

Western Painted Turtle Surveys and Stewardship
Activities on Vancouver Island and the Gulf Islands in
2009



**Prepared for
Habitat Acquisition Trust (Adam Taylor, Executive director)**

**Prepared By
Kristiina Ovaska, PhD, and Christian Engelstoft, MSc, RPBio
In collaboration with Todd Carnahan, landowner contact specialist**

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Executive Summary

The Pacific Coast Population of the Western Painted Turtle (*Chrysemys picta bellii*) was designated as endangered in Canada in 2006. Major loss of wetlands and rapid increases in roads, development, and people pose threats to the turtles over much of their range in southwestern B.C. During the 2009 field season, we continued efforts begun in 2008 to better delineate the distribution of the turtles on Vancouver Island and the Gulf Islands and to work with landowners on stewardship activities. Specific objectives in 2009 were to survey water bodies with suitable habitat to fill in distribution gaps, to revisit known sites to identify nesting areas and clarify habitat use, and to identify threats and prepare guidelines to help landowners and managers protect turtles on their lands. A further objective was to solicit information on turtle sightings through public outreach and to involve private landowners and land managers in stewardship activities.

From April to August 2009, we surveyed 30 water bodies for turtles. Twenty-four sites were on Vancouver Island: Capital Regional District (CRD), 15 sites; Alberni Valley, 7 sites; Nanaimo area, 2 sites. The remaining six sites were on Galiano Island. On southern Vancouver Island, the focus was on unsurveyed water bodies in the west, from Metchosin to Sooke and to Port Renfrew, and on repeated surveys at Elk/Beaver Lake to obtain information on habitat use and timing of reproduction. We found the Western Painted Turtle at six sites, all of which had previous records of the species: Elk/Beaver Lake, Langford Lake, and Matheson Lake on southern Vancouver Island; Patterson Lake, Devil's Den Lake, and "Airport Wetlands" in Alberni Valley. In addition, landowner observations resulted in records of the species from two properties in Metchosin and from Swan Lake Nature Sanctuary in Saanich. We found the introduced Red-eared Slider (*Trachemys scripta*) at nine sites, two of which represent new records (Pease Lake and Kemp Lake), while the species has been reported previously from the remaining sites (Durrance, Thetis, Elk/Beaver, Matheson, Westwood, and Laughlin Lakes). The two species of turtles co-occurred at Elk/Beaver, Matheson, and Langford Lakes. At Elk/Beaver Lake, both species were detected most easily from April to mid-May while basking on logs, on other floating objects, or along the shoreline. Surveys and census counts are best conducted at this time.

Turtles are particularly vulnerable on nesting grounds, and it is important that these areas are identified and protected from disturbance. We located turtle nesting grounds in the Alberni Valley (Patterson Lake, "Airport Wetlands", and Devil's Den Lake) and on southern Vancouver Island (Elk/Beaver Lake and Matheson Lake Regional Parks). In the Alberni Valley, turtles nested along gravel sides of main forestry roads, on abandoned spur roads, and in old gravel pits in human-modified habitats, and in pockets of deeper soil on rocky bluffs and within patches of exposed loamy soil along lakeshores and islands in natural habitats. The nesting sites in the natural habitat are of particular interest, as such sites and their features are poorly documented on the west coast. At Elk/Beaver Lake, with help from CRD Parks volunteers, we located turtle nests on gravel road sides, parking lots, and old field habitats. To obtain information on nesting success and timing, we monitored a communal Western Painted Turtle nesting area adjacent to a pond. After overwintering in the nest, hatchling turtles emerged from 14 nests from 14 April to 28 May 2009. Females laid eggs from end of May to end of June, based on 10 new nests found in 2009. At Matheson Lake, a communal nesting area found in 2008 had been disturbed by

predators, and there was no evidence of successful emergence of hatchlings or of new nests in 2009.

Habitat fragmentation and road mortality were identified as threats to turtles at many sites. A detailed assessment within CRD showed five areas where the potential of road kill is high (in Saanich, Highlands, Langford, and Metchosin). Together with the municipalities, HAT is engaging in negotiations to install road and interpretive signs at strategic locations to help reduce road kill and raise public awareness of turtles.

Stewardship and outreach activities included landowner contacts in prioritized focus areas and general public outreach, which consisted of workshops, festivals, group presentations, and media releases. We worked with two large landowners and developed management guidelines, including turtle best management practices for forestry lands. On private residential lands, direct outreach to landowners in turtle habitat resulted in nearly 400 unique contacts. Of 27 free and confidential visits with landowners in focus areas, 20 families signed non-legal stewardship agreements with HAT. Two private landowners were provided site-specific guidelines to help maintain and enhance habitat for turtles that frequent their properties.

Recommended studies include continuation of surveys to fill in distribution gaps and monitoring of nesting grounds to obtain a more complete picture of hatchling emergence and egg-laying activities over multiple years. Radio-telemetry is recommended to obtain detailed information on movements of individual turtles and to better understand threats from habitat fragmentation, road kill, recreation, and other sources. We hope to continue collaboration with landowners in 2010 to help maintain, restore, and enhance turtle habitat and to protect populations.

Table of Contents:

Executive Summary	2
Acknowledgments	6
1.0 Introduction	7
2.0 Objectives.....	7
3.0 Methods.....	7
3.1 Study Area and Sites.....	7
3.2 Survey Protocol.....	14
3.3 Habitat and Threat Assessment.....	16
3.4 Stewardship and Outreach	16
3.5 Data Handling and Mapping.....	16
4.0 Results	17
4.1 Survey Effort.....	17
4.1.1 Presence/not-detected level surveys	17
4.1.2 Nesting ground surveys and monitoring	17
4.2 Survey Results	18
4.2.1 Distribution surveys.....	18
4.2.2 Nesting area surveys	20
4.3 Threat Assessment and Management Guidelines	26
4.3.1 Overview of threats.....	26
4.3.2 Road mortality assessment and mitigation	29
4.3.3. Best Management Practice guidelines for forestry lands.....	30
4.3.4 Management guidelines for CRD Regional Parks.....	30
4.3.5 Site-specific guidelines for residential properties.....	31
4.4 Landowner Contacts and Outreach.....	31
5.0 Discussion.....	32
5.1 Distribution	32
5.2 Nesting Ecology.....	33
5.3 Threats and Mitigation.....	33
6.0 Recommendations for Further Studies.....	34
7.0 Literature Cited.....	36
8.0 Personal Communications.....	36

List of Tables

Table 1. Water bodies surveyed for the Western Painted Turtle in 2009.....	9
Table 2. Summary of water bodies surveyed for turtles in 2010, including survey effort.	17
Table 3. Turtles found during surveys of water bodies on Vancouver Island and Galiano Island in 2009.....	18
Table 4. Turtle nesting sites located during surveys in the Alberni Valley on 22 - 23 June 2009.	21
Table 5. Threat assessment for sites occupied by the Western Turtle, 2009.....	27

List of Figures

Figure 1. Study area (shaded) on Vancouver Island and the Gulf Islands. Overview map (top) shows water bodies surveyed in 2009 in Alberni Valley and Nanaimo areas.	15
Figure 2. Number of turtles found from 21 April to 15 June 2009 during surveys of Elk/Beaver Lakes.	20
Figure 3. Location of emerged nests, new nests, and nesting attempts (diggings) at a turtle communal nesting area at "Airport Wetlands" in Alberni Valley, as mapped on 22 June 2009.....	23
Figure 4. Location of Western Painted Turtle nests and nesting attempts at a communal nesting area in Elk/Beaver Lake Regional Park in 2008 and 2009. (each grid = 1 m ²).	25
Figure 5. Approximate locations of turtle nest sites in the Capital City Allotment Gardens, 2009.	25
Figure 6. Overview of turtle road kill risk assessment within CRD on southern Vancouver Island.	29
Figure 7. Distribution of the Western Painted Turtle in the Alberni Valley based on observations in 2008 - 2009.....	43

List of Appendices

Appendix 1. Best management practices developed for private forestry lands in the Alberni Valley, Vancouver Island.....	37
Appendix 2. Sample of site-specific habitat guidelines prepared for a private landowner.	56

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Cover photo: Western Painted Turtle basking on log in Elk/Beaver Lake Regional Park, 1 May 2009; photo by Christian Engelstoft

1.0 Introduction

The Pacific Coast Population of the Western Painted Turtle (*Chrysemys picta bellii*) was designated as endangered in Canada in 2006. The turtles occur on Vancouver Island, Lower Fraser Valley, Sunshine Coast and some of the Gulf Islands, where their distribution coincides with populated areas in lowland coastal areas (COSEWIC 2006). The turtles face threats from major loss of wetlands and a rapid increase in roads, development, and people in these areas. Even parks and other protected areas are not necessarily secure, as introduced species, road mortality, and recreational activities can pose serious threats to turtles.

The distribution and population ecology of the Western Painted Turtle in southwestern B.C. are relatively poorly known, although there is a wealth of information on this species from other areas in North America. However, information from other areas may not directly apply to the Pacific Coast Population, which is exposed to a different climate and habitats. Knowledge of the distribution, habitat use, and life history is essential for conservation and appropriate management of turtle populations. Recent studies have begun to fill in knowledge gaps (Lower Mainland: Vanessa Kilburn, pers. comm.; Sunshine Coast: Michelle Evelyn, pers. com.; Vancouver Island: Engelstoft and Ovaska 2008; Gulf Islands: Engelstoft and Ovaska 2008; Laura Matthias, pers. comm.), but much remains unknown. Here we present the results of studies carried out on Vancouver Island and Galiano Island during the 2009 field season. This study represents continuation of efforts begun in 2008 (Engelstoft and Ovaska 2008). This year, in addition to distribution surveys, the focus was on locating nesting areas, identifying threats and problem areas, and developing management guidelines to mitigate threats. On private lands, our efforts focused on landowner contacts and targeted outreach to encourage stewardship of turtle habitats.

2.0 Objectives

The overall 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 for 2009 were as follows:

- Conduct surveys of water bodies for the Western Painted Turtle in the Capital Regional District (CRD) and Alberni Valley
- Identify nesting areas at occupied sites and document timing of nesting events
- Assess threats and develop management guidelines for landowners and managers
- Conduct outreach activities and involve private landowners and land managers in stewardship activities

3.0 Methods

3.1 Study Area and Sites

The study sites were within the southern half of Vancouver Island and on Galiano Island, Gulf Islands. On Vancouver Island, we surveyed lakes, ponds, and marshes located within the Capital Regional District (CRD; 48°26' N, 123°31' W), in the Nanaimo area (49°10' N, 123°57' W), and in the Alberni Valley (49°15' N, 124°46' W) (Figure 1). In the Gulf Islands, we surveyed water

bodies on Galiano Island (48°53' N, 123°21' W). For detailed locations of study sites, see Table 1. The sites in the Alberni Valley and westernmost sites within the CRD are within the Coastal Western Hemlock Biogeoclimatic Zone; the remaining sites are within the Coastal Douglas-fir Biogeoclimatic Zone. In all areas, the upland habitat consisted of mostly coniferous forest or mixed-wood forest, but some were in agricultural or old-field settings.

The sites on southern Vancouver Island included CRD Regional Parks, where the focus was to identify and monitor nesting areas at Elk/Beaver Lake and Matheson Lake Regional Parks. In addition, we conducted surveys at Durrance and Thetis Lake Regional Parks where the species was not found in 2008 but from where there are older or unconfirmed records. The results for CRD Parks are summarized here, but more details of these surveys are presented separately (Engelstoft and Ovaska 2009).

Outside regional parks within the CRD area on Vancouver Island, we selected sites from the Natural Areas Atlas (www.crd.bc.ca), focusing on water bodies in the southwest (Metchosin, Sooke, Port Renfrew areas) that had received little previous attention. We also followed up on reports of turtles from the public and landowners, and surveyed sites on private lands when access was granted. In the Alberni Valley, we focused on warmer, lower elevation lakes, as they are most likely to provide habitat for turtles. The surveys included revisiting known localities of the Western Painted Turtle to identify nesting areas. On Galiano, we worked closely with the Galiano Conservancy Association staff and surveyed water bodies with potential turtle habitat.

Table 1. Water bodies surveyed for the Western Painted Turtle in 2009.

UTM coordinates are from Zone 10 U (NAD 83 datum); the coordinates were recorded for the approximate center of the water body.

Site ID	Location	UTM easting	UTM northing	Ownership	Landscape context	Upland habitat	Wetland type	Comments
<u>Galiano Island, CRD:</u>								
1	Cook Rd wetland	458844	5426266	BC Crown	Rural	Mixed-wood forest	Marsh-pond	Beaver maintained wetland complex; logged strip on steep side; dead standing & down logs in water
2	Devina Drive ponds	457927	5426774	Private	Rural	Coniferous forest	Marsh-pond	Elongated wetland along road; thin line of trees along road; beaver maintained with dead standing & down logs; WRcedar, DF, Arbutus forest
3	Great Beaver Swamp	465062	5421077	Private	Rural	Mixed-wood forest	Pond	Large pond recently expanded by beaver activity; many standing snags
4	Laughlin Lake	462937	5422006	(Covenant (HAT & Trust Fund Board) on private land	Rural	Mixed-wood forest	Lake	Mostly coniferous forest (DF, Wrcedar, few BL maples); beaver maintained wetland
<u>Vancouver Island, Alberni-Clayoquot:</u>								
5	Airport wetlands	358400	54666114	Forestry-Private	Backcountry	Coniferous forest	Lake	

Site ID	Location	UTM easting	UTM northing	Ownership	Landscape context	Upland habitat	Wetland type	Comments
6	Boot Lagoon	355934	5465814	Provincial	Backcountry	Coniferous forest	Lake	Many floating logs and a boom; lake has an old dam and controlled water levels; possibly too cold for turtles
7	Devil's Den Lake	364382	5457080	Forestry-Private & BC Crown	Backcountry	Coniferous forest	Lake	Mainly coniferous with some alder & maple; beaver activity (2 lodges) on lake
8	Little Turtle Lake	358729	5464450	Forestry-Private	Backcountry	Coniferous forest	Lake	
9	Patterson Lake	455563	5356818	Forestry-Private	Backcountry	Coniferous forest	Lake	Lake & wetland connections growing in with vegetation; boggy
10	Sumner Lake	355463	5469326	Forestry-Private	Backcountry	Coniferous forest	Lake	Connected to Turtle Lake through small ephemeral creek; recreation site at access point
11	Tyler Rd Pond	361418	5458688	Private	Rural	Mixed-wood forest	Pond	
<u>Vancouver Island, CRD:</u>								
12	Durrance Lake	464688	5377358	CRD Regional Park	Rural	Coniferous forest	Lake	

Site ID	Location	UTM easting	UTM northing	Ownership	Landscape context	Upland habitat	Wetland type	Comments
13	Pease Lake	463268	5377041	Private	Rural	Coniferous forest	Lake	Good basking habitat at west end of lake with logs and lily pads
14	Blenkhorn Lake	457418	5359550	District of Metchosin Park	Rural	Coniferous forest	Lake	Good aquatic turtle habitat but no nesting habitat identified; wide riparian zone around lake, especially on west side
15	LaBonne Road Pond	455504	5358303	Private; next to large new subdivision	Rural	Coniferous forest	Lake	Moderate to high quality habitat: complex shoreline, lots of aquatic vegetation; also good amphibian habitat
16	Matheson Lake	455452	5356928	CRD Regional Park	Rural	Coniferous forest	Lake	Turtle habitat in shallow weedy bays, especially at west end of lake
17	Mt Mattheson Road, Pond 1	454680	536335	CRD & private	Rural	Coniferous forest	Lake	Low quality habitat; steep-sided lake; second, smaller pond on private land looks better but not accessed

Site ID	Location	UTM easting	UTM northing	Ownership	Landscape context	Upland habitat	Wetland type	Comments
18	Fairy Lake	400616	5382282	Crown forestry land	Backcountry	Coniferous forest	Lake	Moderate quality habitat; excellent habitat in shallow, weedy lagoon at north end of lake
19	Lizard Lake	409827	5384408	Crown forestry land	Backcountry	Coniferous forest	Lake	Poor quality habitat; deep lake
20	Pixie Lake	411822	5382721	Forestry	Backcountry	Coniferous forest	Lake	
21A	Beaver Lake	470962	5373534	CRD Regional Park	Rural	Mixed-wood forest	Lake	
21B	Elk Lake	470352	5375493	CRD Regional Park	Rural	Mixed-wood forest	Lake	Floating logs & rhizome mats provide basking sites; bays with lily pads
22	Kemp Lake	442231	5358774	Private; Community Watershed	Rural	Coniferous forest	Lake	Moderate to high quality habitat; anecdotal reports of turtles in this lake
23	Poirier Lake	443172	5360394	Private; part is CRD Parks (William Simmons Park Reserve)	Rural	Coniferous forest	Lake	Moderate quality habitat
24	Young Lake	443510	5361681	Private: Boy Scouts of Canada	Backcountry	Coniferous forest	Lake	Low to moderate quality habitat

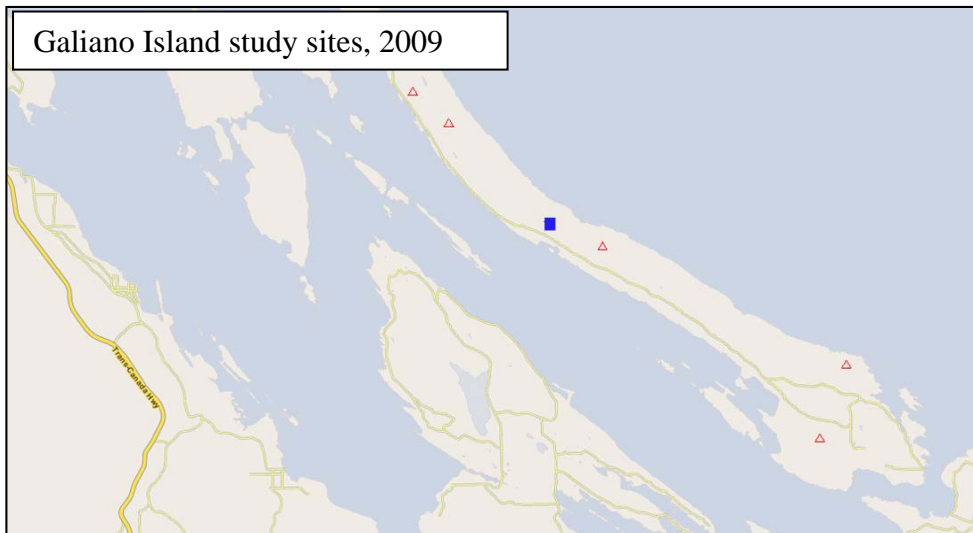
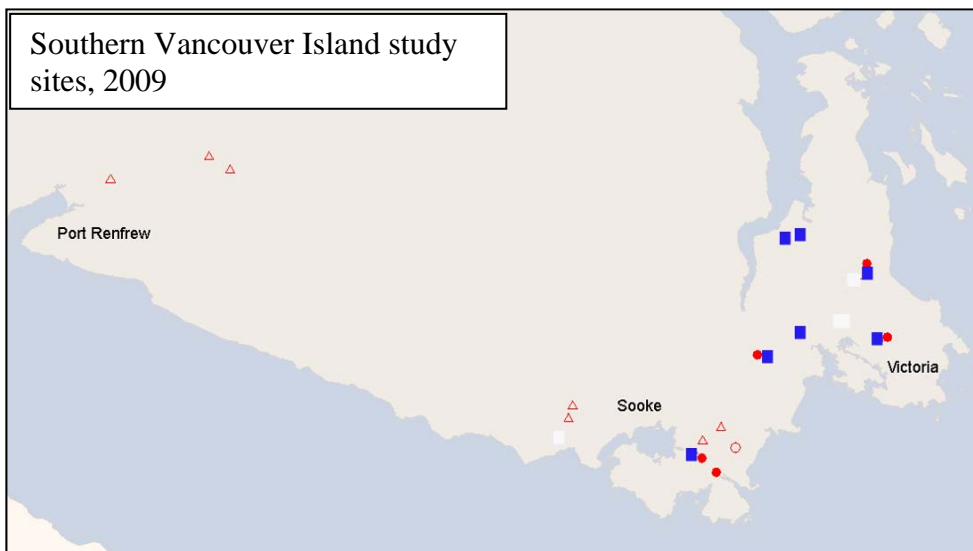
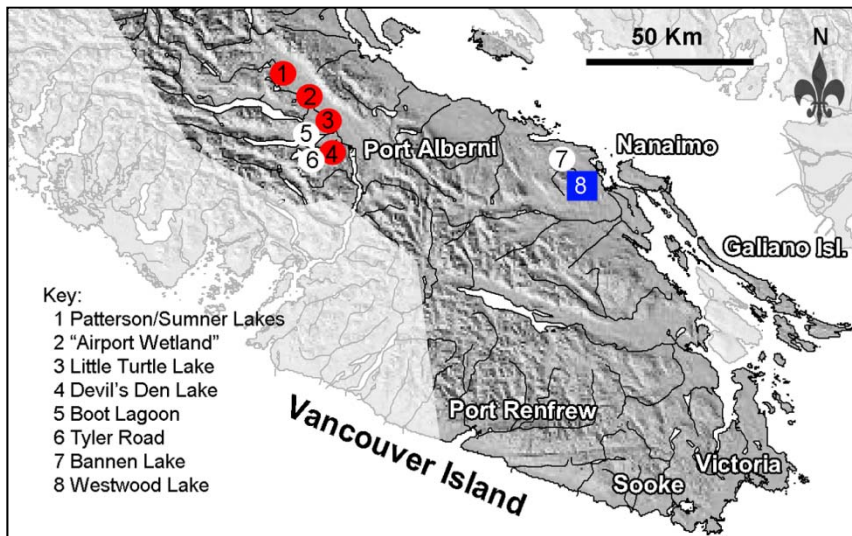
Site ID	Location	UTM easting	UTM northing	Ownership	Landscape context	Upland habitat	Wetland type	Comments
25	Langford Lake	460686	5366651	Private	Urban	Mixed-wood forest	Lake	
26A	Thetis Lake (Lower)	465266	5368375	CRD Regional Park	Rural	Coniferous forest	Lake	Cliffs (10% of perimeter cover)
26B	Thetis Lake (Upper)	464654	5368452	CRD Regional Park	Rural	Coniferous forest	Lake	Cliffs (5% of perimeter cover); good habitat in bay where turtles seen on north side of lake
<u>Vancouver Island, Nanaimo:</u>								
27	Brannen Lake	443510	5361681		Urban	Coniferous forest	Lake	Heavily used for water sports (water skiing, seadoos)
28	Westwood Lake	426448	5446344	Park (regional)	Urban	Coniferous forest	Lake	UTM where turtle seen at north end of lake; bay with fast currents & lots of standing and down trees

3.2 Survey Protocol

Survey methods consisted of visual searches of water bodies for turtles either from vantage points on the shore or through circumnavigation by canoe. We attempted to view the entire shoreline, but in some cases surveyed only a portion of a water body due to access or other logistic constraints. Usually two observers conducted the surveys. Both observers usually scanned the same general area to increase chances of detecting turtles among often dense emergent and floating vegetation. To obtain information on survey effort, we timed each survey. Weather information collected at survey sites included air and water temperature, percentage cloud cover, and precipitation.

At sites where the Western Painted Turtle occurred, we examined shorelines, gravel roads, and other relatively open sites for signs of turtle nesting activity, focusing on habitats with good exposure to the sun such as south-facing slopes. Signs of turtle nesting activity included nest holes (“test” holes dug by nesting turtles or holes from where hatchlings had emerged) or other ground disturbance indicating recently dug nests. Freshly covered nests were identified by observations of females digging a nest and/or by a characteristic wet patch on the ground, resulting from the female urinating on the nest. These wet patches were visible only until the morning following egg-laying, allowing us to extrapolate the exact date for each nest. Turtle egg shells in emerged holes, or sometimes on the surface, often confirmed observation of turtle nesting activities but not the species of turtle. In addition, we received reports of turtle nesting observations from CRD Park’s volunteers who helped with the study. We also received reports of nesting turtles from the public. When possible, we followed up on these leads to confirm the species of turtle and to examine the habitat.

Figure 1. Study area (shaded) on Vancouver Island and the Gulf Islands. Overview map (top) shows water bodies surveyed in 2009 in Alberni Valley and Nanaimo areas. Red circle – Western Painted Turtle; blue square – Red-eared Slider; open symbol – site surveyed but no turtles found



3.3 Habitat and Threat Assessment

During the first visit to each site, we conducted a preliminary habitat assessment, adapted from protocols developed by the B.C. Ministry of Environment. Habitat variables recorded included the following:

- Landscape context (backcountry, rural, urban)
- Predominant 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 Western Painted Turtle was found, we assessed potential threats from 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, or other sources. At sites that were revisited in 2009, we re-evaluated threats and refined the assessment as needed, taking into account new information on nesting area locations.

3.4 Stewardship and Outreach

Landowner contacts included sending postcards to residents in focal areas with turtle habitat and follow-up phone calls. In most cases, HAT's staff conducted site visits to properties of landowners to determine the species of turtle and to discuss stewardship options. Public outreach included media releases and interviews. HAT solicited information about turtle sightings from the public through these sources and through posters placed at bulletin boards and other strategic locations within the focal areas. We worked with Swan Lake staff and volunteers and the Galiano Conservation Association in outreach and landowner contacts. We worked with CRD Regional Parks staff on southern Vancouver Island and with Island Timberlands personnel and local naturalists in the Alberni Valley.

3.5 Data Handling and Mapping

All data were entered into MS Excel spreadsheets. For survey sites within CRD, maps were generated using the Natural Areas Atlas (www.crd.bc.ca). All maps in figures used the UTM projection (UTM Zone 10U North, NAD 83). For unnamed wetlands, we used colloquial names used by local residents (see Table 1 for coordinates of sites). UTM coordinates were determined either by a handheld Garmin Map76 in the field or from Google Earth or the Natural Areas Atlas; for water bodies, the coordinates represent the approximate center of the water body.

The following disclaimer regarding the maps was provided by the CRD GIS department to negate any legal liability:

"The data represented on maps have been provided to the Capital Regional District (CRD) under mutual agreement with several agencies and contractors. The CRD cannot be held

responsible for inaccuracies or errors. Any users of this map series accept full liability for loss or damage.”

4.0 Results

4.1 Survey Effort

4.1.1 Presence/not-detected level surveys

From April to August 2009, we surveyed 30 water bodies for turtles. The sites were located within CRD (15 sites), Alberni Valley (7 sites), and Nanaimo area (2 sites) on Vancouver Island, and on Galiano Island (6 sites) (Table 2). The total survey time was 99.6 person-hours. The surveys ranged from 0.3 to 7 hours (mean = 2.4 h; SD = 2.2 h). Most sites were visited only once. A notable exception was Elk/Beaver Lake, which we surveyed repeatedly to obtain information on habitat use and seasonal pattern of abundance.

Table 2. Summary of water bodies surveyed for turtles in 2009, including survey effort.

Area or district	No. sites	Survey dates	Survey time (person-hours)	No. surveys per site
CRD, Vancouver Island: Central Saanich	2	01-May	1.3	1
CRD, Vancouver Island: Saanich	2	20, 21, 30-Apr, 15, 25-May, 15-Jun	27.5	1 - 5
CRD, Vancouver Island: View Royal	1	03-Jun	4.6	1
CRD, Vancouver Island: Metchosin	4	18-Apr, 21-May, 9-Jun, 21-Aug	9.2	1 - 3
CRD, Vancouver Island: Sooke	3	29-Jul, 18-Aug	5.4	1 - 2
CRD, Vancouver Island: Port Renfrew	3	29-Jul	6.0	1
CRD, Galiano Island	6	30-Jun, 01-Jul	16.2	1 - 2
Alberni Valley, Vancouver Island	7	22, 23-Jun	22.1	1 - 2
Nanaimo, Vancouver Island	2	06-Jun	2.8	1

4.1.2 Nesting ground surveys and monitoring

In the Alberni Valley, we surveyed the vicinity of four water bodies occupied by the Western Painted Turtle for signs of nesting (“Airport Wetlands”, Patterson Lake, Devil’s Den Lake, Little Turtle Lake). The surveys took place on 22 and 23 June 2009; additionally, we revisited the nesting grounds at “Airport Wetlands” with the land managers from Island Timberlands on 21 July 2009.

On southern Vancouver Island, we monitored turtle nesting activity in Matheson Lake and Elk/Beaver Lake Regional Parks, focusing on previously identified nesting areas (Engelstoft and Ovaska 2008). We visited Matheson Lake on three occasions (18 April, 21 May, 9 June 2009) and searched a previously identified nesting area and other potential nesting habitats near the lakeshore for signs of turtle nesting activity. At Elk/Beaver Lake, we surveyed a communal Western Painted Turtle nesting area 27 times (days) in April – June 2009, when hatchlings emerged from nests and when females were laying eggs, and on two days in the autumn (19 September and 2 October) to examine whether any hatchling emergence had taken place. This site is within a heavily used recreational area, and our frequent presence added little to the disturbance already experienced by the site. We took care not to disturb any turtles found and to minimize disturbance to the habitat. In addition to the above surveys, CRD Parks volunteers helped us search for signs of turtle nesting activity in various parts of Elk/Beaver Lake Park in June and early July and reported their observations to us (Engelstoft and Ovaska 2009).

4.2 Survey Results

4.2.1 Distribution surveys

During the 2009 field season, we found the Western Painted Turtle at six of the 30 sites surveyed (Table 3). Three sites were in the Alberni Valley (“Airport Wetlands”, Patterson Lake, Devil’s Den Lake), two were within the Greater Victoria area (Langford Lake and Elk/Beaver Lake), and one was in Metchosin (Matheson Lake). There are previous records of the species from all these sites. In addition, one of us (CE) saw a Western Painted Turtle crossing the road near Matheson Lake, and landowners reported to us observations of the Western Painted Turtle from two small nearby ponds off Williams Head Road, Metchosin, and from Swan Lake Nature Sanctuary, Saanich. The Metchosin observations represent a new locality record for the species.

We found the introduced Red-eared Slider at nine of the sites surveyed (Table 3). The sites were on Galiano Island (Laughlin Lake), near Nanaimo (Westwood Lake), within Greater Victoria (Thetis Lake, Peace Lake, Durrance Lake, Elk/Beaver Lake, Langford Lake), in Metchosin (Matheson Lake), and in Sooke (Kemp Lake). Two sites (Pease Lake, Kemp Lake) represent new locality records for the species.

Table 3. Turtles found during surveys of water bodies on Vancouver Island and Galiano Island in 2009.

CHPI – Western Painted Turtle; TRSC – Red-eared Slider; Unknown – Unidentified turtle

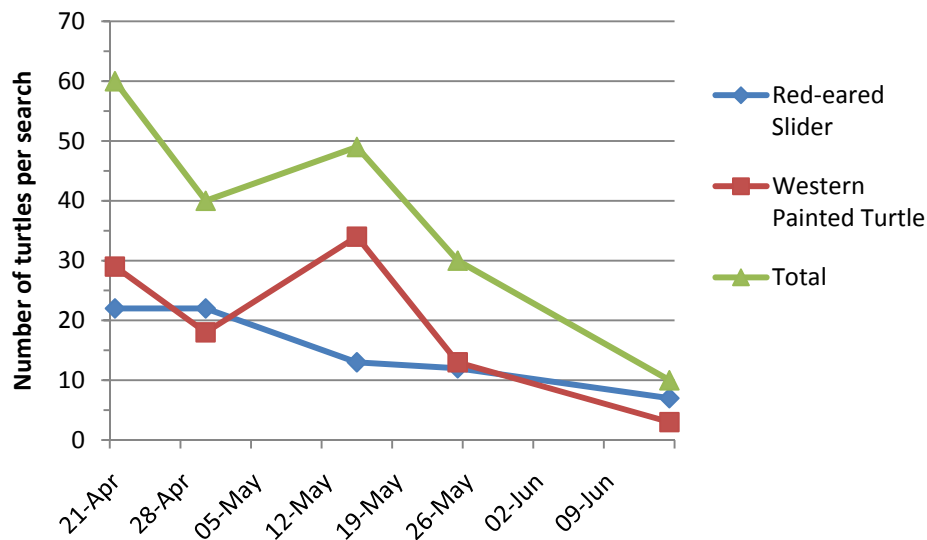
Site ID	Location	Survey date	Survey time (person min)	Air temp (C)	Cloud cover (%)	No. CHPI	No. TRSC	No. unknown	Total no. of turtles
Galiano Island:									
1	Cook Rd/Ecoreserve	30-Jun-09	120	18		0	0	0	0
1	Cook Rd/Ecoreserve	01-Jul-09	360	20		0	0	0	0
2	Devina Drive ponds	30-Jun-09	30	18		0	0	0	0
3	Great Beaver Swamp	30-Jun-09	60	18		0	0	0	0
4	Laughlin Lake	30-Jun-09	40	18		0	0	0	0
4	Laughlin Lake	01-Jul-09	90	18		0	3	0	3
	Finlay Lake	01-Jul-09	270	20		0	0	0	0

Site ID	Location	Survey date	Survey time (person min)	Air temp (C)	Cloud cover (%)	No. CHPI	No. TRSC	No. unknown	Total no. of turtles
	Greenfrog Wetland	01-Jul-09	270	20		0	0	0	0
<u>Alberni Valley, Vancouver Island:</u>									
5	"Airport Wetlands"	22-Jun-09	340		95-100	7	0	3	10
5	"Airport Wetlands"	23-Jun-09	120	23	95-100	2	0	0	2
6	Boot Lagoon	23-Jun-09	40	20	95-100	0	0	0	0
7	Devil's Den Lake	22-Jun-09	284	16	95-100	10	0	0	10
8	Little Turtle Lake	22-Jun-09	54	19	50-95	0	0	0	0
9	Patterson Lake	23-Jun-09	420	22	95-100	1	0	0	1
10	Sumner Lake	23-Jun-09	40	23	100	0	0	0	0
11	Tyler Road Pond	22-Jun-09	30		50-95	0	0	0	0
<u>Nanaimo, Vancouver Island:</u>									
27	Brannen Lake, Nanaimo	06-Jun-09	30		98	0	0	0	0
28	Westwood Lake	06-Jun-09	140		98	0	1	0	1
<u>Central Saanich, Vancouver Island:</u>									
12	Durrance Lake	01-May-09	20	15	<5	0	1	0	1
13	Pease Lake	01-May-09	60	16	<5	0	1	0	1
<u>Saanich, Vancouver Island:</u>									
21	Elk/Beaver Lake	21-Apr-09	270	15	<5	29	22	9	60
21	Elk/Beaver Lake	30-Apr-09	380	16	0	18	22	0	40
21	Elk/Beaver Lake	15-May-09	420	13	10	34	13	2	49
21	Elk/Beaver Lake	25-May-09	402	20	5	13	12	5	30
21	Elk/Beaver Lake	15-Jun-09	115	18	10	3	7	0	10
22	Thetis Lake	20-Apr-09	60	18	10	0	16	0	16
<u>View Royal, Vancouver Island:</u>									
26	Langford Lake	03-Jun-09	276	29	0	24	5	1	30
<u>Metchosin, Vancouver Island:</u>									
14	Blinkhorn Lake	21-Aug-09	60	18.5	100	0	0	0	0
15	LaBonne Road Pond	21-Aug-09	20	21	100	0	0	0	0
16	Matheson Lake	18-Apr-09	22	21	10	1	2	0	3
16	Matheson Lake	21-May-09	202	17	10	1	0	0	1
16	Matheson Lake	09-Jun-09	200	21	5	0	1	0	1
17	Mt Matheson Road, Pond 1	21-Aug-09	50	18.5	100	0	0	0	0
<u>Sooke, Vancouver Island:</u>									
23	Kemp Lake	29-Jul-09	30	38	<5	0	0	0	0
23	Kemp Lake	18-Aug-09	142	21	<5	0	3	0	3
24	Poirier Lake	29-Jul-09	45	35	<5	0	0	0	0
24	Poirier Lake	18-Aug-09	48	23	<5	0	0	0	0
25	Young Lake	18-Aug-09	60	24	<5	0	0	0	0
<u>Port Renfrew, Vancouver Island:</u>									
18	Fairy Lake	29-Jul-09	207	22	<5	0	0	0	0
19	Lizard Lake	29-Jul-09	75	30	<5	0	0	0	0
20	Pixie Lake	29-Jul-09	75	33	<5	0	0	0	0

The number of Western Painted Turtles per survey ranged from 1 to 34 (Table 3). Turtles were observed most often while basking on logs, rhizome mats of pond lilies or other floating objects, or along the shoreline. Especially later in the summer, they were seen swimming in shallow and weedy bays. The species was relatively abundant in Elk/Beaver Lake and Langford Lake (Table 3) and at Swan Lake Nature Sanctuary. Swan Lake Nature Sanctuary staff found 4 – 11 turtles per survey during four surveys from 28 July to 12 August 2009.

At Elk/Beaver Lake where we conducted repeated surveys, the number of turtles detected declined as the season progressed (Figure 2). The decline in numbers was similar for both the Western Painted Turtle and the Red-eared Slider.

Figure 2. Number of turtles found from 21 April to 15 June 2009 during surveys of Elk/Beaver Lakes.



4.2.2 Nesting area surveys

Alberni Valley:

We found evidence of nesting at three of four known sites occupied by the Western Painted Turtle in the valley (Table 4). The exception was Little Turtle Lake, where searches in forest openings in the vicinity of the lake revealed no signs of nesting activity. Apart from the gravel access road, we identified no potential nesting habitat at this site.

At “Airport Wetlands”, nesting areas were located along sides of a main logging road that borders the wetland, along an old spur road to a gravel pit, and in a separate, abandoned gravel pit. At each of the above locations, we found numerous (10 – 86) “test holes”, new nests, and emerged nests with remains of turtle egg shells within relatively small areas (Figure 43). New, covered nests are difficult to identify if not freshly dug, and the numbers found are probably underestimates.

At Patterson Lake, we found turtle nesting areas in four separate sites. Three sites were in natural habitats on a small island, narrow peninsula, and section of the lakeshore, respectively. On the

island and peninsula, most nesting activity was within pockets of deeper soil on rocky bluffs. All sites were in small openings with plenty of exposure to the sun. In addition, we found one turtle nest hole along a small gravel road bordering the lake.

At Devil's Den Lake, we found turtle nesting activity within patches of deeper soil on three rocky bluffs. We had previously found turtle nests on one of the bluffs (Engelstoft and Ovaska 2008), but in 2009 we detected only a few test holes and no new or emerged nests on this bluff.

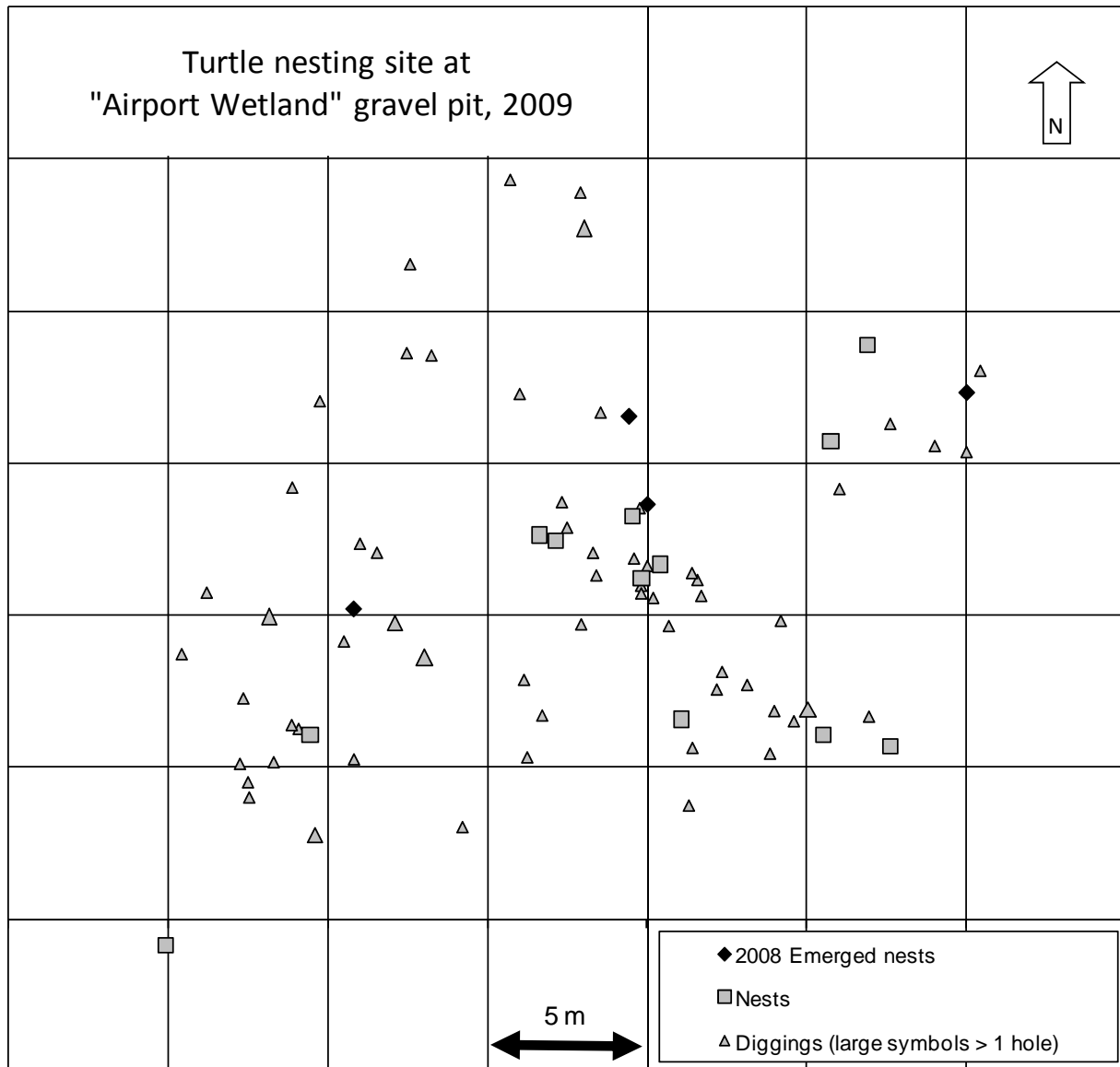
Table 4. Turtle nesting sites located during surveys in the Alberni Valley on 22 - 23 June 2009.

Location	No. emerged nests	No. of new nests*	No. of test holes & diggings	Distance from shore (appr.)	Habitat features	Notes
<u>Airport Wetlands:</u>						
Abandoned gravel pit	5	18	79	50 m	Substrate hard-packed gravel/sand; nests found both on level ground and on low mounds of soil/gravel; small pond in gravel pit	First located in 2008; access from lake through forest; garbage dumping & signs of target shooting
Roadside	0	3	23	25 - 50 m	Gravel sides of main road and intersection with spur road; nests within ca. 20 m section of road	
Old spur road leading to abandoned gravel pit	1	2	86	30 - 80 m	Overgrown gravel road with sparse vegetation; substrate hard-packed sand/soil/gravel; no nests found in gravel pit	
Roadside by lakeshore	0	0	10	< 5 m	Gravel pull-out by side of lake	
<u>Patterson Lake:</u>						
Small island		2	9	1 - 10 m	Bedrock outcrop with lichens, moss, juniper and stunted salal; Nests in pockets of deeper, red rocky soil within ca. 15 x 2 m on SW slope in opening	
Narrow peninsula	1	6	15	1 - 10 m	Rocky bluffs with moss, lichens and some bare soil; 1 new nest along loamy shoreline	
Lakeshore	0	1	2	< 5 m	In patch of bare soil at base of rocky bluff with S-SW exposure	
Roadside	0	0	1	10 m	Side of little-used gravel access road	

Location	No. emerged nests	No. of new nests*	No. of test holes & diggings	Distance from shore (appr.)	Habitat features	Notes
<u>Devil's Den Lake:</u>						
Rocky Bluff 1A	0	1	0	20 m	Rocky bluff with southern exposure; nest in pocket of deeper soil	
Rocky Bluff 1B	0	0	3	< 20 m	Rocky bluff with southern exposure	Signs of otter (potential nest predator) activity at shoreline
Rocky Bluff 2	0	0	Few	< 20 m	Rocky bluff with southern exposure; some diggings but not confirmed turtle signs	Turtle nests found in 2008; signs of otter activity at shoreline

*Underestimate, as new nests are difficult or impossible to find after days or weeks from egg-laying

Figure 3. Location of emerged nests, new nests, and nesting attempts (diggings) at a turtle communal nesting area at "Airport Wetlands" in Alberni Valley, as mapped on 22 June 2009.



Southern Vancouver Island:

With help from CRD volunteers and nearby residents, we identified several turtle nesting areas at Elk/Beaver Lake Regional Park and its immediate vicinity (see Engelstoft and Ovaska 2009 for details). Both the Western Painted Turtle and Red-eared Slider occur in the park, and for some observations reported to us it was impossible to determine the species of turtle. Confirmed and suspected nesting areas of the Western Painted Turtle were identified only in areas southwest of Beaver Lake. Confirmed nests (observations of females in the process of nest construction or egg-laying or emerging hatchlings) were in old field habitat around two ponds, including a communal nesting ground reported previously (Engelstoft and Ovaska 2008), and along gravel paths and openings between the ponds. Nesting has occurred along roadsides near the park entrance according to reports by residents. These reports included four road kill hatchling turtles, three in June 2008 and one in March 2009 (Claudia Copley, pers. comm.). We found a turtle

“test hole” along the roadside near this site on 31 May 2009, but several searches in April – June 2009 revealed no other signs of nesting.

At Elk/Beaver Lake, intensive monitoring of the communal nesting area revealed that hatchlings emerged in April – May, after overwintering in the nests. In total, we found 14 emerged nests at this site from 14 April to 28 May 2009 (Figure 4). Five of the emerged nests were initially located in June 2008, soon after egg-laying. Another five nests located in 2008 failed to emerge. In 2009, egg-laying took place from end of May to end of June. We found nine new nests at the communal nesting site from 28 May to 15 June (Figure 4); a CRD Parks volunteer video-taped and reported to us a further observation of a nesting female by a nearby pond on 28 June. There was no evidence of hatchling emergence during the two checks of the site in the autumn.

In Matheson Lake Regional Park, surveys in April 2009 revealed that a previously identified turtle nesting area had been disturbed by predators, possibly otters. There were many holes and diggings from the shoreline up the bank where we had found turtle nests in 2008. We saw no signs of emerged nests or new nesting activity at this site in 2009.

Nesting sites of the Western Painted Turtle were reported to us from two additional sites, which we subsequently inspected, Swan Lake Nature Sanctuary and Capital City Allotment Association gardens in Saanich. The staff of Swan Lake Nature Sanctuary found an active nest on 1 April 2009, from which three Western Painted Turtle hatchlings emerged by 5 April. Subsequently, a dead hatchling was found near the nest. This nest was on an open southeast slope in hard-packed gravel/loam substrate. A second nest containing 12 turtle eggs was inadvertently unearthed about 30 m from the first nest. None of these eggs showed any development when later dissected. The eggs might have belonged to either the Western Painted Turtle or the introduced Red-eared Slider; the latter is also present in the lake.

Turtle nests found in the Capital City Allotment Gardens were located in potato beds next to paths. Descriptions of the turtles by the gardeners suggested the Western Painted Turtle. We were told of four different nests located throughout the garden complex (Figure 5, Ann Wenham, pers. comm.). The gardens are located across a major highway from the Swan Lake Nature Sanctuary, and to travel between the two sites turtles must either cross the highway or, more plausibly, use a culvert under the highway and travel along Swan Creek.

Figure 4. Location of Western Painted Turtle nests and nesting attempts at a communal nesting area in Elk/Beaver Lake Regional Park in 2008 and 2009 (each grid = 1 m²).

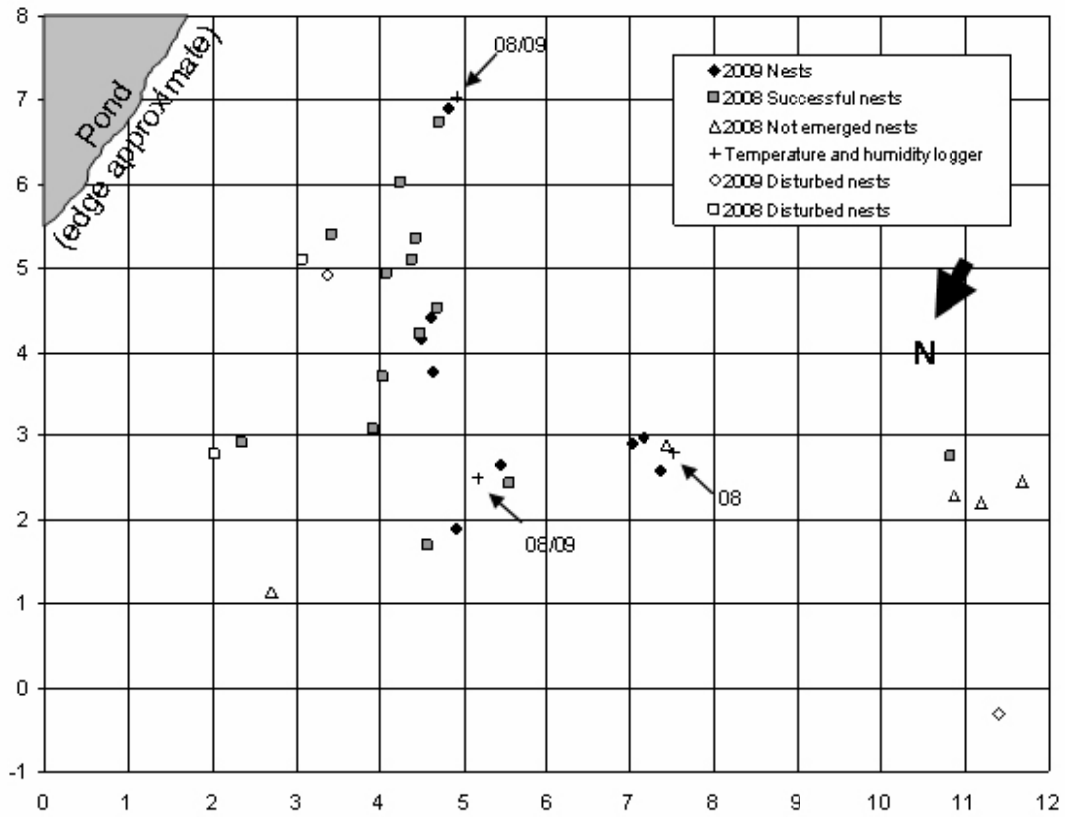
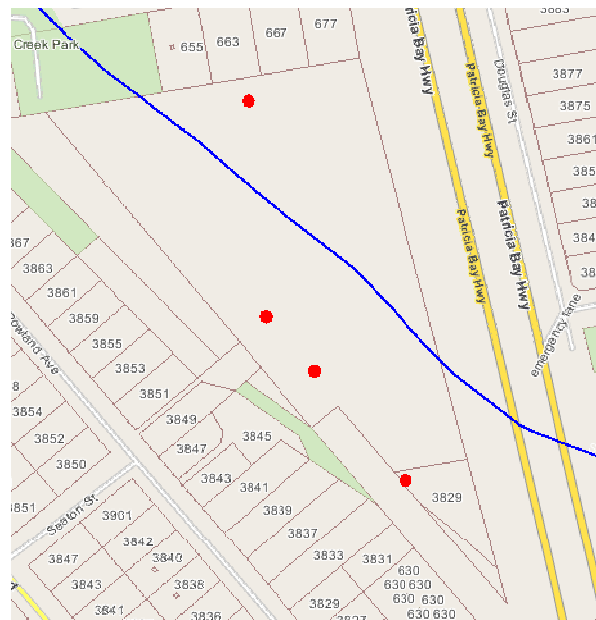


Figure 5. Approximate locations of turtle nest sites in the Capital City Allotment Gardens, Saanich, in 2009.



4.3 Threat Assessment and Management Guidelines

4.3.1 Overview of threats

Sites occupied by the Western Painted Turtle ranged from backcountry lakes within forestry lands in the Alberni Valley to urban and rural residential areas and regional parks on southern Vancouver Island. Threats to turtle populations reflect this variability (Table 5). Road mortality was rated as a potential threat at many of the sites, especially where roads intersected potential travel routes between water bodies and nesting areas or where turtles were known to nest along roadsides.

In the Alberni Valley, threats to nesting areas included vehicular traffic for nests located along roadsides, parking and turning of vehicles on spur roads and old gravel pits, and intensive recreational activities, such as ATV use and target shooting observed at a communal nesting site in an abandoned gravel pit.

In regional parks and residential areas on southern Vancouver Island, threats to nesting areas included disturbance by humans and pets and potential crushing of nests and hatchlings along roads and parking lots by vehicles. In addition, we observed signs of predation at one site, possibly exacerbated by intensive human recreational use and littering.

Table 5. Threat assessment for sites occupied by the Western Turtle, 2009.

Site ID	Location	Roads - paved	Roads - unpaved	Recreation (motorized)	Recreation (non-motorized)	Pets	Exotic species	Residential	Forestry	Human disturbance to nesting areas	Other
<u>Alberni Valley:</u>											
5	Airport wetlands	No	Mod - High	Low?	Low	No	?	No	Low	High (target shooting, ATVs, vehicles)	Predation: disturbed nests & eggs seen at a nesting area
7	Devil's Den Lake	No	No	Low?	Low	No	Mod (bullfrogs)	No	Low	No	Predation
8	Little Turtle Lake	No	Mod	Low?	Low	No	?	No	Low	? (nesting areas not identified)	
9	Patterson Lake	No	Low	Low?	Low	No	?	No	Low	Low (recreation)	Beaver control altering water levels & natural succession
<u>CRD, southern Vancouver Island:</u>											
16	Matheson Lake	Low	Low	No	High	Low	High (bullfrogs, sliders, other spp)	No	No	High (recreation)	Predation: disturbed nests & eggs seen at a nesting area
21A	Beaver Lake portion of Elk/ Beaver Lake	Mod	Mod - High	No	High	High	High (bullfrogs, sliders, other spp)	Low	No	High (recreation, pets)	
25	Langford Lake	Mod - High	Low	Mod	High	Mod	High (bullfrogs, sliders, other spp)	High	No	High?	Mechanical aquatic weed removal; retaining walls along shoreline preventing access to land

Site ID	Location	Roads - paved	Roads - unpaved	Recreation (motorized)	Recreation (non-motorized)	Pets	Exotic species	Residential	Forestry	Human disturbance to nesting areas	Other
NA	Swan Lake	High?	Low	No	Mod	No	High (bullfrogs, sliders, other spp)	Low	No	High (recreation, gardening)	
NA	Capital City Allotment Gardens	High	Low	NA	NA	Low	N/A	High	No	High (gardening)	
NA	Metchosin Rd ponds	Mod - High	Low	No	No	No	?	Low	No	<u>Pond 1</u> : Low (vehicles to roadside nests); <u>Pond 2</u> : Nesting areas not identified	

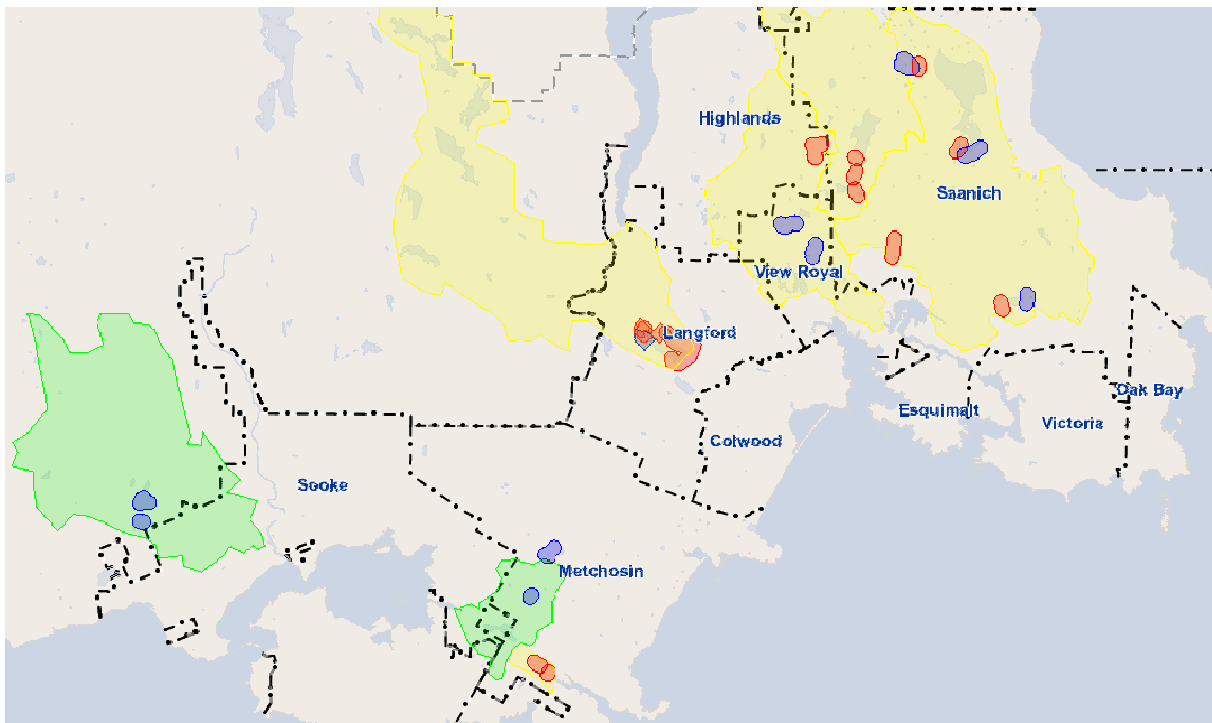
4.3.2 Road mortality assessment and mitigation

Threat assessment:

Within CRD on southern Vancouver Island, we identified sites where Western Painted Turtles are susceptible to road kill based on the proximity of occupied lakes and ponds to roads, type of road, and (where known) location of nesting habitat in relation to roads (Figure 6). Reports of road-killed Western Painted Turtles were also taken into account but were too few to draw conclusions about high-risk areas or the significance of road mortality to the populations. At one location, near Beaver Lake, hatchling turtles have been found dead on road in two consecutive years (Claudia Copley, pers. comm.). We know of only two other opportunistically encountered road-killed turtles within the CRD from 2008 – 2009, but no systematic monitoring has been conducted. Detailed maps prepared as part of this assessment were used to identify priority areas for monitoring and for developing recommendations by HAT for road signage for responsible municipalities (deposited to HAT data files).

Figure 6. Overview of turtle road kill risk assessment within CRD on southern Vancouver Island.

Pink polygons: high risk areas; Blue polygons: road kill possible but uncertainty high; Yellow polygons: watersheds occupied by the Western Painted Turtle; Green polygons: watersheds with suitable habitat but no known records of the Western Painted Turtle



Mitigation initiatives:

Mitigation measures that were conveyed to land managers include closures of selected spur roads to vehicular traffic on forestry lands and installing turtle crossing signage in high risk areas along smaller roads in residential areas and access roads to CRD Regional Parks. Turtle crossing signage was recommended only for areas where they have a likelihood of being effective in reducing vehicle speeds and increasing driver alertness to turtles on roads. Signage that is in

place only during peak periods of vulnerability, from March to June within CRD, was deemed to be more effective than permanent signs due to driver habituation. Intensive measures such as fencing or underpasses are not recommended at this time because of lack of information on road mortality rates and their significance to populations, as well as detailed locations of important crossing areas.

HAT has an agreement with the District of Saanich to create, install, and maintain road crossing signs for the Western Painted Turtle in areas identified through HAT's research, monitoring, and outreach services. Neighbouring municipalities, including the Districts of Langford, Metchosin and Highlands, are also interested in erecting road and/or interpretive signage in key locations, and negotiations have been started.

Monitoring the effectiveness of mitigation measures is important, although direct measures, such as change in road kill frequency, are impossible to obtain at this time because of lack of baseline data. We recommend the following measures for evaluating the effectiveness of the road signage: (1) Record vehicle speeds before and after signage installation; (2) Interview drivers at strategic points; potential interview questions include "Did you see the sign?" "Did it make you change your behaviour (reduce speed; be more alert to animals on road; other); "Did you know that there are turtles in the park before seeing the sign?" In addition, we recommend that a small section of the road by Elk/Beaver Lake Regional Park entrance, where hatchling road mortality has been observed, be monitored intensively for turtle nests and hatchlings from mid-March to end of April, a period which includes the peak hatchling emergence period observed in 2009. The objective of these monitoring efforts is to identify nest site locations and to obtain information on the number of vulnerable nests or hatchlings. Depending on the results, more intensive mitigation measures may need to be prescribed.

4.3.3. Best Management Practice guidelines for forestry lands

In the Alberni Valley, documented sites with the Western Painted Turtle are on private forestry lands. In collaboration with Island Timberlands, we developed a set of best management practice guidelines to help the company minimize impacts of forestry operations and associated maintenance activities on turtles. This document contains a synopsis of recommendations by activity, linked to more detailed measures. The document is meant to be updated as more information on habitats, movements, and threats becomes available. For the entire best management practices document, see Appendix 1.

4.3.4 Management guidelines for CRD Regional Parks

CRD Regional Parks provide refuges for the Western Painted Turtle within extensively modified urban and rural landscapes, and therefore park managers are in a unique position to protect populations and habitats of this species. We provided CRD Parks preliminary recommendations to protect identified nesting habitats and mitigate threats to turtles, as summarized below (see Engelstoft and Ovaska 2009 for more details):

- (1) Communal nesting area in Elk/Beaver Lake Regional Park is heavily used for recreational activities, including retriever training, dog walking, and hiking, which have the potential to disturb this important area. Mitigation options include erection of

temporary fencing around the small area used by turtles from April to June, when turtles are most vulnerable. The site is co-managed by CRD Parks and Vancouver Island Retriever Club, and any mitigation measures need to be discussed with the club.

- (2) In Elk/Beaver Lake Park, three locations were identified that would benefit from nesting habitat enhancement and restoration. Recommended activities would involve removing introduced weeds and grass from small areas at strategic locations. The restoration would cause no or minimal inconvenience to park users.
- (3) Turtles are vulnerable to road kill, particularly from April to June during nesting and hatchling emergence periods. Mortality of Western Painted Turtle hatchlings is documented from near the Elk/Beaver Lake entrance on Beaver Lake Road. Erection of turtle crossing signs in this area and interpretive signs in the park may help reduce vehicle speeds along the access roads. We also recommend monitoring efforts during the sensitive nesting period to clarify threats from road kill.

4.3.5 Site-specific guidelines for residential properties

Landowners with properties containing confirmed turtle habitat were given the option to receive free habitat enhancement or restoration guidelines that were specifically designed for their properties. In 2009, we prepared detailed guidelines for two private residential properties within CRD on Vancouver Island. Both properties contain ponds and wetlands used by turtles, and the landowners reported past nesting observations. The guidelines provided landowners with specific options to enhance or restore nesting habitat for turtles, including optimal locations and step-by-step instructions. They also provided suggestions to enhance aquatic habitat. See Appendix 2 for an example of these guidelines.

4.4 Landowner Contacts and Outreach

HAT delivered community outreach services through the Habitat Stewardship Program for the Western Painted Turtle from March to September 2009. Services included landowner contact in focus areas and general public outreach, which included dissemination of information at workshops, festivals, and naturalist and garden groups, as well as media releases. Direct outreach to landowners in known and potential turtle habitats resulted in nearly 400 contacts. Landowner contacts included the delivery of over 200 postcards, 120 face-to-face contacts with the public, and 73 contacts by telephone. These contacts resulted in follow-up activities, including the delivery of 57 turtle information packages and 27 visits to private property owners. Of the 27 free and confidential visits with landowners in focal areas, HAT staff entered into non-legal, signed stewardship agreements with 20 land-owning families. Two private landowners on residential properties received site-specific habitat guidelines, which presented options for enhancing and restoring nesting and aquatic habitat (see Section 4.3.5). Face-to-face contacts at workshops, presentations, and large events resulted in approximately 120 additional contacts with landowners in focal areas. Contacts received postcards and turtle stickers featuring key messages. An article in a local newspaper resulted in approximately 200 additional contacts.

HAT's outreach efforts in 2008 and 2009 have encouraged the Langford Lake and Area Protection Society to enter into a partnership with the City of Langford to create turtle interpretive signage for Langford Lake, a site of an apparently large Western Painted Turtle population.

5.0 Discussion

5.1 Distribution

It is essential to know where the Western Turtle occurs, so that populations and habitats can be protected and managed appropriately. As part of this project in 2008 – 2009, survey efforts and reports from residents, local naturalist, and the public have helped document the distribution of the species on Vancouver Island and the Gulf Islands. On Vancouver Island, the species appears to be widespread but patchily distributed in low-elevation water bodies. Within Greater Victoria, there are several occupied sites, some of which (Elk/Beaver Lake, Langford Lake) support apparently large populations. In the District of Metchosin, southwest of Victoria, there are scattered records from numerous locations, including roadways and small ponds, suggesting that the turtles move widely within the fragmented landscapes. In other areas, Painted Turtles have been documented to move seasonally among ponds across the landscape (Bowne et al. 2006). We were unable to find the species on southwest portion of Vancouver Island, from around Sooke to Port Renfrew, although several water bodies appeared to contain suitable habitat. Surveys in this area were only started in 2009, and these areas require more investigation.

On southern Gulf Islands, the Salt Spring Conservancy has documented the Western Painted Turtle from several locations on that island (L. Matthias, pers. comm.). There are also records of the species from one location on South Pender Island (Engelstoft and Ovaska 2008). We know of no other confirmed records from other Gulf Islands. However, there are unconfirmed records from both Galiano and North Pender Island, which warrant further investigation.

In the Alberni Valley, with help from local naturalists, we have located the species at four sites since 2008. These observations are of special interest because of old historical reports of the species from several lakes in the Alberni Valley (Carl 1952). However, only one, Patterson Lake, was mentioned by name. This lake is still occupied by the Western Painted Turtle, and in 2009 we found evidence of nesting along the lakeshore, islands, and nearby areas. Apart from the Alberni Valley, limited surveys have been conducted along the east coast of Vancouver Island, north of Greater Victoria. The Western Painted Turtle occurs near Nanaimo (Engelstoft and Ovaska 2008), and there are old and recent reports from farther north, from Texada Island (McTaggart Cowan 1938, Carl 1952, Vanessa Kilburn, pers. comm. 2010). The species may well occur elsewhere along the east coast of Vancouver Island, up to and beyond Campbell River, and on other islands.

Repeated surveys of the Elk/Beaver Lake in spring – summer 2009 revealed that both the Western Painted Turtle and Red-eared Slider were detected most readily early in the season, in April – May. During this time, we usually found turtles basking along the shoreline or on logs or other floating objects. In contrast, later in the summer we often saw turtles swimming, and spotting and identifying turtle heads protruding out of the water took considerably more effort and acuteness of observation than finding basking turtles. In addition, as the season progressed, growth of emerging aquatic vegetation impeded our vision and mobility and probably also decreased our ability to detect turtles. Hence, for maximum detection, surveys to determine whether turtles occupy particular water bodies are best carried out early in the season. This observation concurs with findings on the Sunshine Coast (Michelle Evelyn, pers. comm.).

5.2 Nesting Ecology

In addition to aquatic foraging and over-wintering habitats, Painted Turtles require safe nesting areas on land. Based on studies from other geographic areas, nesting areas are usually located on gently sloping terrain on sunny, sparsely vegetated patches of ground with suitable loamy substrate (reviewed in COSEWIC 2006).

Nesting areas are often within 100 m from water bodies but are sometimes much farther (Semlitsch and Bodie 2003). We found turtle nesting areas at several sites on Vancouver Island, both in natural and disturbed habitats. In the Alberni Valley, natural nesting habitats included patches of exposed ground along shorelines and moss-covered bedrock bluffs with a southern exposure. On rocky bluffs, turtles nested in pockets of deeper, exposed soil and must have climbed up relatively steep gradients to reach these sites. The substrate was hard-packed loamy/sandy soil of varying coarseness mixed with rocks. Suitable open natural nesting habitats appeared to be in short supply in the vicinity of all water bodies that we inspected. Availability of nesting areas may constrain the distribution of turtles in this and other areas on the west coast of B.C., where dense forest cover often extends to the shoreline.

Painted Turtles are known to use roadsides and other human-disturbed habitats for nesting with variable success (Marchand and Litvaitis 2004). Within our study area, turtles also frequently nested along roadsides, in old gravel pits, and at other disturbed sites. Turtles were probably attracted to these areas because of their open nature and sandy/gravelly substrate.

Intensive monitoring of a communal nesting area at Elk/Beaver Lake Regional Park provided information on the timing of egg-laying and hatchling emergence. This site was located on a sparsely vegetated, gentle slope in old field habitat adjacent to a small pond. In 2009, hatchlings emerged in April – May, and egg-laying took place in late May – June. The earliest record was on 26 March, when a hatchling was found dead on the road in the nearby area (C. Copley, pers. comm.) This hatchling probably originated from a roadside nest separate from the communal nesting area. In other parts of the species' distribution, eggs usually hatch in the autumn and hatchlings overwinter in the nest (Mitchell 1998); this appeared to be the case at our study site as well. The timing of hatchling emergence and egg-laying may vary annually, depending on weather and other environmental conditions. Information on the timing of nesting needs to be collected over multiple years, so that protection and mitigation measures can be applied effectively.

5.3 Threats and Mitigation

On southern Vancouver Island, Western Painted Turtle populations are embedded within urban and rural landscapes, where habitats are severely fragmented by roads, residential developments, and other human land uses. Busy roads can act as barriers to turtle movements (Bowne et al. 2006), constraining dispersal and access to resources. When turtles do cross roads, they are vulnerable to road kill, which can be especially severe where roads intersect travel routes between nesting grounds and aquatic habitats (COSEWIC 2006). Our threat analysis identified several locations within CRD where turtles might be at high risk from road mortality. At present, however, the frequency and significance of road mortality to turtle populations in these areas are unknown. HAT is in negotiations with local municipal governments to install turtle crossing

signage at selected locations along small roads where road kills have occurred or are highly likely to occur. Lack of knowledge of road kill “hot spots” and the significance of road mortality to turtle populations in our study area make the deployment of more intensive measures, such as fencing, premature.

In addition to roadsides, we found turtle nesting areas in various disturbed habitats. Turtle nests in disturbed habitats are particularly vulnerable to predation (Marchand and Litvaitis 2004). We noted extensive human disturbance at some nesting areas, including a communal nesting ground in the Alberni Valley, located in an old gravel pit used for target shooting, garbage dumping, and as a vehicle turn-around. Within CRD Regional Parks, turtle nesting areas were within disturbed sites that received heavy recreational use by park visitors. Recommended mitigation measures at Elk/Beaver Lake Regional Park include erection of temporary fencing around the small area used by many turtles and restoration/enhancement of nesting areas by exposing bare ground at selected sites (Engelstoft and Ovaska 2009).

Much of the distribution of the Western Painted Turtle in coastal B.C. is on private lands. Hence, collaboration with landowners is essential to conserve turtle populations and effectively mitigate threats. Within urban and rural areas, even small parcels of land can be important. For example, small pools, such as those periodically used by turtles on residential lots in Metchosin, may act as stepping stones for turtles moving across the landscape. Stewardship by private landowners may provide the only opportunities for habitat protection and threat mitigation in built-up or agricultural landscapes.

Large landowners, such as CRD Parks and private forestry companies, have a unique opportunity to contribute significantly to the conservation of turtle populations by appropriately managing habitats within multi-use areas. For CRD Parks, the challenge is to manage visitor activities so that disturbance to turtles is minimized, especially during the sensitive nesting period. Turtles on forestry lands face a multitude of threats from maintenance and operational activities associated with logging. The best management practices developed as part of this project are designed to help forest companies to identify and minimize threats from different activities (Appendix 1). The development of this document also highlighted information gaps that need to be filled to make the guidelines more effective. We hope to continue collaboration with landowners, both small and large, in the future.

6.0 Recommendations for Further Studies

Surveys of water bodies:

Knowledge of where populations occur is an essential first step for effective protection and management. Therefore, continued survey effort is important to fill in data gaps. We recommend the following priorities for surveys:

- Within CRD, survey water bodies with no previous or recent records of the Western Painted Turtle. Focal areas for 2010 include the following:
 - Southwest coast of Vancouver Island, from Sooke to Port Renfrew area
 - Sea to Sea and Sooke Hills Wilderness Regional Park Reserves (CRD Parks)
 - Galiano Island
 - Pender Islands

- Follow up with reports of turtles from the public
- Low-elevation water bodies outside CRD on Vancouver Island, especially along the east coast north to about Campbell River
- At selected known water bodies, conduct periodic counts of turtles (e.g., twice a month through the active season) to obtain information about the population size and composition, and the ratio of alien versus native turtles

Habitat use:

- Conduct radio-telemetry studies at selected sites to obtain detailed information on seasonal movement patterns and important habitats used for nesting, foraging, and overwintering
- Based on telemetry data, identify threats and locations where turtles are particularly vulnerable to mortality or disturbance

Nesting area monitoring and threat clarification:

- Monitor known nesting areas for timing of hatchling emergence and egg laying, and for hatching success
- Examine predation of newly emerged hatchling turtles by introduced bullfrogs at selected sites
- Work with landowners to monitor turtle nesting activities at other identified sites to document the number of turtles using the sites and to identify threats
- Identify new nesting areas through visual surveys, telemetry studies, and reports from the public

Road mortality:

- Encourage landowners and the public to report road-killed turtles
- Install turtle crossing signs as an initial measure to deter road kill at specific strategic locations; monitor these sites
- Monitor incidence of road kill in specific areas during hatchling emergence and nesting seasons

Landowner contacts and stewardship actions:

- Continue efforts to encourage landowners within turtle habitats to participate in surveys, monitoring, and habitat restoration efforts
- In collaboration with landowners, prepare site-specific habitat guidelines for private lands with turtle habitat
- Assist landowners who wish to complete on-the-ground habitat restoration or enhancement activities
- Prepare or refine best management practices for large landowners

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8.0 Personal Communications

Ann Wenham, Capital City, Allotment Gardens, Victoria, BC

Claudia Copley, Royal BC Museum, Victoria, B.C.

Michelle Evelyn, Ruby Lake Lagoon Society, B.C.

Vanessa Kilburn, British Columbia Conservation Foundation and Fraser Valley Conservancy, B.C.

Laura Mathias, Salt Spring Conservancy, B.C.

Appendix 1. Best management practices developed for private forestry lands in the Alberni Valley, Vancouver Island.



**Best Management Practices for the Endangered
Western Painted
Turtle on Forestry Lands in the Alberni Valley**

Version 1

**HABITAT
ACQUISITION
TRUST**

Suite 316, 620 View St
PO Box 8552
Victoria, B.C.
V8W 3S2

Tel: (250) 995.2428
Fax: (250) 920.7975

hatmail@hat.bc.ca
www.hat.bc.ca



Western Painted Turtle

Prepared by
Christian Engelstoft, MSc, RPBio, and
Kristiina Ovaska, PhD, MSc
(alula.bc@telus.net; 250.652.9770)
on behalf of HABITAT ACQUISITION TRUST

Funded by:
Habitat Stewardship Program, Government of Canada

Synopsis of Best Management Practice Guidelines

1. GENERAL GUIDELINES (ALL ACTIVITIES):

- Check for known Western Painted Turtle occurrences or nesting grounds on the work site on the Island Timberlands GIS system or database.
- Conduct surveys for turtles or for signs of nesting, where recommended by guidelines for specific activities (see BMPs below).

2. GUIDELINES FOR MAINTENANCE ACTIVITIES:

a) Road repair and grading

- Where turtles are known to nest on roadsides, conduct repairs and grade roads in late spring, when chances of harming turtle nests are minimal, and avoid grading road edges and shoulders.
- In other areas where roads are immediately adjacent water bodies with records of turtles, either take above precautions *or* survey for signs of turtle nesting activity on roadsides before starting work.

b) Gravel extraction

- Near water bodies where turtles hibernate or are suspected to hibernate, take out beaver dams including those that are blocking culverts when turtles are not hibernating.
- Rather than eliminating or reducing beaver numbers, use a specially constructed “beaver baffle” to discourage beavers from fixing leaks in their dams and blocking culverts.

c) Ditching

- Where turtles are known to nest on roadsides, clear ditches in late spring, when chances of harming turtle nests are minimal.
- In other areas where roads are immediately adjacent water bodies with records of turtles, either clear ditches in late spring or survey for signs of turtle nesting activity before ditching.
- Avoid piling up dredged materials or cleared vegetation along edges of roads in turtle nesting habitat.

d) Snowplowing

- Take care to avoid scraping road edges and shoulders when plowing snow in turtle nesting habitat.
- Avoid high/large piles of snow along road edges in turtle nesting habitat. Note, however, that piling of snow along road edges as a result of regular snowplowing process (to depths of less than about 1 m) will most likely not harm turtle nests.

e) Repairing or Unblocking Culverts

- Avoid replacing and clearing blocked culverts that could dramatically decrease water levels when turtles are hibernating.

f) Beaver Control

- Near water bodies where turtles hibernate or are suspected to hibernate, take out beaver dams including those that are blocking culverts when turtles are not hibernating.
- Rather than eliminating or reducing beaver numbers, use a specially constructed “beaver baffle” to discourage beavers from fixing leaks in their dams and blocking culverts.

3. GUIDELINES FOR FORESTRY PRACTICES

a) New Road Construction

- Avoid placing new roads in sensitive turtle habitats.
- If roads must be placed close to a water body in known or potential turtle habitat, conduct surveys for turtle nesting grounds so that they can be avoided, and do not encircle the entire water body with roads.
- Follow standard practices when crossing streams and creeks and installing culverts to minimize natural hydrological patterns in turtle habitats.

b) Cutblock Planning and Timber Harvesting

- Conduct surveys in water bodies with suitable turtle habitat in cutblocks slated for timber harvesting.
- Retain a wide riparian buffer zone along lakes, ponds, and wetlands occupied by turtles.
- Apply appropriate buffers to all water courses within the cutblock to retain landscape connectivity through riparian zones.

c) Transportation of Logs

- When using roads that intersect known or suspected turtle migration routes, attempt to travel at seasons and times of day when turtles are not actively moving in the landscape; avoid dusk in June – July, when nesting turtles are likely to travel overland.
- Consider using alternative routes to and from cutblocks in areas where roads intersect important turtle habitats.

d) Reforestation and Stand Management

- Inform contractors and workers of the location of sensitive turtle habitats, and encourage them to exercise caution when working in or driving through these areas.

- Avoid driving on roads at dusk in the summer when turtles are most likely to be on land and crossing roads.
- Ensure that pesticides, herbicides, or fertilizers are used appropriately and do not enter water bodies.

e) **Road or Site Deactivation**

- Conduct surveys to locate signs of turtle nesting activity, if deactivation is to occur in known or suspected turtle habitat.
- Avoid disturbing the ground within areas where signs of turtle nesting activity are found during surveys.

f) **Guidelines for Public Access Management**

- Close public access to old gravel pits and spur roads used by nesting turtles; gate off access or use barriers to these areas to prevent vehicular access.
- Use signage, such as “turtle crossing” where roads intersect known or suspected turtle migration routes; consider information signs to gain community support, for example signs displaying co-management between Island Timberlands, HAT and/or other conservation organizations.

Table of Contents

Executive Summary	2
Acknowledgments	6
1.0 Introduction	7
2.0 Objectives.....	7
3.0 Methods.....	7
3.1 Study Area and Sites.....	7
3.2 Survey Protocol.....	14
3.3 Habitat and Threat Assessment.....	16
3.4 Stewardship and Outreach	16
3.5 Data Handling and Mapping.....	16
4.0 Results	17
4.1 Survey Effort.....	17
4.1.1 Presence/not-detected level surveys	17
4.1.2 Nesting ground surveys and monitoring	17
4.2 Survey Results	18
4.2.1 Distribution surveys.....	18
4.2.2 Nesting area surveys	20
4.3 Threat Assessment and Management Guidelines	26
4.3.1 Overview of threats.....	26
4.3.2 Road mortality assessment and mitigation	29
4.3.3. Best Management Practice guidelines for forestry lands.....	30
4.3.4 Management guidelines for CRD Regional Parks.....	30
4.3.5 Site-specific guidelines for residential properties.....	31
4.4 Landowner Contacts and Outreach.....	31
5.0 Discussion.....	32
5.1 Distribution	32
5.2 Nesting Ecology.....	33
5.3 Threats and Mitigation.....	33
6.0 Recommendations for Further Studies.....	34
7.0 Literature Cited.....	36
8.0 Personal Communications.....	36
Synopsis of Best Management Practice Guidelines	38
Where is the Western Painted Turtle in the Alberni Valley?.....	43
Western Painted Turtle Biology	43
Habitat Requirements.....	43
Life History and Habits.....	44
Main Threats in Relation to Forestry Practices.....	44

Best Management Practices Guidelines for Forestry Activities.....	45
1. General Guidelines (All Activities):	45
2. Guidelines for Maintenance Activities:	45
a) Road repairs and grading	45
b) Gravel extraction.....	46
c) Ditching.....	46
d) Snowplowing	47
e) Replacing and Unblocking Culverts	48
f) Beaver Control.....	48
3. Guidelines for Forestry Activities:.....	49
a) New Road Construction.....	49
b) Cutblock Planning and Timber Harvesting	50
c) Transportation of Logs.....	51
d) Reforestation and Stand Management.....	52
e) Road or Site Deactivation:	53
4. Public Access Management	53
Knowledge Gaps.....	54
Literature Cited.....	54
Background:	56
Objectives:	57
A. Creation of new nesting area by the pond (polygon by yellow arrow).....	57
B. Installation of basking logs in the pond	58
Monitoring the Effect of Actions	60

Where is the Western Painted Turtle in the Alberni Valley?

Recent records of the Western Painted Turtle exist from Patterson, Little Turtle, and Devil's Den Lakes, and from the wetlands to the west and north of the airport, here called "Airport Wetlands" (Engelstoft and Ovaska 2008; Figure 7). There are old reports of the species from Patterson Lake and from other, unspecified small lakes in the valley (McTaggart Cowan 1938, Carl 1952). Additional surveys are needed to establish where turtles presently occur in the area.

Figure 7. Distribution of the Western Painted Turtle in the Alberni Valley based on observations in 2008 - 2009.



(Map source: Google Earth, accessed 09 Sep 2009)

Western Painted Turtle Biology

Habitat Requirements

Western Painted Turtles spend most of their lives in ponds, lakes, oxbows, or quiet waters of rivers, where they prefer shallow, sheltered areas with abundant aquatic vegetation. On sunny days, they can be seen basking on logs or other objects in the water or shorelines. Turtles need to bask to raise their body temperature, which in turn promotes digestion, synthesis of vitamin D, and other vital processes and helps remove ectoparasites and/or algae.

Turtles require suitable habitat on land for nesting. Nesting habitat needs to have the following features: exposure to the sun such as southern aspect in an opening; light clayey, loamy and sandy soils, usually hard-packed; sparse vegetation and bare, exposed ground at well-drained sites; proximity to water, usually within about 150 m. Suitable nesting sites are often limited along the Pacific Coast. In the Alberni Valley, natural nesting habitat includes areas of deeper soil on low, rocky bluffs or along sparsely vegetated shorelines above the flood zone (Engelstoft and Ovaska 2008 and unpublished data). Turtles are also attracted to the sides of gravel roads and other sunny sites with bare soil.

The Western Painted Turtle hibernates in the bottom of ponds and lakes, often in shallow, well-oxygenated water.

Turtles move across the landscape to reach nesting, over-wintering, or foraging sites. While longer movements probably take place along water courses, turtles also regularly move overland, for example when moving to their nesting grounds and between water bodies.

Life History and Habits

Individual Western Painted Turtles can live 50 years or more. While mortality of hatchlings and young turtles is often high, adults have few natural predators. Ravens, crows, raccoons, otters, and rats prey on turtle eggs and hatchlings and otters are known to prey on adult hibernating turtles. In some areas road kill increase the mortality of both hatchings and adults.

Persistence of turtle populations relies on high adult survival and females in particular. It was shown in a computer model that annual kills of 3 adult females in a population of 100 individuals will cause the populations to go extinct in 50 years. Road mortality of females traveling to the nesting ground is a widespread phenomenon, and can result in serious population declines.

Western Painted Turtles often nest communally and use traditional nesting grounds year after year. The female digs a flask-shaped nest in the substrate and can lay more than 18 eggs in early summer. The eggs hatch in the fall, but hatchling turtles usually overwinter in the nest and dig themselves out in the spring, then head to water. Males mature in about 8-10 years, females in 12-15 years.

The northern populations of Western Painted Turtle are more carnivorous than southerly populations. Young turtles feed mostly on small pond invertebrates such as aquatic insects, crayfish, snails and tadpoles. As they mature they switch to larger prey such as small animals, frogs, and crayfish, as well as consuming aquatic vegetation. They are also known to scavenge when opportunities arise.

The following links provide more information about the Western Painted Turtle:

- COSEWIC status report: <http://dsp-psd.pwgsc.gc.ca/Collection/CW69-14-505-2006E.pdf>
- HAT Painted Turtle Project: http://www.hat.bc.ca/index.php?option=com_content&view=article&id=59&Itemid=39
- Species account in Rare Amphibians, Reptiles and Mammals of British Columbia: <http://www.env.gov.bc.ca/wld/documents/spsum/ARAAD01010.pdf>
- Wildlife in British Columbia At Risk brochure: <http://www.env.gov.bc.ca/wld/documents/pturtle.pdf>

Main Threats in Relation to Forestry Practices

- Road mortality of hatchling or nesting turtles, and possibly also of dispersing turtles
- Gravel extraction from sites used by nesting turtles
- Disturbance to habitat at nesting grounds or to nesting turtles by the public
- Change of hydrological regimes from road building or from beaver control
- Limited availability of natural nesting grounds encourages turtles to use roadsides and gravel pits, increasing risk of mortality and disturbance

Best Management Practices Guidelines for Forestry Activities

The following guidelines are general measures that are recommended before any maintenance activities, infrastructure development, or forest practices are undertaken:

1. General Guidelines (All Activities):

- Check for known Western Painted Turtle occurrences or nesting grounds on the work site on the Island Timberlands GIS system or database.
- Conduct surveys for turtles or for signs of nesting, where recommended by guidelines for specific activities (see BMPs below).

2. Guidelines for Maintenance Activities:

a) Road repairs and grading

Rationale:

The main threat from road repairs and grading is inadvertent destruction of turtle nests located along the edges of gravel roads. Grader blades could destroy nests, and the wheels of machinery could crush eggs and hatchlings in nests. It is, however, possible to minimize these risks, because nests are usually located on roadsides and the shoulder rather than on the roadbed itself.

Suggested BMPs:

What?

- Where turtles are known to nest on roadsides, conduct repairs and grade roads in late spring, when chances of harming turtle nests are minimal, and avoid grading road edges and shoulders.
- In other areas where roads are immediately adjacent to water bodies with records of turtles, either take above precautions *or* survey for signs of turtle nesting activity on roadsides before starting work.

When?

- Grade and repair roads in late spring, after hatchlings have emerged from nests but before egg-laying begins. There is a narrow seasonal time-window when these activities can be conducted safely in sensitive turtle habitats. The optimal period is probably in May – early June, but there is uncertainty about the exact timing of seasonal activities of turtles in the Alberni Valley.
- Surveys for signs of turtle nesting activity can be conducted anytime from about March to September.

Where?

- The BMPs apply to sections of roads where the Western Painted Turtle is known to nest, and where roads are immediately adjacent to lakes or wetlands occupied by this species

- Implement the actions to the road from about 200 m before to about 200 m after the occupied water bodies to ensure that no nests are harmed.

b) Gravel extraction

Rationale:

Gravel extraction from old gravel pits that are situated close to wetlands can result in destruction of turtle nesting areas. If new gravel pits are placed in natural openings used by turtles for nesting they could also result in destruction of turtle nesting sites. Therefore an important precautionary measure is to place new gravel pits away from prime turtle nesting habitat. Western Painted Turtles are known to nest in gravel pits in the Alberni Valley (Engelstoft and Ovaska 2008). Resumption of gravel extraction in such places could inadvertently destroy turtle nests. Turtles are attracted to these sites because of the exposed soil and sandy substrate suitable for nest building, especially where natural nesting areas are in short supply¹.

Suggested BMPs:

What?

- Locate *new gravel* pits away from water bodies with records of the Western Painted Turtle; consult a professional biologist if a gravel pit needs to be placed near turtle habitat.
- *At existing gravel pits* in turtle habitat, survey for signs of turtle nesting activity before any material is extracted for road repairs, road construction, or other purposes. If signs of turtle nesting activity are found, use alternative sites for gravel extraction.

When?

- Conduct surveys of existing gravel pits before any extraction takes place; best time for these surveys is from about March to August.

Where?

- The BMPs apply to areas adjacent (within about 500 m) from ponds, lakes, or wetlands occupied by the Western Painted Turtle.

c) Ditching

Rationale:

The main threat from clearing ditches from vegetation and debris is from machinery crushing turtle eggs or hatchlings in roadside nests and from materials extracted from ditches covering them. Suggested BMPs are similar to those for road repair and grading.

Suggested BMPs:

What?

- Where turtles are known to nest on roadsides, clear ditches in late spring, when chances of harming turtle nests are minimal.

¹ As a mitigation measure it would possible to establish a series of smaller nesting areas close to wetlands with known Western Painted Turtle populations. Ensure that such undertaking do not violate other regulations.

- In other areas where roads are immediately adjacent water bodies with records of turtles, either clear ditches in late spring or survey for signs of turtle nesting activity before ditching.
- Avoid piling up dredged materials or cleared vegetation along edges of roads in turtle nesting habitat.

When?

- Clear ditches in late spring, after hatchlings have emerged from nests but before egg-laying begins. There is a narrow seasonal time-window when these activities can be conducted safely in sensitive turtle habitats. The optimal period is probably in May – early June, but there is uncertainty about the exact timing of seasonal activities of turtles in the Alberni Valley.
- Surveys for signs of turtle nesting activity. The best time for these surveys is from about March to August.

Where?

- The BMPs apply to sections of roads where the Western Painted Turtle is known to nest, and where roads are immediately adjacent to lakes or wetlands occupied by this species
- Implement the actions to the road from about 200 m before to about 200 m after occupied water bodies to ensure that no nests are harmed.

d) Snowplowing

Rationale:

There are three main types of threats to turtle eggs and hatchlings in roadside nests from snowplowing. One is the mechanical destruction of nests with the snowplow blade; a second is from removing the insulating snow layer. Snow insulates turtle nests from freezing and is therefore important for the survival of the hatchlings that are overwintering in the nests. A third threat is from high piles of snow on top of nests, which could delay emergence of turtles in the spring and trap hatched turtles.

Suggested BMPs:

What?

- Take care to avoid scraping road edges and shoulders when plowing snow in turtle nesting habitat.
- Avoid high/large piles of snow along road edges in turtle nesting habitat. Note, however, that piling of snow along road edges as a result of regular snowplowing process (to depths of less than about 1 m) will most likely not harm turtle nests.

When?

- Anytime when snowplowing takes place.

Where?

- Implement the BMPs in areas where the Western Painted Turtle is known to nest along roadsides and where roads occur adjacent to water bodies occupied the species.

e) Replacing and Unblocking Culverts

Rationale:

The threat from these activities is sudden and drastic drops in water levels that may expose turtles hibernating at the bottom of ponds, wetlands, or lakes to winter weather. In the Interior of B.C., the Western Painted Turtle hibernates in shallow (below 1 m in depth), well-oxygenated waters of lakes and ponds (Taylor and Nol 1989, St Clair and Gregory 1990). Such shallow areas would be the first to be exposed if water levels decrease. On the Sunshine Coast turtles hibernate in areas with water depths of 2 or more meters (M. Evelyn, 2009 per com). Unfortunately, we know virtually nothing about hibernation habits of the turtles in the Alberni Valley. In the Alberni Valley, turtles probably hibernate during the coldest part of the winter, from October to March, but the exact timing is unknown. In the Interior of B.C., Western Painted Turtles hibernate when water temperatures are below about 10° C (Blood and Macartney 1998). A cautionary approach is recommended when working in turtle habitat until more information of hibernation locations and requirements by turtles become available.

Suggested BMPs:

What?

- Avoid replacing and clearing blocked culverts that could dramatically decrease water levels when turtles are hibernating.

When?

- Conduct work during the activity period of turtles from about March to September.

Where?

- Apply BMPs wherever the activities could result in drastic drops in water levels in ponds, wetlands or lakes with records of the Western Painted Turtle or where water bodies contain suitable habitat for turtles but are yet to be surveyed.

f) Beaver Control

Rationale:

The beaver's industrious dam building creates shallow ponds favoured by turtles, and beavers appear to be important in maintaining turtle habitat in some areas. Beaver activity, however, can block culverts and cause roadbed erosion, flooding, and other problems. Therefore, it is often necessary to manage beaver activity to alleviate these problems.

When beaver dams are removed water level often drops. If the dams are removed during the winter, hibernating turtles might be exposed to the elements, potentially increasing mortality (see *Replacing and Unblocking Culverts* section on page 48).

Beavers and their dens and dams are protected by the Wildlife Act, Water Act and the Municipal Act, so ensure that any management practices conform to these regulations.

Suggested BMPs:

What?

- Near water bodies where turtles hibernate or are suspected to hibernate, take out beaver dams including those that are blocking culverts when turtles are not hibernating.
- Rather than eliminating or reducing beaver numbers, use a specially constructed “beaver baffle”² to discourage beavers from fixing leaks in their dams and blocking culverts.

When?

- Remove or open beaver dams from April to September when turtles are active and not hibernating

Where?

- Apply BMPs wherever the activities could result in drastic drops in water levels in ponds, wetlands or lakes with records of the Western Painted Turtle or where water bodies contain suitable hibernation habitat for turtles but is yet to be surveyed.

Links to further information on beaver management:

Beaver Stop®: <http://www.fsiculvert.com/beaverStop.php>

Beaver Flooding Control Booklet from Massachusetts:

<http://www.wildlifedamagecontrol.net/beaverfloodcontrolbklet.php>

BC Ministry of Agriculture, Food and Fisheries, 2005, Constructed Ditch Fact sheet: Drainage Management Guide - No. 16 : www.agf.gov.bc.ca/resmgmt/publist/500Series/543110-1.pdf

3. Guidelines for Forestry Activities:

a) New Road Construction

Rationale:

Many impacts of forestry activities on turtles can be mitigated during the planning phase, including placement of new roads and cutblocks. Road building near a wetland poses potential problems for the Western Painted Turtle: it exposes migrating or dispersing turtles to road kill; it encourages turtles to nest at roadsides, potentially resulting in poor survival of eggs and hatchlings and wasted reproductive effort; and it may bring more public access and vehicle traffic into turtle habitats. Whenever possible, new roads should be placed away from water bodies where turtles nest, bask, or hibernate. Because current knowledge of the distribution and movements of the species in the Alberni Valley is rudimentary at best, it is important to conduct surveys for turtles when planning new roads.

² **Beaver Baffle:** Where roads are of such low elevation that it is impossible to have a wetland without road flooding, either trapezoidal fences or inexpensive beaver bafflers can be the solution. The beaver baffle is especially useful in areas where ice and snow damage does not occur. A baffle consists of 5-foot-long concentric cylinders of 4 to 5" welded wire with the inner tube of a size to fit inside the road culvert. Connect each 5-foot-long section end to end to make the desirable length (normally 20-feet-long or more) to fit your site. Covering the inside cylinder with 1 by 2" mesh welded wire (garden variety) fencing prevents beavers from stuffing it with debris. Beavers will pack mud and sticks below the baffle, but usually only do this for a few feet. Heavy loads of snow/ice can crush the baffle, so this works best in the South.

Source: <http://www.beaversww.org/solutions.html>

Construction of roads and associated ditches might change precipitation run-off patterns that impact the hydrology of the water bodies inhabited by turtles. In addition to lakes, ponds, and wetlands, turtles probably use streams and creeks to move across the landscape. Turtles will use square culverts with dimensions of 180 by 180 cm (6x 6 feet) as passageways to cross roads (Kaye et al. 2006), but may be reluctant to use small, round culverts. Until we have a better understating of how turtles move around in the Alberni Valley, waterways that connect habitats occupied by the Western Painted Turtle should be treated as potential turtle habitat.

Suggested BMPs:

What?

- Avoid placing new roads in sensitive turtle habitats.
- If roads must be placed close to³ a water body in known or potential turtle habitat, conduct surveys for turtle nesting grounds so that they can be avoided, and do not encircle the entire water body with roads.
- Follow standard practices when crossing streams and creeks and installing culverts to minimize natural hydrological patterns in turtle habitats.

When?

- Conduct surveys for turtles and nesting habitats before road routes are finalized.
- New roads can be constructed anytime of the year, provided that sensitive habitats identified during ground surveys are avoided.

Where?

- Apply BMPs to road planning in the vicinity of water bodies with records of the Western Painted Turtle and to other water bodies where the species might occur.

b) Cutblock Planning and Timber Harvesting

Rationale:

The main threat from timber harvesting is possible loss of nesting areas and damage to riparian zones along water bodies or movement routes. Terrestrial habitats of importance to turtles are riparian zones along wetlands, nesting grounds, and migration routes between foraging, breeding, and hibernation areas. Turtles also move across the landscape among water bodies, but very little is known about these longer dispersal movements. Movement patterns of Western Painted Turtles inhabiting coastal areas, including the Alberni Valley, are virtually unknown, and we must rely on information from other areas. In other areas in Canada, nesting grounds of the turtles were usually located within 150 m from water bodies (COSEWIC 2006). Similarly, movements of 10 species of freshwater turtles in the United States suggest that riparian buffer zone width of 150 m is necessary to protect terrestrial habitat around water bodies (Bodie 2001), and Semlitsch (2003) found that turtles need at least 300 m of terrestrial buffer. On the Sunshine Coast turtles moved among lakes throughout the summer (M. Evelyn, 2009 per com), which could be the case in the Alberni Valley as well.

Suggested BMPs:

³ It is unfortunately not currently possible to provide a distance until more studies have been undertaken in this area.

What?

- Conduct surveys in water bodies with suitable turtle habitat in cutblocks slated for timber harvesting.
- Retain a wide riparian buffer zone⁴ along lakes, ponds, and wetlands occupied by turtles.
- Apply appropriate buffers to all water courses within the cutblock to retain landscape connectivity through riparian zones.

When?

- Conduct surveys for turtles at the planning stage, before the cutblock configuration is finalized. Surveys of water bodies can be conducted anytime during the activity season of the turtles from late spring to early fall. Optimal times are in the spring on sunny days, when turtles are basking and most visible.

Where?

- Apply BMPs to cutblocks that contain water bodies with records of the Western Painted Turtle or those with suitable habitat but no precious records. Also apply BMPs to water courses that connect ponds, lakes, or wetlands where the turtles are known to occur.

c) Transportation of Logs

Rationale:

One of the main threats to the Western Painted Turtle associated with timber harvesting is potential road mortality of turtles during their seasonal travels or while dispersing. Turtles are particularly vulnerable to road-kill where a road is located between nesting grounds and water bodies, or where they nest along road sides. Hatchlings that emerge from roadside nests are also vulnerable. Turtles may also travel across roads when moving from ephemeral ponds to permanent ponds in the summer (Sexton 1959), when they move among water bodies in search of hibernation sites or new foraging area, or when dispersing.

Road mortality of adult turtles in particular may be a problem because turtle populations depend on high adult survival for persistence (Tingley and Herman. 2008). In the United States, high road densities have been shown to be associated with male-biased sex ratios of Painted Turtle populations, probably as a result of mortality of females on nesting migrations (Steen and Gibbs 2004).

Road mortality along logging roads is difficult to mitigate, especially in areas such as the Alberni Valley where migration routes and travel corridors of turtles are virtually unknown. Research into how turtles move across the landscape is urgently needed. The following guidelines are interim measures in the absence of detailed movement information. If road mortality is found to be a problem at a particular site, underpasses could be considered (see page 50).

Suggested BMPs:

What?

⁴ It is unfortunately not currently possible to provide a distance until more studies have been undertaken in this area.

- When using roads that intersect known or suspected turtle migration routes, attempt to travel at seasons and times of day when turtles are not actively moving in the landscape; avoid dusk in June – July, when nesting turtles are likely to travel overland.
- Consider using alternative routes to and from cutblocks in areas where roads intersect important turtle habitats.

When?

- Apply BMPs throughout the active season of turtles from about March to October. It is particularly important to take precautions during the nesting season in June – July, when females are migrating to and from nesting grounds.

Where?

- The most important areas are locations where roads intersect known migration routes between nesting grounds and water bodies. However, because so little is known of movements of turtles and the location of nesting grounds in the Alberni Valley, also take precautions and apply BMPs to roads that are adjacent (within 150 m) and parallel to water bodies inhabited by the Western Painted Turtle.

d) Reforestation and Stand Management

Rationale:

Stand management activities include site preparation, tree planting, thinning, fertilizing, and weed and pest management. As a result there will be an increase in people, machinery, and vehicles in the forest and on roads to and from worksites. Stand management activities are expected to have minimal direct effects on turtles. The main threat is from road mortality associated with increased traffic on roads and from machinery that can crush turtle nests if work is to be constructed in sensitive nesting habitats.

Suggested BMPs:

What?

- Inform contractors and workers of the location of sensitive turtle habitats, and encourage them to exercise caution when working in or driving through these areas.
- Avoid driving on roads at dusk in the summer when turtles are most likely to be on land and crossing roads.
- Ensure that pesticides, herbicides, or fertilizers are used appropriately and do not enter water bodies.

When?

- Apply BMPs when turtles are active from March to September, particularly during the nesting season (May – July).

Where?

- Apply BMPs in turtle habitat, including nesting grounds, occupied water bodies, and potential movement corridors.

e) Road or Site Deactivation:

Rationale:

The main threat from road or site deactivation is from road mortality associated with increased traffic and from machinery that can crush turtle nests if work is done on turtle nesting grounds. In the Alberni Valley, turtle nesting areas have been found on old spur roads and gravel pits located close to wetlands (Engelstoft and Ovaska 2008).

Suggested BMPs:

What?

- Conduct surveys to locate signs of turtle nesting activity, if deactivation is to occur in known or suspected turtle habitat.
- Avoid disturbing the ground within areas where signs of turtle nesting activity are found during surveys.

When?

- Conduct surveys before any ground disturbance takes place. Surveys for turtle nesting activity can best be conducted from about mid-March to August.

Where?

- Apply BMPs in areas adjacent close to water bodies with records of the Western Painted Turtle or where suitable aquatic habitat for turtles exists but is yet to be surveyed.

Notes:

- There is an opportunity to enhance or expand existing turtle nesting grounds or create new nesting grounds along deactivated roads. Habitat enhancement can be done with relatively little additional effort while machinery is already on site. Enhancement activities would consist of exposing bare soil in suitable locations or by mounding up soil to create a gentle south-facing slope that enhances exposure to the sun. Consult a turtle biologist for optimal site-specific prescriptions.

4. Public Access Management

Rationale:

Threats to turtles from recreational activities and public access are from potential road mortality of turtles moving across the landscape and from disturbance to nesting grounds (see *Transportation of Logs* on page 51). Turtles are known to use spur roads and old gravel pits for nesting in the Alberni Valley (Engelstoft and Ovaska 2008 and unpublished data). There is evidence of garbage dumping, target practice, and burning at an old gravel pit where turtles nest communally, possibly resulting in damage or disturbance to nests, hatchlings and nesting female turtles. Parking and vehicles that are turning around at the site could damage nests.

What?

- Close public access to old gravel pits and spur roads used by nesting turtles; gate off access or use barriers to these areas to prevent vehicular access.

- Use signage, such as “turtle crossing” where roads intersect known or suspected turtle migration routes; consider information signs to gain community support, for example signs displaying co-management between Island Timberlands, HAT and/or other conservation organizations.

When?

- Close vehicle access to sensitive nesting areas permanently.
- Display road signs only during the activity season of turtles, from March to September.

Where?

- Apply closures to areas where turtles are known to nest on old spur roads or gravel pits.
- Apply signage where roads are immediately adjacent to water bodies with records of the Western Painted Turtle or where turtles are known to use roadsides for nesting.

Knowledge Gaps

Very little is known of coastal populations of the Western Painted Turtle in British Columbia, although recent survey efforts on Vancouver Island and the mainland coast are starting to fill in data gaps. Information gaps that are most pertinent to forestry practices in the Alberni Valley include the following:

Distribution: Our knowledge of the distribution of the turtles in the Alberni Valley remains rudimentary. It is important to know where the turtles occur, so that BMP guidelines can be applied efficiently and appropriately. We suggest a habitat suitability analysis to identify water bodies with potential turtle habitat, followed by surveys in the most likely areas.

Movements: To mitigate road mortality and locate nesting and hibernation sites, it is important to know how turtles move across the landscape and where potential problem areas are located. We recommend radio-telemetry studies to follow movements of individual turtles at selected sites. In addition, we recommend surveys for turtle nesting grounds in the vicinity of each water body with records of the species.

Timing seasonal activities: The timing of nesting, hatchling emergence from nests, and hibernation are poorly known in the Alberni Valley. Although the general pattern is likely to be similar to turtles in other areas, we need more detailed information to apply mitigation measures more efficiently during an appropriate time-window. We recommend following seasonal activities of turtles through surveys of known nesting areas and through radio-telemetry studies of turtle movements (see above).

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Western Painted Turtle Habitat Enhancement Guidelines for

**The XXXX property
XXXX Road, XXXXX**

**HABITAT
ACQUISITION
TRUST**

Prepared by

Christian Engelstoft, MSc, RPBio and Kristiina Ovaska, PhD, MSc
on behalf of HABITAT ACQUISITION TRUST

Funded by:

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Suite 316, 620 View St
PO Box 8552
Victoria, B.C.
V8W 3S2

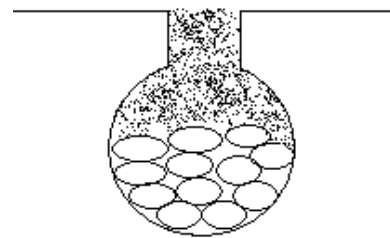
Tel: (250) 995.2428
Fax: (250) 920.7975

hatmail@hat.bc.ca
www.hat.bc.ca

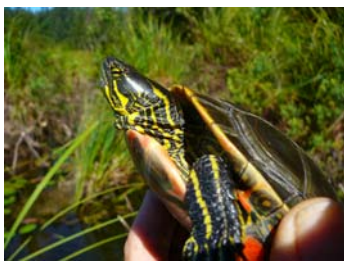
Background:

During a visit to this property in August 2009, we were told about observations of turtles, including a turtle laying eggs along the side of the driveway a few years ago. Turtles of various sizes, including small ones, have been seen in the pond. The identity of the turtle species was not confirmed, but the Western Painted Turtle is known to occur in the immediate vicinity. Also, observations of small turtles suggest the Western Painted Turtle, as the introduced Red-eared Slider may not be able to breed successfully in our climate.

Nesting areas of the Western Painted Turtle usually have fairly compacted loamy or sandy soils, facilitating the construction of an about 15 cm deep, flask-shaped nest. Turtles are probably attracted to the driveway shoulder because the substrate has these characteristics. Here we provide options for enhancing the nesting and pond habitat on your property for turtles, if you so wish. We would be happy to provide any additional information or help with habitat enhancement activities, if you choose to go ahead with some or all of the suggestions and would like assistance.



**Sketch of turtle nest with
eggs**



Western Painted Turtle

Objectives:

- To provide information to create a new, safe nesting area close to the pond
- To provide more turtle basking sites in the pond

Overview of the property, indicating the location of the pond, previously used nesting site by the driveway (thick orange line), and a potential site for the creation of a new nesting area (small polygon by yellow arrow).

(On both maps North is up; Source: Natural Areas Atlas)



Suggested Actions:

In the past, turtles have been seen laying eggs along the drive way, but the grass along the driveway shoulder has grown too dense to provide suitable nesting habitat. Turtles have to cross the driveway to reach this site from the pond; hence we advise against restoring this nesting site. Instead we suggest the creation of a new, safe nesting area by the pond.

A. Creation of new nesting area by the pond (polygon by yellow arrow)

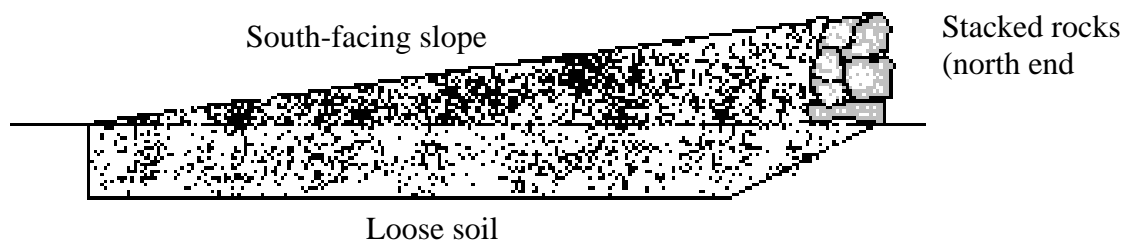
Turtles require bare ground at a warm, sunny location for nesting. A nesting area can be created with relatively little effort by mounding up soil and sand in a suitable location. However, it may take some time before turtles find and start using the new site.

To create a nesting area, we suggest the following actions:

- a. Stake out corners of a patch of ground about 1 m x 2 m or larger for the nesting area. Orient the mound so that the longer side runs from east to west. Prepare the ground by removing the turf and loosening the soil to about a spade depth.

- b. Use stacked rocks on the steeper north side of the mound to keep it from collapsing, if needed,
- c. Pile up soil to create an elongated mound about 30 cm high with gently sloping sides. Make sure that the mound slopes to the south or southwest, so that it provides a warm site for developing turtle eggs. The optimal soil mixture is 40% sand, 40% silt, and 20% clay. You can use soil from the site and add missing soil types, as needed.
- d. Periodic weeding will be required to maintain bare soil in the nesting area.

Side view of nesting mound:



Timing: Any time. Early spring (before June) would be ideal, so that the nesting area would be ready for turtles for this year's nesting season.

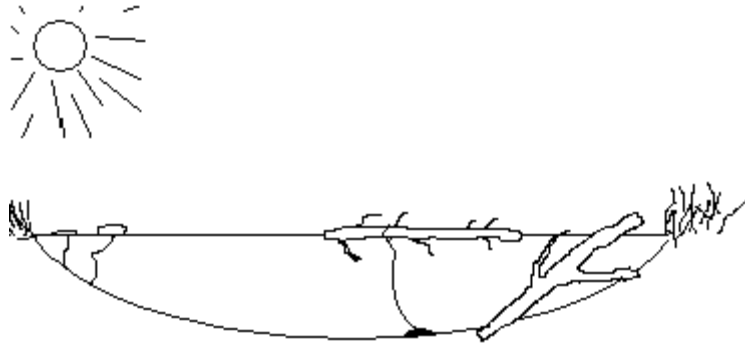
B. Installation of basking logs in the pond

Basking sites are important to turtles. Turtles need to bask to raise their body temperature, which in turn promotes digestion and other vital processes, removal of ectoparasites and/or algae, and synthesis of vitamin D.

Your pond provides excellent habitat for turtles and has shallow areas with cattails, yellow pond lilies, and other native vegetation favoured by turtles. However, there are few sites for the turtles to bask, and they would benefit from the addition of flat boards or logs to the pond. Up to 5 logs or boards could be placed in the sunniest parts of the pond close to the shoreline.

Turtles tend to select basking sites that are easily accessible. There are two basic approaches for creating basking sites:

- 1) Floating boards (about 2" x 8") or logs (diameter over 20 cm or 8"): These boards or logs should be less than about 5 cm (2") out of the water to ensure that turtles can climb up on them. They should be anchored to the bottom of the lake, for example by a rope tied to a rock.
- 2) Angled logs (diameter over 20 cm or 7.5" at water's edge): One end of the log should be anchored or pushed to the bottom of the pond, so that the log emerges out of the water at a shallow angle (less than 30°).



Timing: The most appropriate time for installing basking sites is from July to early September. Avoid times when turtles are seen in the pond. If you see turtles in the pond in September, it could indicate that they might hibernate at the bottom of your pond. In that case you should not install basking sites until the following summer.

