination personnel, and one of us (KO). The meeting resulted in a collaborative action plan to be carried out in spring 2011. CRD actions are pending approval and securement of material and labour resources. The plan included the following:

Riding Ring area (co-managed by Elk-Beaver Lake Equestrian Society and CRD Regional Parks):

- Erect fences or other barriers to keep turtles from nesting in unsafe locations, such as temporary sand piles and the riding ring itself; protect two existing nests in an unsafe site by wire cages (already installed by HAT), until the nests emerge in spring 2011.
- Enhance nesting habitat at the edge of the riding ring area where turtles have been seen. The enhancement site is currently overgrown with Himalayan Blackberries and other weedy vegetation that need to be removed. HAT will assist with substrate preparation once the site has been weeded. A detailed plan for nesting habitat enhancement has been prepared (Appendix 2).
- CRD will consider installing interpretive signage to reduce inadvertent disturbance to turtles and their nests by park users and pets. HAT offered to help with the design of the signage and give a presentation to Elk-Beaver Lake Equestrian Society upon request.

Retriever or East Pond (area co-managed by Vancouver Island Retriever Club and CRD Regional Parks):

- CRD Parks will replace the existing temporary enclosure around a small (ca. 10 x 12 m) communal turtle nesting ground with wooden snake fencing on three sides; one side will be left open with the option of closing it temporarily during sensitive periods. The existing enclosure, delineated by flagging tape, was erected in June 2010 by us for the duration of a dog trial event at the request of the Vancouver Island Retriever Club but was left in place because it effectively protected this important site from inadvertent disturbance.
- CRD Parks grounds maintenance staff will continue to mow the nesting area and the field annually to keep it from becoming overgrown with vegetation.
- Ensure that no piles of brush or other removed vegetation are left within the nesting area.
- Install a surveillance camera to monitor nesting activity by turtles at the communal nesting ground in spring 2011 (by HAT with assistance from CRD Parks maintenance staff).
- Conduct additional weeding on the nesting ground in 2011 as part of habitat restoration/enhancement experiment that is currently in progress at the site (by HAT, to be discussed with CRD Parks staff).

Swan Lake and Christmas Hill Nature Sanctuary

The sanctuary provides an important refuge for the Western Painted Turtle and other wetland wildlife within an otherwise urbanized landscape. Since 2009, we have collaborated with Swan Lake and Christmas Hill Nature Sanctuary ground manager to help protect the turtle population. Stewardship activities undertaken in 2010, with help from staff and volunteers of the sanctuary, included installation of basking logs and monitoring their use by turtles (see **Chapter 3**), restoration of nesting areas and monitoring turtle nesting activity at two sites within the sanctuary (see **Chapter 2**), and initiation of a mark-recapture and telemetry study to improve knowledge of the location and features of seasonally important habitats (see **Chapter 4**).

Recommendations for 2011 include the following actions:

- Continue monitoring the condition and use of basking logs installed in 2010; assess needs for additional basking sites (April – June).
- Monitor the condition of restored nesting sites; weed areas where vegetation is encroaching; consider planting native plants, such as clumping grasses, between experimental plots to stabilize the ground and reduce weed establishment.
- Monitor the use of the restored nesting areas by turtles using a surveillance camera and visual inspections during the nesting period
- Monitor Western Painted Turtle and Red-eared Slider nests found in 2011 for emergence; place a protective cage over each nest to discourage predators and to allow an accurate count of emerged hatchlings.
- Expand on nesting area restoration/creation as deemed desirable based on monitoring results of existing areas.

- Continue following turtles with radio tags to identify nesting and hibernation habitats and migration routes; outfit additional turtles with telemetry tags as deemed necessary; continue mark-recapture study initiated in 2010 to obtain more accurate estimate of population size and demographics.

Road mortality mitigation in Saanich: Beaver Lake Road

In an attempt to minimize the risk of road mortality to Western Painted Turtles, Saanich Municipality erected two turtle crossing signs in a previously identified problem area near the entrance to Elk/Beaver Lake Regional Park on Beaver Lake Road (Figure 14). Our attention to this site was first directed by local residents and biologists D. and C. Copley, who documented road killed Western Painted Turtle hatchlings from section of the road in spring 2008 (Engelstoft and Ovaska 2008, Ovaska and Engelstoft 2009, 2010). The road signs were installed late March and removed in mid-September 2010. One of the signs was stolen soon after its installation and had to be replaced.

Figure 14. Road sign erected by Saanich Municipality on Beaver Lake Road during the turtle nesting season in 2010 (right); Western Painted Turtle crossing a spur road (Glencoe Drive) off Beaver Lake Road (left).

The stretch of road between the signs was surveyed from March to July 2010 by driving slowly in car, scooter, bicycle or by walking to monitor turtle road kill mortality. The observers scanned the paved road surface and the gravel sides for turtles. We also periodically investigated the gravel sides carefully for signs of turtle nesting activity,

including exit holes from emerged nests or newly constructed nests. With help from volunteers, we searched this section of the road 117 times in 2010. Additionally, the site was surveyed approximately three times a week by residents who travelled on the road on their way to work. Most of the monitoring efforts took place from mid-March to mid-July, which encompasses periods when hatchlings emergence from nests and when females lay eggs. During the peak egg-laying period in June, we visited the site at least once a day and often twice a day (morning and evening). We stayed on the asphalt surface to minimize disturbance. There was one visit in January and one in February to monitor possible early emergence of hatchlings and an additional visit in October to monitor possible emergence of hatchlings from eggs laid the same year.

A traffic counter was installed for 5 days before (25 February – 1 March) and after (15 – 19 April) the signs were erected. In each case the counter was installed on a Thursday and taken down after the weekend. In the period before the sign installation, 1904 vehicles passed the site with an average speed of 34 km/h; the speed of 85% of the vehicles was less than 42 km/h. In the period after the sign installation, 2509 vehicles passed the site with an average speed of 33 km/h; the speed of 85% of the vehicles was less than 40 km/h (Eric Deibert via Darren Cobley, pers. comm.) The speed was slightly lower after the installation of the signs, but it is unknown whether such a slight reduction would help protect turtles from road mortality.

On 31 March 2010, five small juvenile Western Painted Turtles were found dead along the monitored section of Beaver Lake Road between the two signs (reported to us by D. and C. Copley). We located the nest from where the hatchlings had most likely emerged on the shoulder of the road adjacent to the road kill site. An additional hatchling Western Painted Turtle was found dead on the side of the road (by CE) on 26 April. The latter was not a road-kill, but it more likely died from dehydration or weather exposure. No other turtles, small or large, were encountered on Beaver Lake Road. However, on several occasions in June and July 2010 we saw adult turtles crossing the gravel access road to Elk/Beaver Lake Regional Park (Glencoe Drive); this road joins Beaver Lake Road between the two signs. We found no evidence of new turtle nesting activity, such as test holes or wet patches indicating a recently covered nest, along Beaver Lake Road.

Considering the small size of newly hatched Western Painted Turtles (about the size of a $1 coin), it is not surprising that motorists did not see the juveniles on the road. Clearly signage will not prevent hatchlings from being killed by vehicles. A more effective measure would be to install a low fence surrounding nest sites, if their location is known. The enclosure would need daily inspection and a shaded area where the hatchlings could stay out of the sun. The small turtles could then be transported manually to the nearby ponds.

The intention of the signs was to prevent adult mortality, but because no adult turtles were seen on this section of the road, it is difficult to determine the effectiveness of the signs. However, drivers entering Elk/Beaver Lake Regional Park along Glencoe Drive, where adult turtles frequently cross the road, would also have been exposed to the sign.

Drivers that regularly pass the signs would have been alerted to possibility of encountering turtles on the road and hopefully would have been prepared to avoid a collision. The signs also functioned as outreach tools, informing drivers of the presence of turtles in the area and their vulnerability to road mortality.

Recommendations for 2011 include the following actions:

- Reinstall signs on Beaver Lake Road for the March – July breeding period.
- Survey motorists entering Elk/Beaver Lake Park whether they saw the sign and how it affected their behaviour.
- Continue monitoring road mortality and turtle nests along this section of the road; if emerging nests are found, take steps to protect them with enclosures and manual transport of hatchlings across the road.

Conclusion and Recommendations

In 2010, we helped plan and implement stewardship actions for three large landowners/managers with Western Painted Turtle populations on their properties: Island Timberlands; Swan Lake Nature Sanctuary; and CRD Regional Parks. The activities consisted of threat assessment and recommendation of mitigation measures in response to proposed activities on forestry lands; mitigating threats to nesting turtles on within multi-use areas; and restoring/enhancing nesting habitat and adding basking logs to improve aquatic habitat. In addition, we assessed the effectiveness of road signs installed by the Municipality of Saanich at a reviously identified problem area for turtle road kill. More complete turtle habitat guidelines for CRD Regional Parks and Swan Lake and Christmas Hill Nature Sanctuary are to be prepared when longer-term results of nesting habitat restoration experiments, basking log study, and mark-recapture and telemetry studies become available.

Chapter 6: Outreach and Stewardship

Corresponding Objective

Objective 6: Conduct outreach and involve private landowners and land managers in stewardship activities

Description of Activities

The following summary was provided by Todd Carnahan, Land Care Coordinator for Habitat Acquisition Trust:

HAT continued public outreach and landowner contact services in 2010 through the federal Habitat Stewardship Program. Outreach activities included: water body monitoring, assisting biologists working on the species, engaging media to solicit reports and contacts, following up on reports from the public, providing presentations to local groups and municipalities, and contacting landowners to provide turtle habitat management guidelines on private lands. Staff provided workshops to representatives of the District of Metchosin, District of Sooke, the Tsawout First Nations lands committee, and CRD Parks staff. Staff conducted field trips to known turtle habitats for high school students and residents of Metchosin. The land trust confirmed two new occurrences of the Western Painted Turtle in three separate watersheds (DeMamiel, Tetayut, and Bilston) in 2010 through monitoring and public response to media articles. Seven media articles (including national coverage) generated dozens of reports from the public. Staff visited fourteen landowners with suitable turtle habitat in six different watersheds in 2010. Three private landowners received management guidelines and offers of habitat enhancement where turtle presence was confirmed.

In addition to the above outreach activities, we collaborated with large landowners within CRD and Alberni Valley, as described in **Chapter 5** increasing awareness of the Western Painted Turtle and needs to protect its habitats and populations. One of us (KO) gave a presentation of the project at Canadian Amphibians and Reptile Network annual meeting in Wolfville, Nova Scotia, in September 2010, so increasing knowledge of the project within the scientific community and exchanging information with turtle biologists working on conservation issues in other parts of Canada.

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Appendix 1. Plan for nesting habitat creation at Swan Lake Nature Sanctuary.

Plan for Nesting Habitat Rehabilitation for the Western Painted Turtle at Swan Lake Nature Sanctuary

Prepared by Christian Engelstoft, MSc, RPBio and Kristiina Ovaska, MSc, PhD
Habitat Acquisition Trust, Victoria BC
June 2010

Rationale:

The endangered Western Painted Turtle occurs in Swan Lake Nature Sanctuary, where turtles are regularly observed basking and foraging in the lake. In the past, turtles have been found nesting along trails and in the native plant garden near the Nature House at the north side of the lake, but suitable nesting grounds appear to be in short supply. We propose to rehabilitate a small area below the trail that runs parallel and close to the lake below the Nature House to enhance opportunities for nesting turtles.

Proposed Site for Rehabilitation:

Figure 1 shows the location of the proposed nesting area. The site is located near the bottom of a hill and has a southern aspect. Exposed bedrock is present. The soil layer is mostly thin except on the east side. The ground is currently covered with introduced grasses (Figure 2). Scattered native plants (*Clarkia*, *Brodiaea*) are also present.

Nesting grounds of the Western Painted Turtle need to have the following qualities:

- Good exposure to the sun, such as on a south-facing slope
- Exposed ground, free of turf or matting grass roots
- Compact sandy/loamy substrate suitable for nest construction
- Accessible from aquatic foraging areas

The proposed site has a suitable exposure and is located close to the lake (within 20 m), but both the substrate and access from the lake need to be improved.

Figure 1. Location of the proposed site for turtle nesting site rehabilitation at Swan Lake Nature Sanctuary.

Figure 2. Habitat at the site proposed for rehabilitation.

Tasks:

A. Site preparation:

- Conduct a plant survey, so that native plants are not inadvertently harmed; move or mark such plants if found.
- Clear the ground from introduced grasses and other plants; turn over the soil.
- Assess the need for additional substrate and for terrain shaping, such as making the slope gentler.

B. Nesting area construction:

- Bring in sand/soil as needed to create soil depth of about 20 cm and distribute as outlined in Figure 3.
- The area is to be set up as an experiment to test preferences of nesting turtles of substrate types of two different coarseness. There are six paired plots of treatments; each pair should be located in areas with similar slope and distance from the lake, and the treatments within each pair should be randomly allocated. In one of the treatments, only the soil present at the site will be used; in the other treatment, a substrate consisting of a mixture of 20% clay, 40% silt, and 40% sand (loam) will be used.
- On the ground, delineate areas to be left bare for turtle nesting; plant clumping (not matting) native grasses or other low, slow-spreading native plants amidst these patches.
- Taller native plants, such as wooly sunflower, may be used at the trail edge to create a visual barrier and to mitigate disturbance to the habitat from visitors using the path.
- Install a pole in an appropriate location for attaching a camera with a view of the nesting area for video surveillance.

C. Access enhancement:

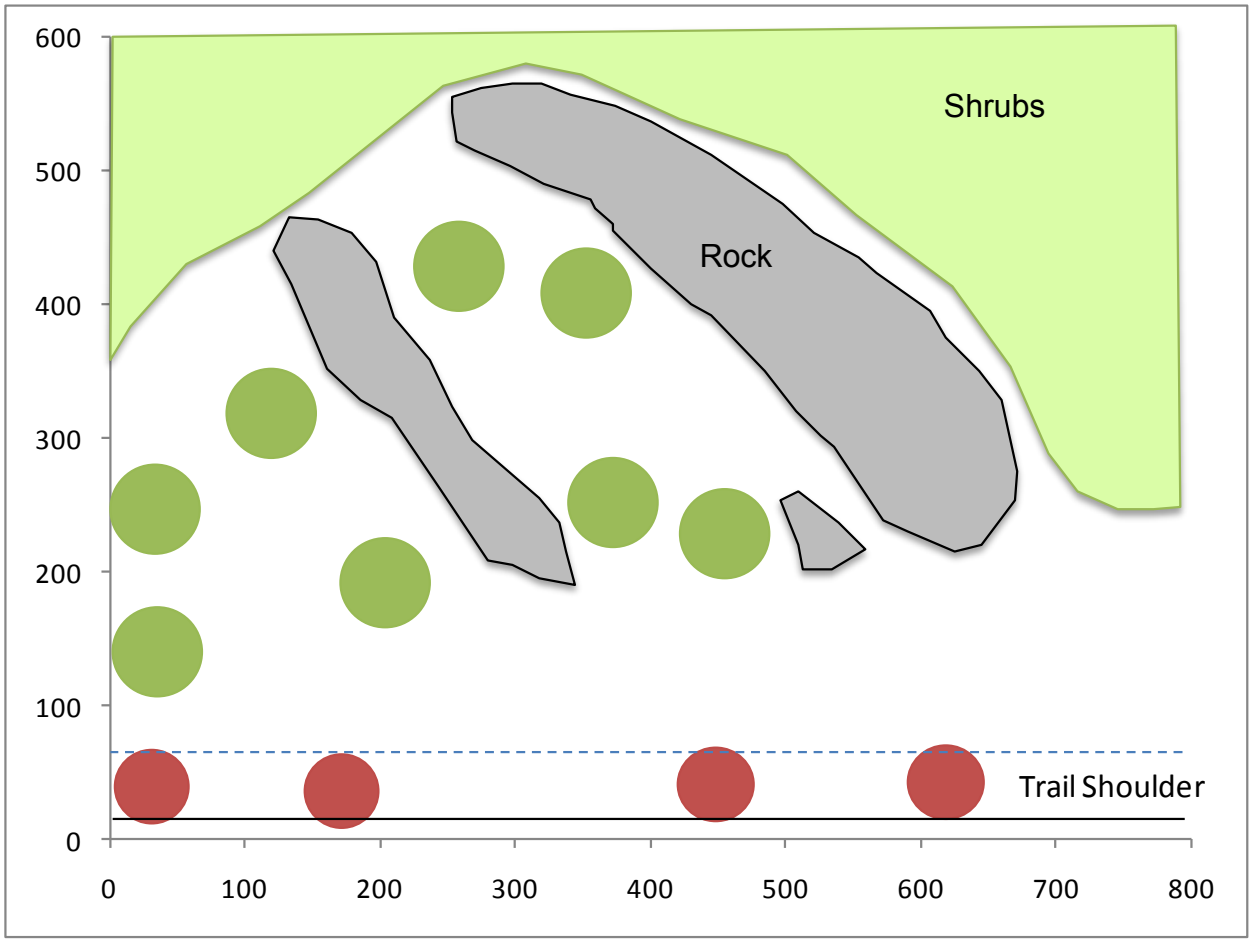
- Clear an access route for turtles from the lake, taking care to camouflage the entrance to the site to discourage visitors from using the route.
- Install a basking log near the entrance from the lake to encourage turtles to investigate the new access route.

Maintenance and monitoring:

The areas that are left bare need to be kept weed-free to ensure that suitable conditions for nesting turtles persist over time. Growth and spread of native plants also need to be monitored to ensure that they do not excessively shade the site.

It is important to monitor the use of the rehabilitated site by turtles, so that methods that are successful can be repeated. It may take some time before turtles start using the site. The peak egg-laying season of the Western Painted Turtle in our area is in June; turtles may not use the site until next year. We recommend that an automated camera be installed to monitor use of the rehabilitated area by turtles.

Figure 3. Schematic of turtle nesting area rehabilitation, showing circular areas to be rehabilitated as turtle nesting sites (green: larger plots of bare ground on the slope below the trail; red: smaller plots of bare ground on the level shoulder of the trail). Clumping native grasses and other low, slow-spreading native plants may be planted between the circular plots to provide cover and to enhance the appearance of the site.



Appendix 2. Plan for nesting habitat enhancement near riding ring in Elk/Beaver Lake Regional Park.

Western Painted Turtle
Habitat Enhancement Guidelines for

Elk-Beaver Lake Equestrian Society & CRD Regional Parks

Prepared by

Christian Engelstoft, MSc, RPBio, and Kristiina Ovaska, PhD, MSc

on behalf of HABITAT ACQUISITION TRUST

Funded by:
Habitat Stewardship Program, Environment Canada
With logistic support from CRD Regional Parks and Beaver Lake Equestrian Centre

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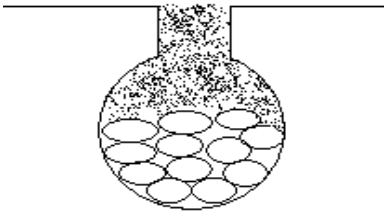
Background:

Nesting surveys for the Western Painted Turtle (*Chrysemys picta*) have been conducted each year from 2008 to 2010 in Elk/Beaver Lake Regional Park. These surveys have shown that the area southwest of Beaver Lake, including grounds used by the Elk-Beaver Lake Equestrian Society, contains important nesting habitat for the turtles. In June 2010, two nests were found on a gravel patch adjacent to the horse training ring. One of the nests was inadvertently covered by a sand pile, used for site maintenance activities. The guidelines presented here are intended to help enhance turtle nesting habitat in safe areas and to avoid inadvertent disturbance to nesting turtles.

Western Painted Turtle

Turtles require bare ground at a warm, sunny location for nesting because they have to rely on the sun to incubate their eggs. Nesting areas usually have fairly compacted silty or sandy soils, facilitating the construction of an about 15 cm deep, flask-shaped nest. Turtles often use traditional nesting areas and return to



Sketch of turtle nest with

Creating Conservation Legacies

the same sites year after year, even after site modification. After a meeting among CRD Parks personnel, Elk-Beaver Lake Equestrian Society representative, and a turtle biologist on 13 August 2010, it was decided that the two known nests in the riding ring area would be protected by cages until the hatchlings emerge in the spring, and a small area in the vicinity of these nests would be restored as a designated turtle nesting area. Here we provide a plan for the nesting area enhancement.

Objectives:

- Enhance a designated turtle nesting area at grounds co-managed by Elk-Beaver Lake Equestrian Society and Elk/Beaver Lake Regional Park.

Enhancement area:

Figure 1. Overview of the area, indicating the circular horse training ring, previously used turtle nesting sites by sand pile (star), and location of the proposed enhancement site (red polygon).

(North is up; Source: Natural Areas Atlas)

Figure 2. Proposed nesting habitat enhancement site by horse training ring. Protective cages with pink ribbon show locations of two Western Painted Turtle nests from June 2010.

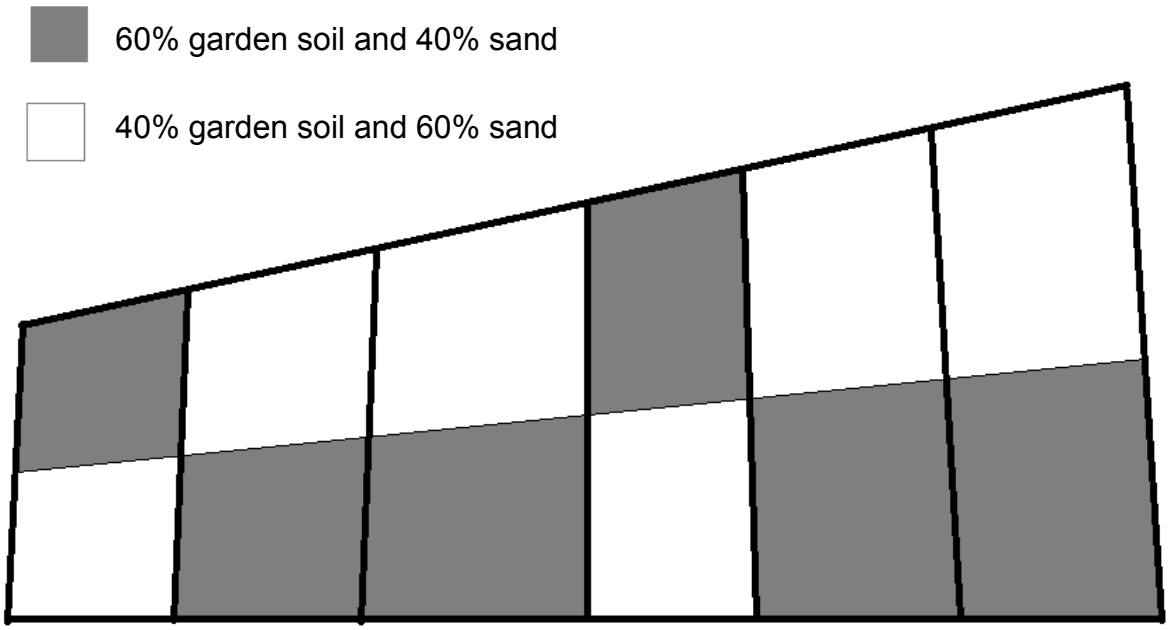
Enhance breeding grounds by the training ring (red polygon)

We recommend that a rectangular area about 6 m long and 2 – 5 m wide on the north side of the horse training ring be designated as a turtle nesting area (Figure 1). This site is selected because turtles are known to use the area for nesting, and our past observations suggest that turtles are likely to encounter this area when moving from the ponds to land during the breeding period. Additional area to the north, which is currently covered by blackberries, can be cleared for possible future expansion of the nesting area.

Anecdotal information suggests that a loam substrate (mixture of 40% sand, 40% silt, and 20% clay) provides a suitable nesting substrate, but optimal substrate needs to be tested. We recommend that the nesting enhancement project is set up as an experiment similar to that deployed in other areas in the CRD. The goal is to determine the best soil mixture that eventually will cover the entire enhancement site. The preferred mixture will provide a substrate that enhances nesting success and that requires minimal maintenance such as weeding.

The suggested approach is to divide the area up into grids, as shown in Figure 3. Each grid is randomly assigned a substrate treatment of a mixture of either 40% garden soil and 60% sand (SAND treatment) or 60% garden soil and 40% sand (SOIL treatment).

Figure 3. Proposed experimental set-up for the nesting habitat enhancement using two different mixtures of sand and soil as substrate.



Steps to create a nesting area:

a. Stake out corners of the patch of ground about 6 m long and between 2 and 5 m wide for the nesting area. Orient the area so that the longer side runs from east to west.

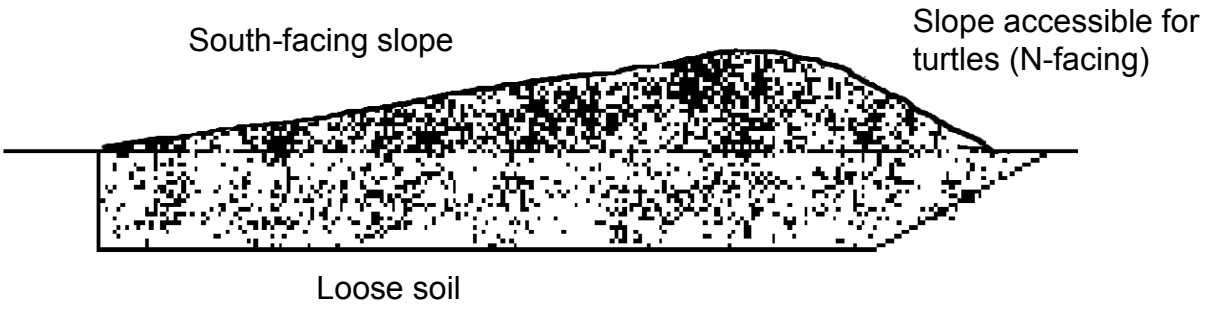
b. Prepare the ground by removing vegetation and loosening the soil to about a spade depth.

c. Divide the area into 2 m grids and randomly assign substrate treatment.

d. Pile up soil to create an elongated mound about 50 cm high with gently sloping sides. Make sure that the mound slopes to the south, so that it provides a warm site for developing turtle eggs. Ensure that the north

slope allows turtles access to the south-facing breeding area, and that the shallow end of the slope has at least 20 cm soil depth (Figure 4).

Figure 4. Side view of sloping nesting habitat.



e. Separate grid edges and treatment sections with cardboard to prevent mixing at the edge during site establishment. Fill grids with the predetermined soil/sand mixture.

f. Periodic weeding will be required to maintain bare soil in the nesting area.

<u>Timing:</u> The most appropriate time for undertaking the nesting enhancement is in May after the known turtle nests have emerged and before females are digging nests and depositing their eggs.

Monitoring the Effect of Actions

The most exciting part of doing habitat restoration and enhancement is observing the effects of the work. Documenting changes by keeping notes on when and where turtles or signs of nesting can contribute important data about behavior of this endangered species.

We have provided a datasheet you can use. Feel free to contact us for any help you may require. If you so wish, you may submit your datasheet to HAT, so that the information can be added to our database on evaluating the effectiveness of this and other habitat restoration and enhancement projects.

Turtle Survey Form:

Location name: (Street # and name)		**Observers:**		**Contact information:**	Habitat Acquisition Trust, P.O. Box 8552,Victoria, B.C. V8W 3S2, Tel: 250.995.2428

Observation Information

Observer Initials	**Date**	**Time**	**Species[1]**	**# seen**	**Activity[2]**	**Size Class[3]**	**Location on property**	**Notes on observations**

[1] WPT - Western Painted Turtle; RESL - Red-eared Slider or U - Unknown (Try to take a picture if on land)

[2] BA = basking; NE = nesting , digging on land; SW = swimming; WA = walking on land ; Other (describe)

[3] Shell length: L = Large >15cm; M = Medium = 5-15 cm; S= Small = <5cm