



2016/2017 - Coastal Western Screech-Owl Surveys and Habitat Assessment for Habitat Acquisition Trust Victoria, BC

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Many of the volunteers from 2016 returned to assist with surveys in 2017. Well over 50 people, including survey volunteers, landowners and partners, contributed to the success of this project. We would like to acknowledge and thank all of the keen volunteers that donated their time to survey for owls and to learn about this species at risk.

Additional in-kind project support was provided by BC Ministry of Environment (Dave Fraser; species specialists), Bird Studies Canada (Catherine Jardine), and Todd Golumbia, Environmental Conservation Specialist, Capital Regional District, Regional Parks.

A new component added to the project this year was non-invasive monitoring using recording units. This research was conducted with support from Xavier Mouy (University of Victoria PhD candidate and acoustic research specialist with JASCO). The software (PAMLab Lite) used for analysis of the sound files was provided as an in-kind support to HAT. Five recording units (Wildlife Acoustic SM2 units) were loaned to HAT by FLNRO (Louise Waterhouse, FLNRO, Nanaimo).

A number of volunteers spent many hours building the nest boxes that were installed this year: Jill Robinson, Paige Erickson-McGee, Scouts Canada and their leader George Clark.

HAT has a history of educating local residents regarding conservation values, and motivating private landowners to undertake meaningful land stewardship programs. They have been an active partner in many island campaigns to acquire and protect properties with important conservation values including Species at Risk. The information collected through this project is necessary to assist recovery of the species and associated ecosystems at risk.

1 Introduction

Madrone Environmental Services Ltd. (Madrone) was contracted by Habitat Acquisition Trust (HAT) to assist with the Western Screech-Owl component of their project "**Habitat Stewardship & Protection for Endangered Molluscs, Turtles, Snakes, and Screech-Owls.**" This project was funded by the Habitat Stewardship Program (HSP) as a 2016-17 Habitat Stewardship Project (Year 3 of the owl component).

The overall project goal is to identify sites suitable for the protection and/or improvement of habitat for the Western Screech-Owl (*Megascops kennicottii kennicottii*). This subspecies was up-listed in 2012 to Threatened due to its small and declining number of mature individuals (COSEWIC 2012). As of March 2017, it is still SARA-listed under Schedule 1 as Threatened based on the previous COSEWIC assessment completed in 2012. As per the national document "State of Canada's Birds", special attention is needed for bird species showing substantial population declines which have not yet reached critical status.

1.1 Overview of Western Screech-Owl

The Western Screech-Owl (*Megascops kennicottii*) is non-migratory species that occurs along the Pacific Coast of North America, from southern Alaska to central Mexico (Cannings and Angell 2001). In Canada, this species occurs only in British Columbia (BC). There are two subspecies: *M. k. kennicottii*, along the coastal mainland and Vancouver Island, and *M. k. macfarlanei*, in the southern BC interior (COSEWIC 2002).

This species is historically known to have been locally abundant over many parts of its range in BC (Campbell *et al.* 1990). All populations of this species are now believed to be in decline due to loss of habitat as a result of forest harvesting and land development (Cannings and Angell 2001; Fraser *et al.* 1999).

1.1.1 Species Status

The interior subspecies has a Federal listing of "Threatened" (COSEWIC 2002) and is provincially "red-listed" (BC Conservation Data Centre 2015). Coastal Western Screech-Owls (*Megascops kennicottii kennicottii*) have recently had their Federal conservation status increased from a species of Special Concern (COSEWIC 2002) to Threatened (COSEWIC 2012).

As well, based on observed declines reported in Alaska (Kissling and Lewis 2009), it is assumed that it has also declined in the northern part of its range (between southern BC all the way up the coast to Alaska) (COSEWIC 2012).

1.1.2 Description and Behaviour

The Western Screech-Owl is a small owl, with tufted ears, yellow eyes and streaked markings. Adults vary from 19 to 25.5 cm in length and 100 to 305 g in mass; with females generally being larger and heavier than males (Cannings and Angell 2001). The primary song

consists of a series of short whistled hoots (notes) more closely spaced at the end of the series that is similar to a “ball bouncing more and more rapidly over a frozen surface” (Johnsgard 1988, Tripp 2004). Listen on-line at www.allaboutbirds.org

This nocturnal raptor preys on mammals, fish, insects, invertebrates, and other birds. It is also prey for other avian predators, such as the Barred Owl (*Strix varia*) (COSEWIC 2002).

1.1.3 Habitat

Western Screech-Owls use a variety of habitats for roosting and nesting including; mature forests (80-250 years old), 50 to 60 year old open Douglas-fir (*Pseudotsuga menziesii*) forests, dense young Douglas-fir forests, black cottonwood (*Populus trichocarpa*), and woodlands bordering marshes, ponds, wet areas or fields. Although the general habitat needs for nesting and roosting overlap, nesting requires cavities that are typically associated with older forest. In contrast, a roost tree for security cover during the day could consist of old or young trees. On southern Vancouver Island, they are often found roosting amongst the bushy crowns of young (<50 years) Douglas-fir or in the thick branches of Western red cedars (Tripp pers. obs.).

In BC, nests are usually found in cavities 1.2 to 12.2 m up a tree, on sites below 600 m elevation (Campbell *et al.* 1990). Favoured nesting cavities/holes may be appropriated from Pileated Woodpecker and Northern Flicker excavations (cavities) in Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), arbutus (*Arbutus menziesii*), grand fir (*Abies grandis*), red alder (*Alnus rubra*), Garry oak (*Quercus garryana*) and western hemlock (*Tsuga heterophylla*) (Campbell *et al.* 1990, COSEWIC 2002).

1.1.4 Home Range

At present, few detailed home range and territory size estimate studies have been completed for this species in North America. Research by Hayward (1983) in central Idaho indicated a home range of two radio-tagged birds to be 3-9 hectares, and 29-58 hectares, respectively. A study on Western Screech-Owls in southern California calculated an average of 2.1 territories per kilometer of river channel, with a minimum average distance of 420 m between nest sites (Feusier 1989). Recent telemetry efforts in the interior of British Columbia have documented territory ranges of 112 ha (mean minimum convex polygon for five tagged males), and a mean 95% utilization distribution estimate of home range size for four owls of 49 ha (Davis and Weir 2006, and Davis and Weir 2007).

1.2 Project Area

The project is located in the south coast region of British Columbia within the Capital Regional District (CRD) on south eastern Vancouver Island near the city of Victoria. Part of the project takes place within a regional priority area, the Coastal Douglas-fir (CDF) biogeoclimatic zone. The focus of survey efforts and landowner contacts was within the

Highlands, Metchosin, Saanich, and Langford. The habitat type that is the focus of improvement and protection efforts is low elevation forest within the CDFmm.

1.3 Workplan Activities

Two workplan activities were identified for this project for 2017: 1) Surveys, Inventories and Monitoring, and 2) Habitat Protection. A series of project objectives was established to fulfill the goals of the workplan activities.

1.3.1 Surveys, Inventories and Monitoring

A series of survey stations along road transects was established in areas previously or recently associated with use by Western Screech-Owls. Priority was assigned to areas (transects) where this species of owl was detected in 2016, and to new areas that were not surveyed in 2016.

For each occurrence of Western Screech-Owl, HAT attempted to engage private landowners for protection opportunities. HAT and Madrone also solicited reports of current detections from residents and the birding community. Where access was permitted, HAT and Madrone attempted to locate a roost site, which are typically found in the core of the active territory within close proximity to a nest cavity during the breeding season. Where roost sites were confirmed, detailed habitat assessments were completed for the site.

Automated Recording Units (ARUs) were an additional tool used this year which allowed for non-invasive and more continuous monitoring. The units were deployed at sites that had Western Screech-Owl detections during Year 1 or 2 of the HAT owl surveys. The goal of ARU deployment was to determine which areas were still inhabited by Western Screech-Owls, and whether a mating pair was present or not. An additional objective was to assess the effectiveness of monitoring using ARUs.

Objectives associated with this workplan activity included:

- Conduct surveys for Western Screech-Owls in select areas of the Capital Regional District, at sites representative of suitable habitat.
- Survey for Western Screech-Owls using best practices for monitoring.
- Continue to facilitate a volunteer program for the general public to participate in owl surveys.
- Identify additional sites for habitat enhancement (nest box stewardship) and protection.
- Deploy ARUs at sites with a history of Western Screech-Owl habitation and examine sound recordings to see if they detected the presence of Western Screech-Owls.
- Evaluate the effectiveness of ARUs for monitoring.
- Provide data in a format useful to the BC Conservation Data Centre for Element Occurrence data in order to aid in species protection and recovery.

1.3.2 Habitat Protection

Protecting habitat that supports existing Western Screech-Owl occurrences is an important step to enabling the persistence of this small owl in southern Vancouver Island. By first identifying existing populations, HAT can pursue land protection and habitat enhancement activities at priority areas. Identifying active Western Screech-Owl sites in 2016 enabled HAT to undertake actions to protect and enhance habitat. Both of these actions are recommended in the Western Screech-Owl (*kennicottii* subspecies) Recovery Plan prepared by the BC Ministry of Environment (2013) to address threats posed by residential development.

In locations where Western Screech-Owls were detected on private land, HAT was able to initiate landowner contact with the goal of protecting and enhancing habitat if/where required (i.e., lack of wildlife trees and associated nest cavities). Objectives associated with this workplan activity included:

- HAT to engage landowners at sites associated Western Screech-Owl activity.
- Assess habitat where Western Screech-Owls are detected and make recommendations for habitat improvement and protection (to discuss with landowners).
- Place 30 nest boxes on appropriate sites as determined with HAT Staff.
- Report on all activities for the use of Habitat Acquisition Trust and the Habitat Stewardship Program (Environment Canada).

2 Methods

Owl inventory assessment surveys were conducted in accordance with the specifications and requirements outlined in the provincial standards (RISC 2006). Surveys took place during the appropriate time of year for this species between February and March 2017.

2.1 Project Initiation

A project initiation meeting was conducted to: (a) review nest box design and organize materials and building of nest boxes; (b) determine the best sites for nest box installation and arrange agreements with landowners; (c) review project objectives and methods (data forms, call broadcast call files, maps of the project area, survey protocols, equipment, etc.); and (d) finalize the survey sites and transects and the associated survey schedule.

2.2 Nest Boxes

Nest boxes were built by volunteers and were installed in the fall and winter of 2016/2017. All nest boxes were built out of Western Redcedar 1" X 10", untreated lumber. The nest box design was based on a modified Wood Duck box. Nest Box dimensions are provided in Appendix 1. The main modification was to place the entrance hole higher up and to make the box deeper to assist in predator protection; namely Raccoon hands reaching into nest

boxes. A 3" diameter opening was used based on literature that indicates that size entrance is too small for large, predatory Barred Owls to enter. That is also the typical size opening made by the Northern Flickers and Pileated Woodpeckers (primary cavity nesters); subsequently used by Western Screech-Owls (secondary cavity nesters).

Multiple nest boxes were installed at each site, typically in pairs along a contour or transect for each of future monitoring by landowners and HAT/Madrone. The boxes were installed approximately 3 m up the tree (from the top of a 12" ladder). Notes were taken on the location of each box, the tree species that it was installed on, and landowner information.

2.3 Surveys

Surveys were conducted as per the BC Resource Inventory Standards Committee (RISC) (2006) *Inventory Methods for Owl Surveys*. Only surveys for Western Screech-Owl were conducted. The clean recording of a male, territorial call from southern Vancouver Island that was created and used for surveys in 2015/2016 was used again in 2017 (WSOW_HAT_2015.mp3) (the recording was provided by T. Tripp). A call broadcast data form was developed to document survey efforts and results (Appendix 1). The following is a summary of the methods applied:

1. Select transect routes based in areas proximate to previous WSOW sightings and in areas with expected suitable habitat.
2. Each survey point was located along secondary roads, every 800m.
3. Site information was noted at each survey station (Appendix 1).
4. Owl surveys were conducted between a half hour before sunset and midnight. An attempt was made to conduct the survey at the same time of night, but to start from the opposite end between survey rounds (as an attempt to randomize disturbance).
5. At the beginning and end of each survey night, information on environmental conditions such as cloud cover, wind, and temperature were noted (see Survey Form in Appendix 1).
6. Conduct surveys at each point using methods below:
 - i. *At each survey point, record: start and end time, ambient noise level and precipitation class.*
 - ii. *Begin survey by starting WSOW playback recording. It will begin with 2 minute listening period to detect spontaneous owl calls.*
 - iii. *The owl playback will then begin and will repeat 5 times (takes about 10 minutes to play though in total). Face each cardinal point during each playback sequence.*
 - iv. *After playback completes, listen again for 2 minutes and record all observations. Assuming no owl calls, each survey will take about 15 minutes.*

- v. *If any owl is detected, stop playing callback immediately to minimize disturbance or threat to Western Screech-Owl.*
 - vi. *For each detection, record the time of the call, distance, direction of call and species, age, sex and number of individuals.*
 - vii. *Include any additional information about the call in comments section.*
7. Repeat surveys at least once within a two week period using the standardized playback methods.
 8. In the case that a Western Screech-Owl is identified as present, identify potential local stewards, and return during day to conduct habitat assessments and determine potential nest trees, and potential for nest box installations.

2.4 Habitat Assessments

Habitat suitability for the Western Screech-Owl was assessed at new sites identified in 2017 (i.e., we didn't collect habitat data at sites described in 2015/2016), where access was granted. Appendix 3 provides the updated field form used for habitat assessments this year. Site specific characteristics assessed included:

- Presence of potential nesting cavities.
- Presence of wildlife trees which provide habitat and support stand-level biodiversity.
- Forest Structural stage.
- Vertical canopy complexity.
- Coarse Woody Debris (CWD) - The assumption being that the more CWD of various sizes and ages of decay, then the greater the population of small mammals (one type of prey for this species of owl) in the area.
- Presence of primary nesting species (cavity excavators that create potential nesting cavities for secondary nesters such as Western Screech-Owls) – Pileated Woodpecker, Northern Flicker, Hairy Woodpecker, Red-breasted Sapsucker.
- Security habitat for adults and juveniles, as per their different requirements (adults typically roost in the crowns of trees or against tree trunks with thick branch cover vs. juveniles which require thick ground cover of shrubs and regenerating trees to roost in when recently fledged and unable to fly).
- Observed and potential predator and prey species.
- Landscape factors such as distance to water, slope/grade of the site, distance to forest edge and edge type, level of site disturbance, etc.

2.5 Automated Recording Units

Automated Recording Units (ARUs) were deployed at a total of 8 (eight) different locations at 5 (five) different sites. All of the recording units were on loan from the Ministry of Forests, Lands and Natural Resources Operations in Nanaimo, and were SM2 models, manufactured by Wildlife Acoustics. The units were secured to trees at sites with a history of recent Western Screech-Owl detections and were left to record at each location for a minimum of one week, with the exception of HBARU3, which only collected one night of data due to the batteries in the unit dying. A single microphone was attached to each device and the direction it was pointing (up the tree in most cases) was noted.

The ARUs were programmed to turn on at sunset, which was calculated by the device, and became increasingly later as days became longer. The units recorded until midnight each night when they turned off. Data was saved to SD cards which were collected and transferred to a computer.

The sound files collected by the ARUs were analyzed using the program PAMLab, developed by JASCO Applied Sciences. Each night's file was loaded into the program and its spectrogram was visually scanned by a trained observer who confirmed any owl calls by listening to the audio as well. Western Screech-Owl calls or calls from other owl species were annotated within PAMLab and kept record of in a database. The type of call and whether it was made by a male or female was noted. Many sound files and annotations were sent to Xavier Mouy (PhD candidate and acoustic researcher at the University of Victoria) to be used in the making of a recognizer which, when completed, will be able to automatically detect Western Screech-Owl calls from a sound file. A successful recognizer (also referred to as a 'detector') will greatly speed up the data processing of our owl monitoring efforts.

Some ARU locations were also adjacent to survey transects which allowed for observing the range of detection of the ARUs. The sound files from survey nights for the Finlayson Road, Humpback Road, and Caleb Pike ARUs were examined to see if the call broadcast surveys could be detected. The distance of the ARU from the surveyors was noted, to be used in ongoing efforts to determine a rough range of the ARUs for recording Western Screech-Owl calls. At the Finlayson site, a trial survey was carried out at a site where an ARU had been installed and was recording and the frequency spans of the calls from each directional bout of the recording were compared.

3 Results

All objectives associated with the workplan activities were achieved. The following section summarizes the results of the activities.

3.1 Habitat Enhancement and Restoration (Nest Box Efforts)

As per the project recommendations from 2015 and 2016, nest boxes were installed on multiple private properties in the area (Table 1, Figure 1). The second year of this nest box program was very well received, and the target goal of 30 nest boxes was surpassed.

HAT worked with a total of 5 (five) landowners to arrange for nest box installation in the winter of 2016/2017. Efforts were also made to identify sites suitable for protection in current conditions or as recruitment habitat.

In addition, a list was created of other property owners that would like to have nest boxes installed in the winter of 2017/2018.

Table 1. Summary of Habitat Enhancement (Nest Box) Efforts for Western Screech-Owls 2016/2017.

Property Reference	Date Installed	Nest Box ID	Tree Species Installed On	Height to Base of Box	General Habitat Type
Petworth Place – Site 1	2017\01\16	HAT01-06	Douglas-fir and Western Redcedar	~ 3.0 m	Young and Mature Forest, Riparian
Petworth Place - Site 2	2017\01\16	HAT06-14	Douglas-fir and Western Redcedar	~ 3.0 m	Young and Mature Forest
Millstream Lake Road	2017\01\20	HAT15-25	Douglas-fir and Western Redcedar	~ 3.0 m	Young and Mature Forest
Munn Road - Site 1	2017\01\20	HAT26-30	Douglas-fir and Western Redcedar	~ 3.0 m	Young and Mature Forest, Forest Edge
Munn Road - Site 2	2017\02\13	HAT30-33	Douglas-fir	~ 3.0 m	Young and Mature Forest

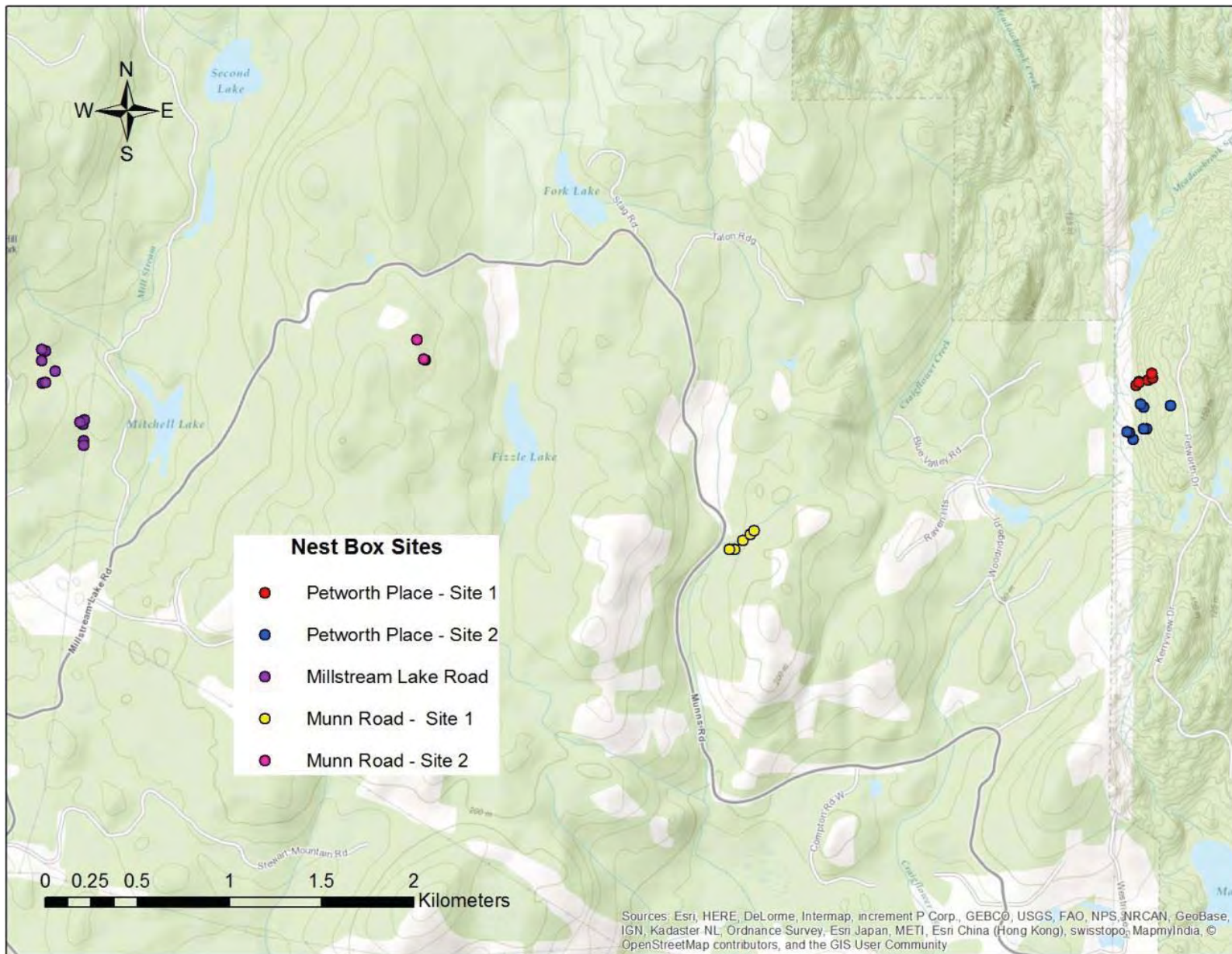


Figure 1. Locations of new HAT nest boxes, installed in January and February 2017 at five sites.

3.2 Inventory Efforts

One to three rounds of surveys were conducted at 62 stations spaced 800 m apart along 9 transects, covering approximately 60 km (Table 2). Transect names were assigned based on the main road that they followed or common name used for the area (typically based on a natural feature such as a lake or hill) (e.g., Highland, Finlayson, Humpback, Caleb Pike, etc.).

Surveys for Western Screech-Owls were conducted over three nights in 2017: February 18th, March 4th, and March 11th. The second round of surveys had been planned for February 25th, but was rescheduled due to weather. Additional surveys were carried out by a few team leaders on February 22nd, 24th, and 25th and March 20th, 21st, and 22nd in order to complete survey objectives for the season and survey additional sites of interest. The total survey efforts and results are summarized in Table 3a (2015), 3b (2016), and 3c (2017); all 3 years provided for comparison.

Table 2. Summary of HAT Survey Effort for Western Screech-Owls 2015 to 2017.

Description	2015	2016	2017
Number of transects visited	9	9	10
Number of survey stations	63	62	73
Number of surveys conducted (3 rounds of surveys at each station in 2015; 2 rounds due to weather in 2016; 1 to 3 rounds in 2017)	186	122	216
Survey hours	72	54	86
Number of Volunteers	41	45	39
Total Survey Distance covered (km)	51 km	60 km	55 km

As a result of the surveys in 2017, 3 distinct Western Screech-Owl territories were documented (Figure 2c). An additional 2 territories were identified by ARUs in 2017. Other species of owl detected during surveys included Great Horned Owl, Northern Pygmy Owl, and Northern Saw-whet Owl (Table 3c).

Table 3a. Summary of Detections from Western Screech-Owl Surveys 2015.

Species of Owl	Number of Stations with Detections	Total Number of Detections*	Level of Effort (# of stations)	Detection Rate
Western Screech-Owl	5	5	186	2.7%
Great Horned Owl	10	12	186	6.4%
Barred Owl	5	7	186	3.8%
Northern Pygmy Owl	1	1	186	< 1%
Total	22	25	186	13.4%
Total # of Active Western Screech-Owl Territories Identified in 2015				4

Table 3b. Summary of Detections from Western Screech-Owl Surveys 2016.

Species of Owl	Number of Stations with Detections	Total Number of Detections*	Level of Effort (# of stations)	Detection Rate
Western Screech-Owl	5	5	122	4.1%
Great Horned Owl	6	8	122	6.5%
Barred Owl	6	8	122	6.5%
Northern Saw-whet	3	3	122	2.4%
Northern Pygmy Owl	0	0	122	0%
Total	20	24	122	19.7%
Additional Western Screech-Owls Reported to HAT and Confirmed	3	n/a	n/a	n/a
Total # of Active Western Screech-Owl Territories Identified in 2016				7

Table 3c. Summary of Detections from Western Screech-Owl Surveys 2017.

Species of Owl	Number of Stations with Detections	Total Number of Detections*	Level of Effort (# of stations)	Detection Rate
Western Screech-Owl	5	7	216	3.2%
Great Horned Owl	3	3	216	1.4%
Barred Owl	1	1	216	0.5%
Northern Saw-whet	1	1	216	0.5%
Northern Pygmy Owl	1	1	216	0.5%
Total	11	13	216	6.0%
Additional Western Screech-Owls Reported to HAT and Confirmed	None reported to HAT in 2017			
Total # of Active Western Screech-Owl Territories Identified in 2017 (Combined from surveys and ARUs)				5

*Number of detections is total detections of all individuals (i.e., some stations detected the same species of owl on multiple survey nights, and some stations had a confirmed pair).

Of the three (3) active territories confirmed in 2017, two were sites that were also active in 2016. The other two territories identified in 2016 did not have any response to call broadcast surveys in 2017 (i.e., not detected, but not necessarily unoccupied).

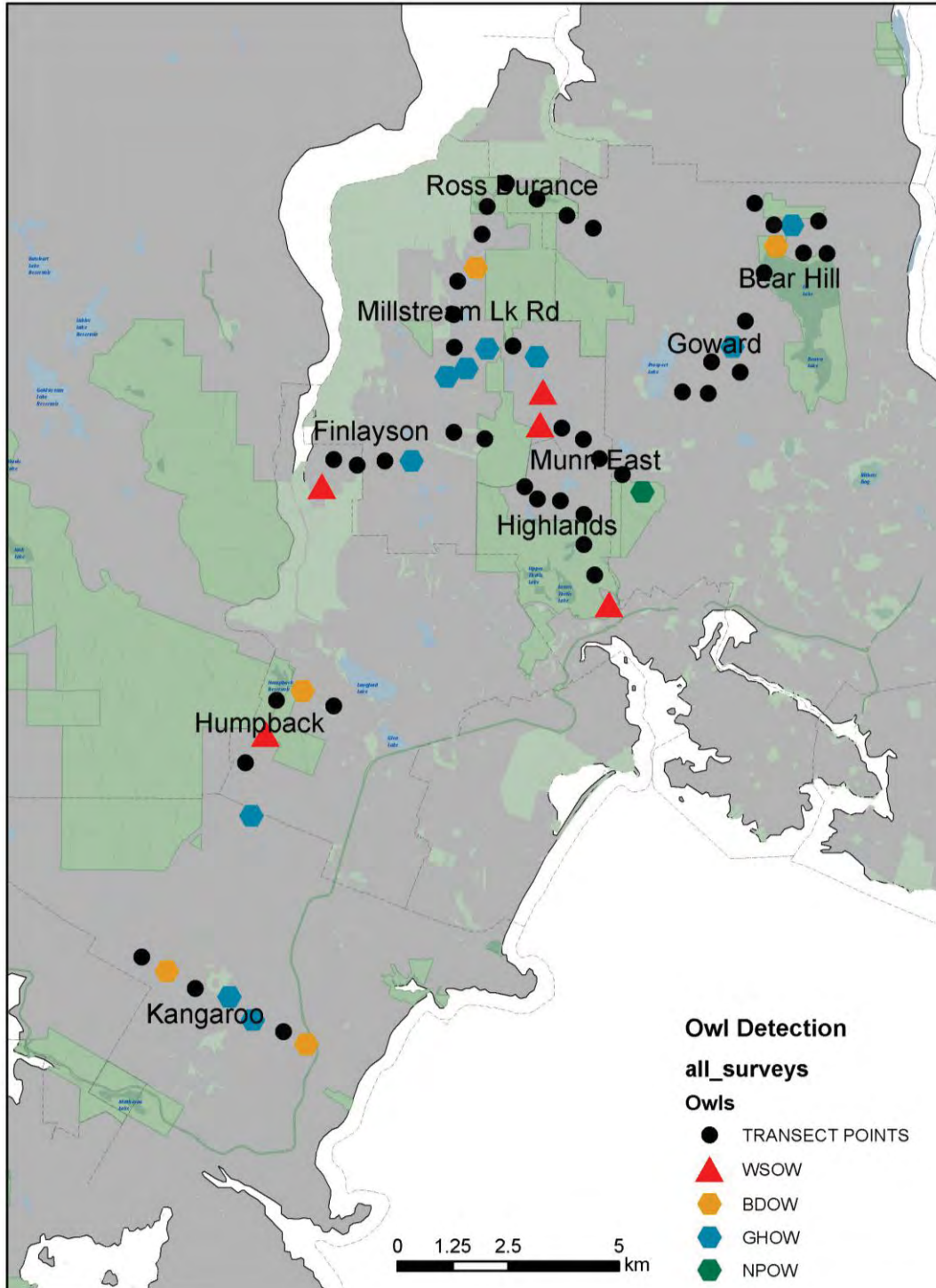


Figure 2a. Results of Surveys for Western Screech-Owl in the HAT Project Area (February and March 2015) (Figure prepared by HAT).

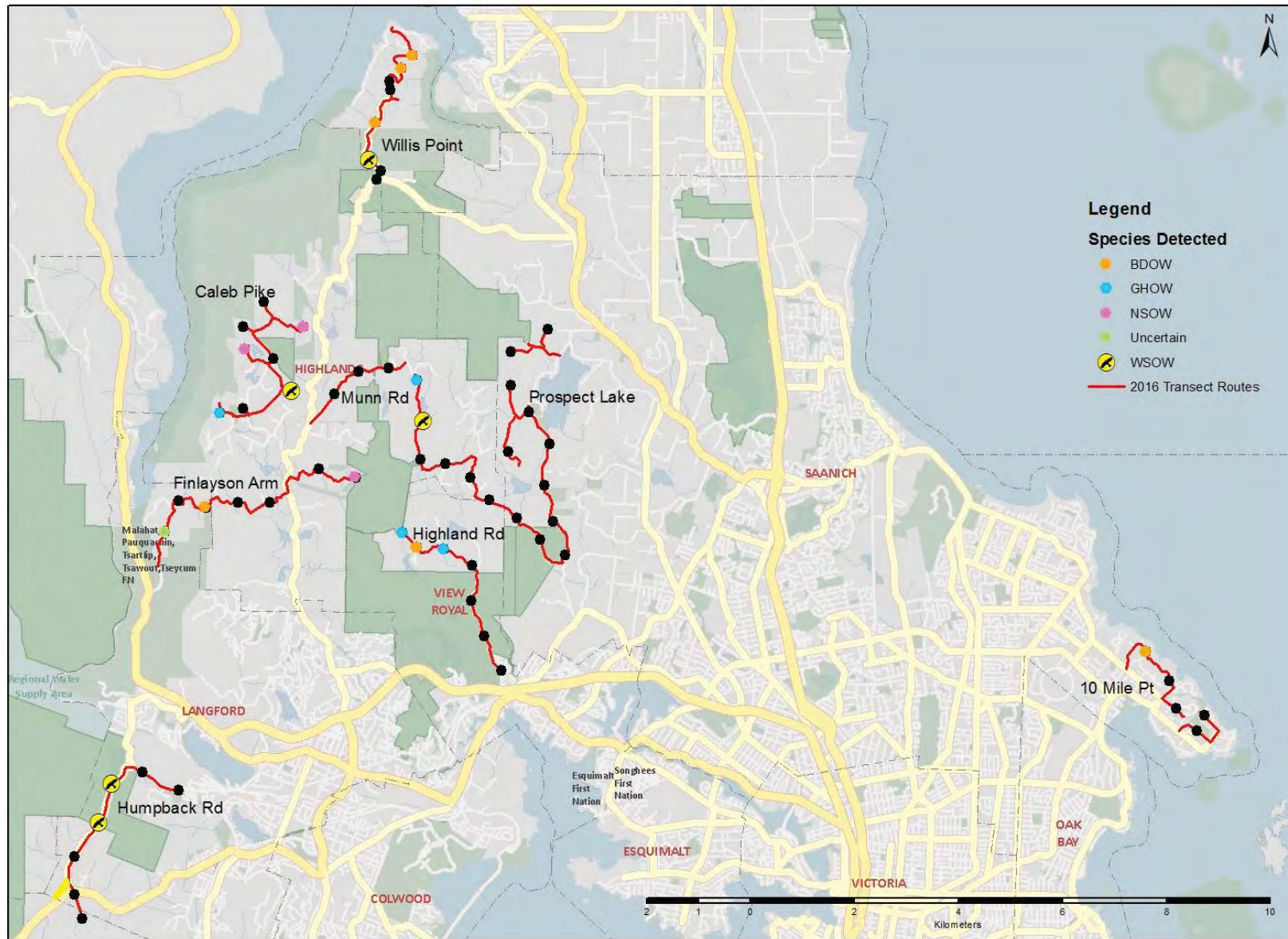


Figure 2b. Results of Surveys for Western Screech-Owl in the HAT Project Area (February and March 2016).

3.3 Habitat Assessments

A new habitat assessment form was introduced this year (Appendix 3) and was used to verify that potential nest box sites would benefit from nest boxes being installed and to determine the habitat suitability of occupied territories. For each of the five (5) sites, a habitat assessment form was filled out prior to the nest box installation. All three of the sites which had Western Screech-Owl detections during broadcast surveys had previously had habitat assessments done as a result of Nest box/ARU installation or previous detections in 2015/2016.

Based on the occupancy of these sites within the breeding season, and given that this is a non-migratory species, all are considered suitable breeding habitat. However, standardized habitat assessment forms were completed to collect additional site information such as tree height, forest age, stand composition, etc. (see form provided in Appendix 3).

3.4 Volunteers

Volunteer coordination was conducted by HAT (Paige Erickson-McGee, Stewardship Coordinator). Volunteers and crew leads met during a series of Saturday nights in February and March at the Helmcken Park and Ride and the Sugar Shack in Metchosin village. Volunteers were assigned to each of the survey teams. As a result of the owl surveys conducted in 2016 and volunteer coordination efforts, eight survey leaders were available in 2017.

As with 2016, the participation and support from 39 volunteers enabled us to double the area planned for surveys. We were also able to achieve the goal of repeat survey evenings for each transect. Each survey took 2.5 to 3 hours on average, and consisted of 1 survey leader and 2 to 3 additional volunteers.

3.5 Landowner Contacts

Landowners in areas near confirmed owl detections were contacted. The idea of introducing nest boxes received a positive response from homeowners. Many who had nest boxes installed on their properties took a keen interest in the owl population in their area and some even helped to install nest boxes or volunteer for a survey session. A total of 24 landowners were contacted (8 new ones and re-connected with 16 landowners from 2015 and 2016) as part of the stewardship outreach component of the project that was led by HAT. A project information sheet, which was developed the previous year, was used as a handout to landowners, volunteers, and interested locals (Appendix 4).

3.6 Automated Recording Units

Four (4) ARUs were placed at five (5) different sites in eight (8) locations (Figure 3). The units collected 870 hours of recordings (sunset until midnight) collectively and allowed for Western Screech-Owls to be detected at four out of five sites (Table 5) and four out of eight locations.

Table 5. ARU recordings and detections of Western Screech-Owls by location.

Location	Site	Date	Number of nights recording	Number of Nights Manually Viewed/ Listened to	Number of nights with Western Screech-Owl detections	Percentage of nights with Western Screech-Owl Detections	Male, Female, or Pair detected
PETARU1	Petworth	16/01/2017-07/02/2017	23	23	9	39.1%	Pair
HBARU1	Humpback	13/02/2017-	36	10	7	70%	Pair
FINARU1	Finlayson	13/02/2017-	34	22	6	27.3%	Female
MRARU1	Munn Road	21/02/2017-12/03/2017	20	16	0	0%	Null
HBARU2	Humpback	22/02/2017-28/02/2017	7	7	0	0%	Null
HBARU3	Humpback	01/03/2017-02/03/2017	2	2	0	0%	Null
HBARU4	Humpback	15/03/2017-21/03/2017	7	4	0	0%	Null
CPARU1	Caleb Pike	18/03/2017-02/04/2017	16	7	0	0%	Null

Using PAMLab, it was possible to identify male and female calls and confirm whether a pair was active at sites with detections. Pairs were confirmed at the Humpback site and the Petworth site. Figure 4 shows an example of a pair of Western Screech-Owls calling, viewed in PAMLab. It was also possible to differentiate between types of calls (e.g. male territorial call versus male trill call).

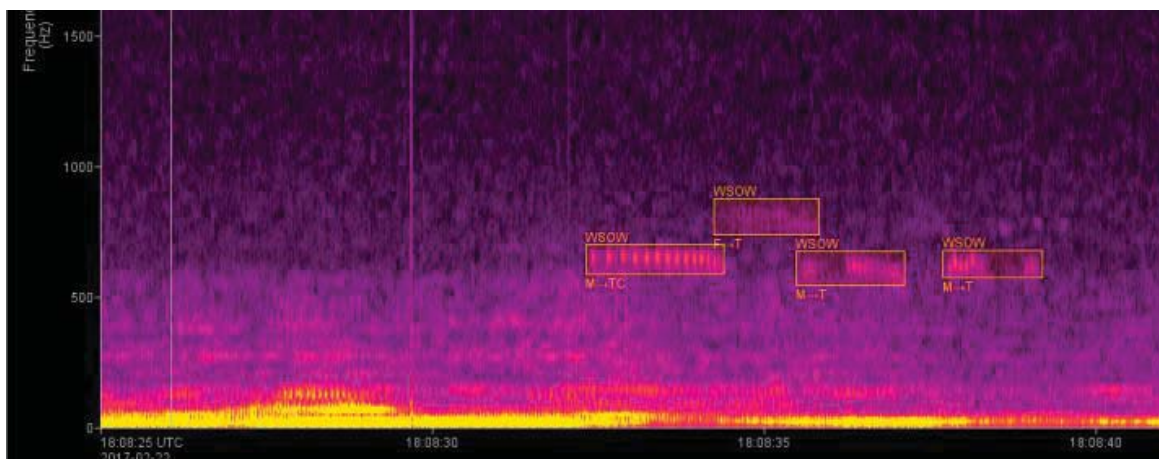


Figure 4. Male and Female Western Screech-Owl calls viewed and classified using PAMLab.

Selected annotations for each site were sent to Xavier Mouy (HAT volunteer assisting with the acoustic research), and he incorporated them into a recognizer prototype. When tested, the recognizer may allow coastal owl researchers to automatically detect Western Screech-Owl calls from sound files.

The ARUs which were adjacent to survey transects allowed for observing the rough range of detection of the ARUs. The sound files from survey nights for the Finlayson Road, Humpback Road, and Caleb Pike ARUs will continue to be compared in on-going efforts to determine a detection range (distance) of the ARUs for recording Western Screech-Owls. The Finlayson site trial survey showed a significant decrease in frequency span (and therefore “loudness”) between the two trial broadcast survey stations (Appendix 5). At 160 m away from the ARU, the call broadcast was very faint but still audible and recognizable on the spectrogram. Based on initial analyses, we estimate that the ARUs are good at detecting/recording owls calling within 200-300m of the unit. The distance varies depending on the site conditions.

4 Discussion and Recommendations

Results from the first three years of the project are very encouraging. In 2015 and 2016 four and seven territories respectively were confirmed through project survey and stewardship network efforts. This year, five territories were confirmed by using a combination of survey efforts and ARUs. While the number of confirmed territories is lower than last year, there was only one detection of Barred Owl. As well, the ARUs have proven that it is possible to miss detections of Western Screech-Owls when using traditional survey methods.

It is encouraging to confirm that a Western Screech-Owl population is still established in the Capital Regional District (CRD). However, there is a lot more that can be done to assist the recovery of this species. Additional nest boxes to increase suitable nesting opportunities, and

landowner stewardship and education are obvious ways to assist this species. Continuation and expansion of the ARU program will allow for larger-scale, long-term, and less invasive monitoring

4.1 Nest Box Monitoring

During previous years of this project, HAT contacted landowners that were interested in having nest boxes installed on their property where suitable habitat is present that could attract this species of small owl. The nest boxes are also suitable for Northern Saw-whet Owls and Northern Pygmy-owls (blue-listed).

The degree to which owls use nest boxes will indicate limitations in suitable nesting and roosting sites for Western Screech-Owls. Lack of use could reflect a low local population, or that nesting habitat is not a limiting factor for their use of the area (i.e., where owls are detected but not using nest boxes).

The nest box stewardship program is helping to promote and support long-term conservation of the Western Screech-Owl. The success of nest box programs cannot be determined without monitoring. Putting up the boxes is only part of the first step of the process. Checking them to see if they are successful is just as important.

5 Relevant Literature

- B.C. Ministry of Environment. 2013. Recovery Plan for the Western Screech-Owl, *kennicottii* subspecies (*Megascops kennicottii kennicottii*) in British Columbia. Prepared for and by the Ministry of Environment, Victoria, BC.
- BC Conservation Data Centre (CDC). 2015. Provincial tracking list for red and blue-listed species in British Columbia, Ministry of Environment, Conservation Data Centre, Victoria, B.C., Canada. <http://www.env.gov.bc.ca/atrisk/toolintro.html>
- Cannings, R. J., and T. Angell. 2001. Western Screech-Owl (*Otus kennicottii*). In *The Birds of North America*, No 597 (A. Poole and F. Gill eds.). The Birds of North America, Inc., Philadelphia, PA
- Campbell, W., N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. *Birds of British Columbia Volume II: Diurnal Birds of Prey through Woodpeckers*. UBC Press, Vancouver, B.C.
- COSEWIC. 2012. COSEWIC Assessment and Status Report on the Western Screech-Owl *kennicottii* subspecies and the Western Screech-Owl *macfarlanei* subspecies in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 30 pp.
- COSEWIC. 2002. COSEWIC assessment and update status report on the Western Screech-Owls *Megascops kennicottii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 31 pp.
- Davis, H. and R. Weir. 2006. Conserving Western Screech-Owl habitat along the Shuswap River. Project 05.W.Sh.01. Prepared for BC Hydro Bridge Coastal Restoration Program, Burnaby, BC.
- Davis, H. and R. Weir. 2008. Western Screech-Owl Conservation Along the Shuswap River. Prepared by Artemis Wildlife Consultants, Armstrong, BC. Funded by BC Hydro, BCRP, Project # 07.W.SHU.01, Environment Canada and Forest Investment Account (FIA), Forest Science Program.
- Davis, H. and F. Doyle. 2014. Surveys of Coastal Western Screech-Owls. Prepared by Artemis Wildlife Consultants and Wildlife Dynamics Consulting. Prepared for the Ministry of Environment, Victoria, BC.
- Elliott, K. 2006. Declining Numbers of Western Screech-Owl in the Lower Mainland of British Columbia. *British Columbia Birds*. Vol. 14: 2-10.
- Feusier, S. 1989. Distribution and behavior of Western Screech-Owls (*Otus kennicottii*) of the Starr Ranch, Audubon Sanctuary, Orange County, California. M.Sc. Thesis, Humboldt State University, Arcata, California.
- Fraser, D.F., W.L. Harper, S.G. Cannings and J.M. Cooper. 1999. *Rare Birds of British Columbia*. Ministry of Environment, Lands and Parks, Wildlife and Resources Inventory Branches, Victoria, BC

- Johnsgard, P. 1988. North American Owls: Biology and Natural History. Smithsonian Press, Washington D.C.
- Kissling, M.L. and S.B. Lewis. 2009. Distribution, abundance, and ecology of forest owls in Southeast Alaska. U.S. Fish and Wildlife Service, Juneau Field Office, Alaska, and Alaska Department of Fish and Game, Division of Wildlife Conservation, Douglas, Alaska. 215pp.
- Pendergast, C.L. 2003. Campbell River Watershed Owl Surveys Summary Report for 2000, 2002 and 2003. Prepared for BC Hydro Bridge River/Coastal Compensation Fund, Burnaby, BC
- RISC (Resource Inventory Standards Committee). 2001. Standardized inventory methodologies for components of British Columbia biodiversity: Raptors (Vol. 2). Ministry of Environment, Lands and Parks, Victoria, BC. 56pp.
- RISC (Resource Inventory Standards Committee). 2006. Inventory Methods for Owls. Standards for Components of British Columbia's Biodiversity No. 42. Prepared by Doris Hausleitner for Ministry of Environment, Lands and Parks, Victoria, BC.
- Tripp, T. 2004. Use of bioacoustics for population monitoring in the Western Screech-Owl (*Megascops kennicottii*). M.Sc. Thesis. University of Northern British Columbia, Prince George, BC.
- Tripp, T. and K. Otter. 2006. Vocal Individuality as a potential long-term monitoring tool for Western Screech-Owls (*Megascops kennicottii*). Canadian Journal of Zoology. 84: 744.753.
- Tripp, T. and L. Menzies. 2008. Campbell River Watershed Owl Monitoring and Habitat Restoration – Final Report Year 5. Project #07.W.CBR.02. Prepared by Madrone Environmental Services Ltd. for BC Hydro Bridge Coastal Fish and Wildlife Restoration Program, Burnaby, BC.
- Tripp, T. 2009. Assessment of habitat for Western Screech-Owl and potential breeding bird occurrence and chronology – adjacent to Japan Gulch Treatment Plant. Prepared for Capital Regional District (CRD), Victoria, B.C.
- Tripp, T., J. Robinson, and A. Taylor. 2015. Coastal Western Screech-Owl Surveys and Habitat Assessment for Habitat Acquisition Trust. Prepared by Madrone Environmental Services Ltd. And Habitat Acquisition Trust. Funded and prepared for the Habitat Stewardship Program (HSP).

Appendix 1: Western Screech-Owl Nest Box Design

Western Screech-Owl Nest Box Dimensions (T. Tripp and M. Tripp - 2015):

Please consider the following dimensions (keep in mind that the dimensions will vary slightly when working with finished, dimensional lumber vs. unfinished, undried, non-dimensional 1"X 10" cedar):

- Back: 10"X 20 ¼" (the ¼ allows for the 10 degree cut for alignment with the 10 degree cuts on the sides for the roof to be sloped and the front to pivot open for cleaning. This length also makes the back flush for sitting nicely on the floor for the end product)
- Sides: 10" X 20" (then a 10 degree cut is done on one end)
- Front: Designed to open for cleaning. 18 ¼ inch by 8 ¼ inch. We found that because of working with unfinished lumber, the front pieces were too narrow a lot of the time at 8" but if the wood was finished this probably wouldn't be as much of an issue. You want to be able to swing the front open but you don't want big gaps along the sides. Front has a 3" diameter hole. The holes were cut on the front 2" down from the top to provide at least 13" from the bottom of the inside of the box to the bottom of the entrance. Leave about ¼" or less of a gap from the top to the roof for the front to be able to swing open for cleaning.
- Bottom: 8"X 9" (this is the actual inside dimension of the finished product, as the other pieces fit all around the bottom, leaving a 1" gap in the front for the front piece to fit. Therefore, the bottom is 9" wide by 8" deep. We drilled 4 quarter inch drill bit holes in the bottom for drainage, but others have taken small cuts out of the corners instead).
- Roof: 10" by 14" (ideally the roof would be 12" by 14" to give it overhang all around, but if you only have 1X10 then the sides of the roof are flush)
- Entrance: 3" diameter hole

Total length of board is about 105 ½ inch

Appendix 2: Western Screech-Owl Survey Forms

Appendix 3. Detailed Habitat Assessment Form.

Coastal Western Screech-Owl Nest Box Protocols

Form #1: Nest Box Site Selection Form - Urban and Rural Areas

The following forms are intended for use in determining site suitability for nest box installations. There are two parts to the assessment: 1) Desktop assessment of general habitat conditions (i.e., if there were potential nest sites in the area (wildlife trees with cavities made by woodpeckers), would they be suitable for Western Screech-Owls; is there potential for use or historical records of use for the area); 2) Field (at the site, check on the desktop assess of habitat conditions and determine if nest sites are likely limiting and would benefit from next boxes).

Project Name	
Site Name	
Land Ownership	Crown / Private / Municipal Park / Provincial Park / Regional Park

1) Desktop Site Description and Habitat Assessment

Ideal habitat for the coastal subspecies (based on current, known nest records) is <600 m elevation (CDF or CWH), valley bottom to mid-slope of flat to moderate slopes. Nest sites are often adjacent to natural edges such as meadows, farm fields, and riparian areas.

Slope position	Valley bottom (10 pts)	Lower slope (10 pts)	Mid slope (8 pts)	Upper slope (4 pts)	Exposed Ridge top (1 pt)	
Slope grade	Flat <5% (10 pts)	Gentle 5-15% (10 pts)	Moderate 15-40% (8 pts)	Steep 40-90% (4 pts)	Very Steep >90% (2 pts)	
Distance to natural edge	<25m	25-50m	51-100m	100-200m	200-500m	
Natural Edge Type(s)	Field	River	Creek	Lake	Pond	

Disturbance (Site Conditions)

Distance to a human made edge¹	<25m (2 pts)	25-50m ¹ (4 pts)	51-100m (6 pts)	100-200m (8 pts)	200-500m (10 pts)	
Edge Type(s) within 500 m	Road Gravel	Road Paved (2 lane)	Highway	Houses	Hydro Line	
Size of Forest (consider in relation to surrounding area if a smaller, private parcel of land)		<0.5 ha (2 pts)	1-2 ha (4 pts)	2-5 ha (8 pts)	>5 ha (10 pts)	
Site in context to surrounding (Connectivity)		Isolated (2 pts)	Connectivity Low (4 pts)	Connectivity Moderate (6 pts)	Connectivity High (10 pts)	
Site Conditions Total Points						

¹For trails adjust 25-50 m (hence 4 pts)

Total Points:

- <15 points = don't install a nest box at this site (highly unlikely to be used by this species of small owl)
- 15-30 points = reduced chance of being used by this species of small owl, but not impossible
- >30 points = good habitat for owls; if nest sites are limiting, installation of nest boxes at sites with these conditions should increase the probability of success

2) Field – Habitat Assessment for Nest Box Suitability (Page 1 of 2)

Project Name					
Site Name					
Date of Site Visit (MM/DD/YYYY)					
UTM from GPS	Zone:	Northing:	Easting:	(+/- m)	
Observers (Full name and initials)					

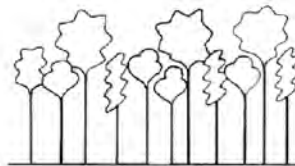
Forest Description (Ranked Attributes)

An ideal forest type for nest boxes for the coastal subspecies is a young to mature forest (>60 years old but under 250 years), coniferous to mixed stand, with average tree size of >35 cm dbh <80 cm dbh but without an abundance of cavities. The rating scheme below goes from low to high, with higher points are given to ideal conditions because (in theory) those forest conditions should provide plenty of snags and cavities (nesting opportunities). However, for this component of the assessment we are looking for sites *in-between* low and high (i.e., forest conditions that are relatively good for WSOW but indicate a likely lack of nest sites).

#1: No forest or trees <10m (newly growing – future forest)



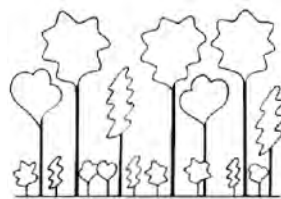
1. Stand initiation



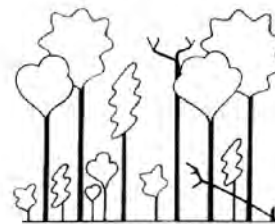
2. Stem exclusion

#2: Dense, young forest; limited light in understorey; lack of shrubs

#3: Young to mature second growth.



3. Understorey reinitiation



4. Old, multi-aged community

#4: Canopy gaps, multiple ages of trees, mature to old forests, diverse shrub and new tree growth in the understorey.

Vertical Canopy Complexity	Nil (see #1 above) (0 pts)		Low (see #2 above) (4 pts)		Moderate (#3 above) (6 pts)		High (#4 above) (10 pts)	
Forest Age (Dominant)	<30 yrs (0 pts)	30-60 yrs (1 pts)	61-80 yrs (2 pts)	81-100 yrs (3 pts)	101-250 (4 pts)	>250 (5 pts)		
Ave. Tree Ht. (Range)	<10m (0 pts)	10-15m (1 pts)	16-25 (2 pts)	26-35 (3 pts)	36-45 (4 pts)	>45 (5 pts)		
Average Tree DBH (trees >10 m tall)	<15 cm (1 pt)	15-30 (2 pts)	31-60 (3 pts)	61-80 (4 pts)	>80 (5 pts)			
Potential Nest Cavities Observed During Search (see next page for instructions)			0-1 (2 pts)	2-4 (4 pts)	5-10 (8 pts)	>10 (10 pts)		
Number of snags / Wildlife Trees Observed During Search (see next page for instructions)			0-1 (2 pts)	2-4 (4 pts)	5-10 (8 pts)	>10 (10 pts)		
Dominant Snags / Wildlife Tree Class			Class 3 (2 pts)	Class 5-7 (5 pts)	Class 8 (1 pt)	Class 9 (0 pt)		
							Total Points	

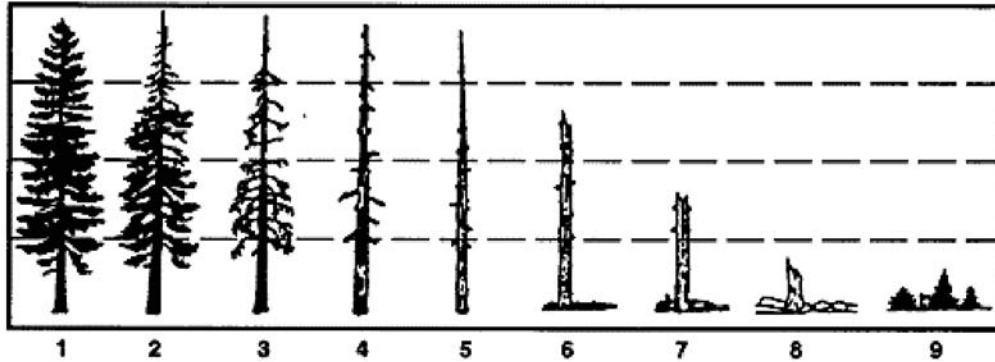
Total Points:

- <15 points = May be a bit young still for use by Western Screech-Owls
- 15-30 points = Ideal (highest priority) forest conditions for nest box installation
- >30 points = Conditions indicate that nesting potential is not limited (not a high priority for boxes)

Wildlife Tree / Nest Cavity Availability Survey:

The following assessment will enable a quantification of the abundance (or lack of) available wildlife trees, and potential nest cavities. Results of the quantitative assessment will help to indicate whether-or-not nest boxes are needed. Complete a 100 m transect within the site selected, within consistent habitat, to scan each of the trees (15m to either side) for wildlife trees and suitable nest cavities for small owls.

Circle the Most Common Wildlife Tree Classes Observed During Your Survey of the Site for Wildlife Trees and Potential Nest Cavities (Circle up to two classes)



Additional information to record at sites where nest boxes are installed (factors that may influence suitability of the stand for nesting):

Woodpeckers Detected (Yes / No)	Pileated Woodpecker PIWO	Northern Flicker NOFL	Red-breasted Sapsucker RBSA	Downy or Hairy Woodpecker DOWO or HAWO
Predators in the area? Yes / No / Unknown				
Potential predators (or signs of them) observed at the site include: Barred Owl / Great Horned Owl / Domestic Cats / Raccoons / Gray Squirrels				
Security – Ground vegetation for fledglings (dense shrub patches and thickets)				
Historical records of Western Screech-Owl detections in the area (within 5 km): Yes/No If Yes, please specify under the “Notes” section.				

Stand Composition	Coniferous	Mixed	Broadleaf			
Leading tree species	Douglas-fir	Hemlock	W. Redcedar	Amabilis Fir or Spruce sp.	Oak or Arbutus	Maple/ Cottonwood
Other tree species present at the site	Douglas-fir	Hemlock	W. Redcedar	Amabilis Fir or Spruce sp.	Oak or Arbutus	Maple/ Cottonwood

Information Related to Foraging Habitat / Prey Availability

Observed potential prey species:
Red-legged Frog, Pacific Treefrog, insects, small birds, medium-sized birds (e.g., American Robin), small mammals (shrews, voles, mice, rats), squirrels, chipmunks

Notes

Appendix 4: Western Screech-Owl Project Information Handout

Western Screech Owl Stewardship Project



HAT

Habitat Acquisition Trust | 250.995.2428 | hatmail@hat.bc.ca | www.hat.bc.ca | 825 Broughton St

Western Screech-Owls Need Help

If you are reading this information sheet it is probably because this owl lives or used to live in your neighbourhood.

Unfortunately, the Western Screech-Owl population in Greater Victoria has plummeted over the past decade, and today only a few known pairs of Screech-Owls remain.

Coastal Western Screech-Owls (*Megascops kennicottii kennicottii*) have recently had their Federal conservation status increased from a species of Special Concern (COSEWIC 2002) to Threatened (COSEWIC 2012).

HAT is surveying for Western Screech-Owls this late winter/early spring, in an effort to locate and improve habitat for these small owls.

What's the Problem?

Coastal Western Screech-Owls (*Megascops kennicottii kennicottii*) face a number of threats, including:

- Predation from Barred Owls - a new arrival on Vancouver Island.
- Habitat loss. In particular, the loss of dead trees and snags, which serve as nest sites and roosts, has hurt Western Screech-Owls.

In the past 10 years, the number of Screech-Owls in Greater Victoria has declined by over 90%.

Coastal Western Screech-Owls are also thought to have declined in the northern part of their range (between southern BC all the way up the coast to Alaska).

Whose Hoo is Who?



Photo: Ann Nightingale

Western Screech-Owl, Coastal subspecies

Latin Name: *Megascops kennicottii kennicottii*

Size: 7.5 to 10 inches tall, 20 - 24 inch wingspan (slightly larger than a Robin)

Diet: Small mammals, like rodents and shrews

Preferred Habitat: In general, Western Screech-Owl populations in BC are associated with mixed forests near riparian areas (COSEWIC 2002). However, just to keep us on our toes, they can also be found on dry sites with Douglas-fir and Arbutus.

Western Screech-Owls are secondary cavity nesters - that is they require holes in trees created either naturally or by woodpeckers. This species of small owl also uses nest boxes for both breeding and roosting (Campbell et al. 1990, Tripp and Menzies 2008).

Voice: Series of short whistled hoots, more closely spaced at end of series. Listen online at www.allaboutbirds.org.

Western Screech Owl Stewardship Project

About HAT's Surveys

During 2015-16, Habitat Acquisition Trust (HAT) and local volunteers will survey sites in Greater Victoria that used to have resident screech-owls. Most of these historic sites have not been systematically re-surveyed (that we are aware of) since 2003. Surveys will be conducted primarily from mid-February to the end of April to coincide with the territorial and courtship calling periods of Western Screech-Owls.

The surveys will be conducted from dusk until midnight as per standardized owl survey protocols. First, we listen for spontaneous calling of owls in the area, with the territorial call of a male Western Screech-owl played to elicit a response from this species. To minimize disturbance, once a screech-owl is detected, no further calls are played. More importantly, if Barred Owls (a known predator of small owls) are heard, no calls will be played.

At each site a standardized data form for owl surveys will be completed to keep track of our efforts and results.

Project Goals:

In the first year of the project, our goals are to survey past known Western Screech-owl sites, and to expand inventory and nest box efforts. In the future, we hope to use the results of these inventory and monitoring efforts to support habitat protection, habitat improvement, and recovery efforts for this species. Project goals include:

1. Follow up with landowners who received Western Screech-Owl nest boxes in the past to determine box usage and condition.
2. Survey for Western Screech-Owl in select areas of the Capital Regional District, using best practices for monitoring.
3. Assess habitat where Western Screech-Owl are detected and make recommendations for habitat improvement and human impact mitigation.

Contact us

If you have any questions about the surveys that we will be conducting or would like to volunteer with them, or have any knowledge of recent Western Screech Owl activity, please contact us.

- Tania Tripp - tania.tripp@madrone.ca
- HAT - hatmail@hat.bc.ca
- Call Habitat Acquisition Trust 250 995-2428

What can you do to help?

1. Let us know if you see or hear a Western Screech-Owl - see contact information below.
2. Leave standing dead trees up if it is safe. Screech-Owls need wildlife trees for their natural nesting sites.
3. Participate in the Nest Box program - see below.

Nest Boxes for Owls

We are also looking for landowners that are interested in having nest boxes installed on their property where suitable habitat is present that could attract this species of small owl. The nest boxes are also suitable for Northern Saw-whet Owls and Northern Pygmy-owls. Unfortunately, Grey Squirrels also like to use them.

The goal of the nest box stewardship program is to promote and support long-term conservation of the Western Screech-Owl. Some of you may recall that some nest boxes were installed in Victoria and the Cowichan Valley between 2000 and 2004 with help from local landowners, Girl Guides Canada, and the Habitat Conservation Trust Fund (HCTF). Happily, some of the nest boxes have been successfully used (see below photos).

The success of nest box programs cannot be determined without monitoring. Putting up the boxes is only part of the process. Checking them to see if they are successful is just as important.



Photo: Paige Erickson-McGee



Photo: Laurie Savard

Sponsors

Funding for this project has been provided by the Government of Canada through the Habitat Stewardship Program, and by donors like you.

This project was undertaken with the financial support of the Government of Canada.
Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.

Canada



HAT

Appendix 5. Western Screech-Owl Call Broadcast Trial Survey Report

Catriona Dempsey

Feb. 21, 2017

Western Screech-Owl Call Broadcast Surveys as Recorded by a Wildlife Acoustics SM2 Automated Recording Unit

Summary:

In order to determine the degree of which call broadcast surveys were recorded by an automated recording unit (ARU), a trial survey was carried out at a site where an ARU had been installed and was recording. The recordings from the ARU were annotated in PAMLab and the frequency spans of the bouts were compared in association with the direction that the call broadcast unit was pointed.

Survey Location:

The trial survey was carried out at a private property adjacent to Finlayson Road on February 13, 2017. The property has a history of occupation by Western Screech-Owls and Finlayson Road has been surveyed using the call broadcast technique annually since 2014.

Methods:

A SM2 ARU manufactured by Wildlife Acoustics was attached to the back of a large tree with a single microphone pointing up the tree toward the top. The device was set to record nightly from sunset until midnight. The trial survey was carried out after the ARU had automatically turned on and was recording.

For the trial survey, a FoxPro call broadcast unit with a recording of a male Western Screech-Owl territorial call was used. Each bout consisted of 6 uniform calls spaced 3 seconds apart. Each bout was followed by 2 minutes of silence. The first survey station included 5 bouts. For the first 4 bouts, the broadcast unit was pointed in each cardinal direction with the ARU station serving as the reference point. The 1st and 5th bouts were directed straight at the ARU. The second survey station consisted of 2 bouts with the 1st bout directed straight at the ARU and the 2nd bout directed straight away from the ARU.

The first survey station was 35-40 m away from the ARU and the second survey station was 150-160 m away from the ARU. There was a moderate amount of background noise from wind and the distant highway.

The third call of each bout was annotated using PAMLab software and the frequency span was recorded in a table (Figure 1). As the frequency span of a call is directly correlated with the overall amplitude of the call, the frequency span serves as an indicator of the intensity of the sound and therefore the volume of the call recorded by the ARU.

Results:**Table 1. Frequency span of the third call of each bout in a trial call broadcast survey in relation to the direction of call broadcast for the bout.**

Trial Station Number	Bout	Frequency Span of 3 rd Call (Hz)	Direction
1	1	105.640	Straight away from unit
	2	133.810	Straight at unit
	3	126.760	120 degrees E SE
	4	119.720	290 degrees W
	5	105.640	Straight away from unit
2	1	98.590	20 degrees S (straight at unit)
	2	84.5	20 degrees N (straight away from unit)

The bout of the first trial station with the greatest frequency span (133.810 Hz) was the second one, which had the broadcast unit pointed straight at the ARU. The first and fifth bouts of the first trial survey station had the lowest call frequency spans of the trial station, with both having a frequency span of 105.640 Hz. The third and fourth bouts of the first station, where the broadcast unit was pointed to either side of the ARU, had frequency spans of 126.760 Hz and 119.720 Hz respectively.

The second trial station recorded much lower frequency spans than the first trial station. The first bout of the second trial station had a frequency span of 98.590 Hz and the broadcast unit was pointed directly at the ARU. The second bout had a frequency span of 84.5 Hz and the broadcast unit was pointed directly away from the ARU.

Conclusions:

It is unsurprising that the call broadcast survey was recorded loudest by the ARU when the broadcast unit was pointed directly at the ARU and quietest when it was pointed directly away from the ARU. It was also to be expected that the second trial station, which was 110-125 m farther away from the first trial station would have its bouts recorded as being much quieter than those recorded from the first station.

The significant decrease in frequency range between the two stations is notable, as it shows how quickly the volume of sound recorded by the ARU decreases with distance and it could be used to estimate the maximum distance that a SM2 ARU is able to record from. Colbert *et al.* (2015), determined in their study of recording gobbling activity of turkeys with a SM2 ARU that the range of the ARU was 207 m. While there are several differences between Colbert *et al.*'s research and ours, such as the species and location studied, their range of a SM2 ARU can be accepted as a broad estimate of the distance that the recorder can pick up a Western Screech-Owl call from. The maximum distance that the trial survey calls were broadcast from was 160 m from the ARU which is within the 207 m range determined by Colbert *et al.*

Future testing of the ARU should include our own determination of the maximum distance that a SM2 ARU can record Western Screech-Owl calls in a variety of conditions. Additionally, more ARUs should be installed at survey locations throughout the season in order to determine the quality of recording at various sites and any responses of owls to the survey calls.

References:

Colbert, D. S., Ruttinger, J. A., Streich, M., Chamberlain, M., Conner, L. M., & Warren, R. J. (2015). Application of autonomous recording units to monitor gobbling activity by wild turkey: Automated monitoring of gobbling chronology. *Wildlife Society Bulletin*, 39(4), 757-763. doi:10.1002/wsb.577