



Wildlife News

FIRST NEWSLETTER!!!!

Greetings!

It has been three years since the Forest Renewal BC Wildlife/Wildlife Habitat Inventory Program first came into full swing and we felt that it would benefit everyone if we summarized the work that has been completed or ongoing as of 1998/99. In this first newsletter, we will include:

- a list of projects, by year, that have been completed or are ongoing under the Forest Renewal Program in the Ministry of Environment, Lands and Parks Region 1 (which includes all of Vancouver Island and part of the mainland coast; Figure 1) from 1995/96 to 1998/99;
- abstracts from yearly reports completed since the initiation of the program;
- we will also include a profile of one of our high priority species in Region 1, the Queen Charlotte Goshawk, *Accipiter gentilis laingi*.

We will also try and indicate where we think the program is going, criteria used in determining future priorities and a list of potential future projects.



FUTURE PLANNING

The Future of Wildlife Inventory in Region 1

The challenge for the coming year will be determining what work will be included with an ever-shrinking level of investment. As always, the list of priorities seems huge and the support dollars small, but we still should be optimistic as the level of support for wildlife inventory, especially for rare or endangered species, is still higher than it has been for many years. We have made some headway in understanding the ecological requirements of relatively obscure species, such as the Vancouver

Island Water Shrew, the Sharp-tailed Snake and Northern Goshawk. However, there are still a number of species that still remain virtually unstudied.

Overall objectives include: further research into understanding ecological requirements of high priority species, habitat supply modeling, identification of resource features, population monitoring, defining 'stable' population levels for species, and providing information to support habitat protection staff in their role as reviewers of forest development plans.

Along with our current inventory efforts remain a number of lingering questions, such as: does current habitat use reflect optimum habitats or are animals eking out a living in marginal or poor quality habitats? Are animals successfully reproducing in the habitats where they have been located? Will populations maintain themselves? How will habitat fragmentation affect reproductive success of species? Many of these questions will prove to be challenging to answer and many will require long-term monitoring to even come close to a supportable conclusion. Inherent variation in most ecological systems means that multiple years of data are

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required before any conclusions can be made about population levels and there can be a number of factors influencing reproductive success.

Criteria used to determine priorities for wildlife species included:

- species status (Red-, Blue-, Yellow- or Green-list, i.e., rare and endangered, vulnerable, of conservation concern or stable);
- dependence on forests; and,
- a general rank based on the expert opinion of Regional Biologists familiar with issues and amount of information currently available for that species in Region 1 and elsewhere in B.C.

Priorities for Terrestrial Ecosystem Mapping were determined based on the biodiversity emphasis options detailed in the Vancouver Island Land Use Plan with Landscape Units given high rankings for BEOs also ranking higher in priority for TEM. This prioritization may be further refined when forestry land use patterns and various species habitat suitabilities are determined.

Various areas on Vancouver Island have received designation as Special Management Zones (previously labeled Low Intensity Areas). These areas must be managed with a focus on resource values other than forestry, but still allowing for a low-level of harvesting. Special features within these SMZs were outlined in the Vancouver Island Land-Use Plan and where wildlife features have been delineated, we will attempt to use inventory information to assist in planning in these Special areas.



Wildlife Projects 1996-1999

Project Name, Year (s), Location

Ongoing Projects

- **Montane Ecosystems, 1996-1999, Mt. Cain;**
- **Kingcome Grizzly Inventory, 1996-1999, Kingcome and Wakeman watersheds, Mainland Coast;**
- **Sharptailed Snake Inventory, 1996-1999, Southeast Vancouver Island and the southern Gulf Islands;**
- **Northern Goshawk Inventory, 1996-1999, various locations on Vancouver Island;**
- **Vancouver Island Marmot Inventory, 1996-1999, central Vancouver Island;**
- **Nimkish Elk Inventory, 1996-1999, upper Nimkish watershed;**
- **Deer Winter Range Assessment - 1998-1999, various locations, Vancouver Island, including north island TFL's for Canfor and Western Forest Products;**
- **Wildlife Capability/Suitability Mapping - portions of WFP's Gold River TFL area, 1998-1999.**

Completed Projects

- Bald Eagle Nest Inventory, 1996-1998, TFL 37, Nimkish Valley;
- Nimkish Owl Inventory, 1996-1998, TFL 37, Nimkish Valley;
- Nimkish Woodpecker Inventory, 1996-1998, TFL 37, Nimkish Valley;
- Woodlot 082 Wildlife Inventory, 1996-1998, Forbidden Plateau;
- White-tailed Ptarmigan Inventory, 1996-1998, various alpine locations throughout Vancouver Island;

- Vancouver Island Water Shrew Inventory, 1996-1998, various streams throughout Vancouver Island;
- North Island Cougar Ecology Project, 1996-1998, Adam and Eve watersheds;
- Woodlot Inventory - South Islands, 1996-1997, Southern Gulf Islands;
- Kingcome Goat, 1996-1997, Kingcome watershed, Mainland Coast;
- Bald Eagle Nest Inventory, 1996-1997, eastern Vancouver Island;
- Golden Eagle Nest Inventory, 1996-1997, Nanaimo, Nitnat and Nimkish watersheds;
- Marten/Ermine Inventory, 1996-1998, Tahsish and Artlish watersheds; and
- Kingcome Goat Habitat Mapping 1996-1997, Kingcome watershed, Mainland Coast.

Clayoquot Sound Inventories *Ongoing Projects (to be completed 1998/99):*

- **Bat Inventory, 1996-1999;**
- **Marbled Murrelet Inventory, 1996-1999;**
- **Amphibian Inventory, 1997-1999;**
- **Owl Inventory, 1997-1999; and,**
- **Black Bear Inventory, 1996-1999.**

Completed Projects:

- Clayoquot Elk Inventory, 1996-1997;
- Clayoquot Forest Birds Inventory, 1996-1997; and,
- Clayoquot Bald Eagle nest Inventory, 1996-1998.

Completed project reports **should be** available in the Ministry of Environment, Lands and Parks provincial library in Victoria. For most projects, an annual report was prepared and filed each year although an overall end of project report may summarize all findings.

Abstracts

Forest Renewal B.C. Funded Wildlife Inventories - 1996/97

Forest Songbirds

Bryant, A.A. 1997. *Breeding songbirds and woodpeckers in Clayoquot Sound, British Columbia*. Andrew A. Bryant Services, Nanaimo, B.C. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 24 pp.

ABSTRACT

Songbirds, woodpeckers and vegetation were surveyed in the Bulson and Sydney watersheds of Vancouver Island, British Columbia using established RIC standards. Total richness was moderate (23 species), but 4 species (Pacific Slope Flycatcher, Winter Wren, Chestnut-backed Chickadee and Varied Thrush) accounted for >70% of all detections. Three woodpecker methods produced uncorrelated estimates of relative abundance in a simple community comprised of common Hairy Woodpeckers and rare Pileated woodpeckers and Red-breasted sapsuckers. Forest stand measurements were poor predictors of relative abundance for any of the common songbirds. Overall, Bulson and Sydney watersheds shared most species with other stands on Vancouver Island. Bird abundance was relatively high, but evenness was lower. In general, old-growth forest bird communities on Vancouver Island are dominated by a few species which are abundant. Most between-watershed differences were attributable to presence/absence of uncommon species. Continued reliance upon community-level songbird surveys may not help elucidate which old-growth habitats should be protected, simply because similar abundance of few species produces high between-watershed similarity. More work is needed to a) determine which rare species are of management concern, b) develop and test inventory methods for these groups, and c) develop methods to link presence/absence data with information concerning demographic success, and use of patchily-distributed resources.

Marbled Murrelet

Burger, A.E., B.A. Beasley, and T. Chatwin, eds. 1997. *Clayoquot Sound Marbled Murrelet Inventory for 1996*. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1, Nanaimo, B.C. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program.

This report provides preliminary results from the first of a three-year project on Marbled Murrelets (*Brachyramphus marmoratus*) in Clayoquot Sound, Vancouver Island. Summaries of four component projects, 1) At-sea surveys of Marbled Murrelets in Clayoquot Sound, 2) Radar inventory of Marbled Murrelets in Clayoquot Sound, 3) inland inventory of Marbled Murrelets within 11 watersheds of Clayoquot Sound in 1996, and 4) Distribution and relative densities of Marbled Murrelets in the Ursus Valley in 1995 and 1996.

AT-SEA SURVEYS OF MARBLED MURRELETS IN CLAYOQUOT SOUND

Sixteen boat surveys were conducted between May 31 and September 29, 1996 to obtain baseline information on the distribution and densities of murrelets in Clayoquot Sound. A strip-transect route followed the coastline south from Felice Island to Portland Point, then went offshore 300 m and northwards to Vargas Island, then continued around Vargas Island to Schindler Point near Tofino. The 49.8 km route was divided into sectors that ranged in length from 3.4 to 15.4 km. Marbled Murrelets were abundant in surveys conducted between June 18 to July 18 and began to decline in the latter part of the summer. The densities of murrelets varied within each sector but sector 1 (Felice Island to the north end of Chesterman Beach), sector 3 (Cox Point to Portland Point), and sector 5 (southern tip of Vargas Island to Ahous Point) were consistently preferred over others. The highest density of murrelets was noted in the Gowland Rocks area of sector 3. Recommendations for future work include: 1) maintain the same survey route in future years, with the addition of a less frequently surveyed route farther north in Clayoquot Sound. A circumnavigation of Flores Island and transects out towards Cleland Island would cover areas where murrelet activity in March-May was high; 2) conduct future surveys from May 1 to August 31; and, 3) shorten some of the sectors to the same length as others so that a detailed analysis of bird-use along the length of the transect can be done.

RADAR INVENTORY OF MARBLED MURRELETS IN CLAYOQUOT SOUND

We used high-frequency marine surveillance radar to count and observe Marbled Murrelets at 14 forested watersheds in Clayoquot Sound. A pilot study in 1995 showed the feasibility of counting murrelets as they crossed from the ocean inlets into the watersheds. We tallied other birds and bats likely to be confused with murrelets on radar and measured their flight speeds. Such birds were not common (usually <10 seen per day), and most birds and all bats had speeds and flight paths which were quite different from those of murrelets. Radar detections of incoming murrelets were consistently higher than those of circling or outgoing birds, and we used incoming counts for inventory. Incoming and circling birds flew much slower than outgoing birds (mean speeds 66, 69 and 105 km/h, respectively). We found significant seasonal variations in radar counts, but those made in the period 1 June through 16 July were fairly consistent, and were used for inventory analysis. A total of 4071 murrelets were counted entering the 14 watersheds, with the following breakdown: Atleo 99; Bedwell-Ursus 410; Bulson 436; Clayoquot River 100 (a low count made late in the season); Cypre 58; Flores creek no. 6, 169; Hesquiat

Point Creek 316; Kennedy River 227; Megin 467; Moyeha 374; Sydney 111; Tofino Creek 116; Tranquil Creek 193; and Watta 995. Flight paths were plotted at each station, which showed that some incoming murrelets were flying beyond the scanned range of the radar at five watersheds (Atleo, Bulson, Cypre, Flores and Hesquiat Point Creek), so that counts there were underestimates. Some murrelets were undoubtedly missed at all other stations. The total radar count (4,071 birds) compared favourably with the 1996 at-sea census (4,510), but since both radar and boat surveys missed many birds and did not cover all areas, the Clayoquot Sound population was tentatively estimated to be about 6,000-8,000 birds. In the Bedwell-Ursus watershed, the only one sampled in two years, both radar and audio-visual detections declined significantly in 1996 and were about half of the 1995 values. The cause of this change is not known, but might be due to changes in ocean conditions, or a shift to another watershed. A preliminary analysis found no significant correlation between maximum radar count of murrelets per watershed and areas of logged, immature or old-growth forest, total forested area, or total watershed area. Topographic maps suggested that murrelets were probably entering the Megin valley via Watta Creek. With data from these watersheds pooled there was a significant correlation between dawn radar-counts of murrelets and the area of old-growth forest per watershed, which explained 55% of the variation in murrelet counts. More detailed ecosystem mapping is needed to test this relationship further. The maximum murrelet count was not affected by the distance from each watershed to the nearest foraging area. Recommendations for future work include: 1) a power analysis to determine the minimum number of sampling days per season needed to estimate incoming murrelets per watershed; 2) repeated radar inventory at the 14 watersheds sampled in 1996 to determine and explain annual variability; 3) establishment of additional stations at watersheds not sampled in 1996 (e.g. Pretty Girl Valley, Meares Island, Vargas Island, and unsampled creeks on Flores Island) to improve the overall estimate of the murrelet population; 4) inland audio-visual surveys on low passes between watersheds to determine the proportion of murrelets which crosses into adjacent watersheds; 5) incorporation of more detailed ecosystem mapping data into landscape-level comparisons of radar counts as the ecosystem data become available.

INLAND INVENTORY OF MARBLED MURRELETS WITHIN 11 WATERSHEDS OF CLAYOQUOT SOUND IN 1996.

Inland ground surveys for Marbled Murrelets were made following the RIC protocol in Bulson Creek (26 stations), Sydney River (22 stations), Hesquiat Point Creek (12 stations), Flores Creek #6 (13 stations), Tranquil Creek (9 stations), Flores Creek #9 (9 stations), North Flores Island (4 stations), Hootla Kootla Bay (6 stations), Riley Creek (2 stations) and West Bedwell Sound (6 stations), in addition to the Ursus Valley (38 stations). We found a dramatic decline in detection rates after July 20 so we restricted our analysis to the period between May 25 and July 20, 1996. Detection rates were significantly higher when surveys were conducted in cloudy weather but our samples were too small to analyze cloudy and clear surveys separately among habitats. We sampled most stations under both cloudy and clear conditions so it was valid to combine all surveys to calculate average detection rates per station and use those in the analyses. The frequency of occupied detections which indicate nesting in nearby stands of trees differed among watersheds. The mean number (+/- SD) of occupied detections per station was greatest in Hesquiat Point Creek (6.3 +/- 7.8) but not significantly greater than in Flores Creek #6 (3.9 +/- 2.9) or Sydney River (3.4 +/- 3.2). The mean numbers of occupied detections were significantly lower in Bulson Creek (2.5 +/- 4.7), Ursus Creek (1.6 +/- 2.2), Flores Creek #9 (0.8 +/- 2.5), and Tranquil Creek (0.1 +/- 0.4) than in Hesquiat Point Creek. Sample sizes in the other watersheds were too small for statistically meaningful comparisons but the mean numbers of occupied detections were within the low range for Riley Creek (2.5 +/- 1.5), West Bedwell Sound (2.5 +/- 0.4), Flores North (1 +/- 1.5) and Hootla Kootla Bay (0.3 +/- 1.4). The mean rates of occupied and subcanopy detections per station were significantly greater at stations in the valley bottom than on slopes. There was large variation in detection rates within the subzone variants, CWHvh I and CWHvml. There were more occupied detections at some stations in CWHvml than any of the stations in CWHvh I but the difference between their means was not statistically significant. We obtained low numbers of detections at stations in CWHvm2 but too few were surveyed (N=4) for a meaningful statistical comparison with the other subzone variants. There were no significant differences in occupied detection rates between the 7 sampled site series within CWHvh 1 or the 8 sample site series within CWHvm 1 but these results are inconclusive because sample sizes for many of these site series were very small. Site series with relatively high mean rates of occupied detections were CwYc-Goldthread (3.6 +/- 4.3), CwHw-Salal (3.5 +/- 6.4) in the CWHvh I and BaCw-Foamflower (4.7 +/- 5.9), BaCw-Salmonberry (3.8 +/- 3.9), Ss-Salmonberry (3.2 +/- 3.3), HwBa-Blueberry (2.5 +/- 2.6), and HwB a-Deerfern (2.0 +/- 2.9) in the CWHvm 1.8. The highest mean rates of occupied detections were associated with stands of large conifers (especially Sitka spruce) with thick moss and lichen covering their boughs. The frequency of occupied detections declined as elevation increased and densities of western redcedar and mountain hemlock increased. These results match those of several other studies, and confirm that Marbled Murrelets prefer to nest in stands of large, old-growth conifers. The number of potential predators was highest in habitats sampled near the coast where Bald Eagles, Northwestern Crows and Steller's Jays were most common. Further behavioural studies will be needed to assess the actual predation risk that these species pose to murrelets in Clayoquot Sound. Recommendations for future work include: 1) continued surveys for murrelets at a proportion of the stations sampled in each watershed in 1996, to determine the annual variation in detection rates and whether murrelets shift between watersheds in consecutive years; 2) systematic sampling of murrelets and habitat features in Bulson Creek, Flores Creek #6, Hesquiat Point Creek, Sydney River and Ursus Creek at new stations not used in 1996, to increase the sample size for habitats that were under replicated in 1996, particularly those at mid- to high-elevations; 3) systematic tree-climbing within sample plots of a few watersheds, including both high and low quality ecosystem units, to confirm whether the occurrence and densities of nests corresponds to high frequencies of detections; 4) field tests and work with plant ecologists to improve our classification of ecosystem units, and to allow combinations of similar site-series into meaningful units.; and, 5) use more detailed ecosystem data for areas adjacent to survey stations to correlate detection rates of murrelets and their predators with a wider range of habitat features as ecosystem data become available.

DISTRIBUTION AND RELATIVE DENSITIES OF MARBLED MURRELETS IN THE URSUS VALLEY IN 1995/96.

The Ursus Valley is an unlogged Special Management Area, with priority on wildlife values. Inland surveys for Marbled Murrelets were made following the RIC protocol at 53 stations in the valley in 1995 (33 stations) and 1996 (38 stations). At 18 stations sampled in both years, mean detection frequencies declined significantly between 1995 and 1996 (total detections: 45.7 vs. 24.0; occupied detections: 5.8 vs. 1.5). We found no correlation between detection frequencies per station between years; some good stations in 1995 were poor in 1996. These results confirm the need for multi-year surveys and a large sample of stations when assessing habitats. To combine data from both years we derived an index of relative activity (IRA) for each station (the station's annual mean divided by the mean for all stations). The combined 1995-1996 IRAs for occupied detections (IRA09596) were significantly correlated with a suite of habitat variables which characterised large conifers with high epiphyte cover on their boughs, and low elevation. Sitka Spruce was common at many stations with high IRA09596. These results match those of several other studies, and confirm the preference by nesting murrelets for large, old-growth conifers. Stations with high rates of occupied detections were usually within or close to habitat polygons with high timber volumes. This habitat feature was considered important in the draft Marbled Murrelet guidelines for the Forest Practices Code. Detection frequencies varied among the 12 primary ecosystem units sampled. We used the mean IRA09596 in each ecosystem unit in a preliminary map of nesting habitat suitability. Most of the high quality habitat polygons were along the valley floor, but there were also several on the slopes, typically in western redcedar/salal, amabilis fir/blueberry and "Cottonwood"/ Dogwood ecosystem units. The combined 1995-1996 map of nesting habitat suitability was very similar to the 1995 map. The Ursus Valley study provides a suitable watershed-level model for forest companies and wildlife managers in applying the Marbled Murrelet guidelines of the Forest Practices Code. There are perhaps hundreds of situations in coastal B.C. in which similar methods can be applied, but we need to be sure that our methodology and conclusions are rigorously tested with multi-year data and broad spatial sampling. The following work is recommended in Ursus Valley for 1997 and 1998: 1) continued surveys for murrelets at the 18 stations sampled in both 1995 and 1996, to give a better understanding of the annual variation in detection rates, and the number of years needed for adequate habitat assessment; 2) sampling of murrelets and habitat parameters at new stations not used in 1995 and 1996, to increase the range of habitats sampled, particularly at mid- to high-elevations; 3) systematic tree-climbing within sample plots, including both high and low quality ecosystem units, to confirm whether the occurrence and densities of nests corresponds to high frequencies of detections; 4) field tests and work with plant ecologists to improve our classification of ecosystem units, and to allow combinations of similar site-series into meaningful units; and, 5) conduct a series of surveys on low ridges (e.g. between Ursus and Bulson valleys) to establish whether a significant number of murrelets cross between these watersheds.

White-tailed Ptarmigan

Commons, M.L. 1997. *Vancouver Island White-tailed Ptarmigan Inventory Project: Progress Report, 1997 summer surveys. Principal investigator, Dr. Kathy Martin, UBC. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 24 pp.*

Executive Summary

Very little is known about the Blue-listed white-tailed ptarmigan subspecies (*Lagopus leucurus saxatilis*) which occur only on Vancouver Island. In 1997, an inventory was done on a total of 25 mountains on 16 sites covering 2,303 ha for an approximate cost of \$32.58 per ha. Ten professional and technical field workers spent 203 days covering the terrain. From June-October we observed 206 ptarmigan across the island from the Nimpkish valley south to North Cowichan. The first active nest of the projects was found in Strathcona Park in mid-July. We located 25 broods and placed radios on 24 brood hens. Twenty chicks were radio-marked from 6 different mountains (3 on the south Island, 1 in Strathcona Park, and 2 on north Island). As a value added component, we conducted a census of birds using alpine sites during late summer and fall migration. We observed 53 species using the alpine over a 3 month migration period. Habitat types were evaluated in the field for GIS mapping, and GPS and map UTM's were evaluated for accuracy.

Bald Eagle

Deal, J.A. 1997. *Nimpkish Bald Eagle Nest Inventory (FRBC #PA-96-296-IN) 1996 Annual Report. Canadian Forest Products, Englewood Logging Division, Woss, B.C. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 30 pp.*

A Bald Eagle nest inventory was conducted in the Nimpkish Valley on northern Vancouver Island in TFL #37 and FL A19233 between May 29 and July 17, 1996. Eighty-seven Bald Eagle nests and one Golden Eagle nest were located. Twenty-five nests were active on May 29 and of these, 11 fledged offspring. Nest success was 36% for coastal nests, 30% for river nests and 0% for lake nests. Ninety-seven percent of the nests were located in old-growth trees. Eighty-one percent of the nests were located in old-growth Douglas-fir. Seventy-six percent of the nests were within the top 15 m of the crown. Bald Eagle nests were generally found near a section of a river with a slow rate of water flow, near a junction of the main channel and a tributary, near the mouth of a river or creek where it enters a lake, or within 350 m of a shoreline. All successful nests were located within three Kilometers of the ocean. The final survey indicated that the mean distance between active nests was 1298 m along the coast, while, the mean distance between active nests along the section of the Nimpkish River, between Nimpkish Lake and the river mouth, was 817 m. On the coast, the minimum distance between

active nests increased from 400 m on the first survey to 1240 m on the final survey. Results of the inventory will be used to ensure the protection of nesting habitat in the long-term.

Woodpeckers

Deal, J.A. and A.T. Smith. 1997. *Nimkish Woodpecker Nest Inventory (FRBC #PA-96-294-IN) 1996/97 Annual Report. Canadian Forest Products, Englewood Logging Division, Woss, B.C. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 67 pp.*

A woodpecker nest inventory was conducted in the Nimkish Valley on northern Vancouver Island in TFL#37 between May 1 and July 5 1996. Twenty-three Northern Flicker nests, 37 Red-breasted Sapsucker nests, 8 Violet-green swallow nests, 1 Tree Swallow nest, and one Red-breasted Nuthatch nest were located. Eighty percent of the nests were located in trees on less than 20% slope. Seventy seven percent of the Hairy Woodpecker and Northern Flicker nests and 59% of the Red-breasted Sapsucker nests were located in the CWHxm. The majority of nest trees were western hemlock, followed by Douglas fir for Hairy Woodpecker and Northern Flicker. Twenty \-six percent of the Red-breasted Sapsucker nest trees were western white pine. Western redcedar and yellow-cedar were used very infrequently for nesting. This may be due to their pattern of decay. Hairy Woodpecker nest trees had the following average tree size and nest height characteristics: tree height of 28 m, diameter at breast height (1.3 m, dbh) of 81 cm, and nest height of 21 m. Northern Flicker trees had the following average characteristics: tree height of 23 m, dbh of 70 cm and nest height of 19 m. Red-breasted Sapsucker nest trees had the following average characteristics: tree height of 26 m, dbh of 80 cm and nest height of 19 m. On average, Northern Flickers nested in the top 82% of the snag compared to 76% and 72% for Hairy Woodpeckers and Red-breasted Sapsucker respectively.

When the tree size data were separated by biogeoclimatic variant, there was no significant difference in tree size of nest height for both Hairy Woodpecker and Northern Flicker across the range of variants. Red-breasted Sapsuckers used significantly larger trees in the CWHvm2 than in the CWHxm. Also, the proportion of nest height to tree height for Red-breasted Sapsuckers was significantly lower in the CWHvm2. When comparing each species within the biogeoclimatic variant, no significant difference was detected in tree size and nest height in the CWHxm and CWHvm1. In the CWHvm2, Red-breasted Sapsuckers nested in trees that were significantly larger than Northern Flicker nest trees. Woodpeckers used wildlife tree classes 2-7 for nesting, however, classes 4-6 were used most frequently. The majority of the nest trees had >95% of the bark remaining. Nest trees generally had hard sapwood and heartwood at breast height (1.3m). Results from this study will be used in planning high quality wildlife tree patches for stand-level biodiversity management and planning supplemental nesting habitat in young second-growth forests.

Sharp-tailed Snake

Engelstoft, C. and K. Ovaska. 1997. *Sharp-tailed snake inventory within the coastal Douglas fir biogeoclimatic zone, June-November 1996. Alula Biological Consulting. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 50 pp.*

EXECUTIVE SUMMARY

The Sharp-tailed Snake, *Contia tenuis*, is one of the rarest vertebrates in British Columbia, and the species is on the provincial Red-list of species at risk. From 15 June- 15 November 1996, we conducted surveys on the southern Gulf Islands and southeastern Vancouver Island to obtain information on the distribution and habitat requirements of the snakes. The surveys constituted the first year of an inventory project of the Sharp-tailed Snake, approved in principle for three years of funding. The overall goal of the study is to provide information that contributes to the management and conservation of biodiversity in forest ecosystems within the Coastal Douglas Fir Biogeoclimatic Zone.

The methods consisted of flipping over natural cover objects (rocks and downed wood) during time-constrained searches and using artificial cover objects (**ACO's**) to sample snakes. ACO stations were established at three sites on North Pender, one site on South Pender, 12 sites on Saltspring Island and four sites in Metchosin, Vancouver Island. The ACO's were constructed of three different materials: tar roofing, tin roofing and plywood.

Eight observations of Sharp-tailed Snakes were made at two sites: Magic Lake Estates on North Pender Island and near Vesuvius on Saltspring Island. Shed skins, representing four additional snakes, were found at the Saltspring Island site. The observations occurred on 10 May (during a reconnaissance survey), 20 June and between 23 September and 9 October, suggesting that the seasonal activity of the snakes may peak in spring and fall. Two hatchling-sized snakes were found on Saltspring Island, indicating that nesting had occurred nearby. The macrohabitat at both sites consisted of open Douglas Fir - Arbutus forest that was severely fragmented by residential development. The Saltspring Island site was on a rocky, south-facing slope, and the two snakes found at this site, as well as the shed skins, were under rocks on soil. At the North Pender Island site, all snakes were found under artificial cover objects made of tar roofing. Rocky knolls and loose rocks were common in the natural habitat patches at this site. Rocky substrate on south-facing slopes may form a critical egg-laying habitat for the snakes.

Other species of reptiles and amphibians found during the surveys were the Common Garter Snake (*Thamnophis sirtalis*), Western Garter Snake (*T. elegans*), Northwestern Garter Snake (*T. ordinoides*), Northern Alligator Lizard (*Elgaria coerulea*), Roughskinned Newt (*Taricha granulosa*), Western Red-backed Salamander (*Plethodon vehiculum*), Clouded Salamander (*Aneides ferreus*), Pacific Treefrog (*Hyla regilla*), Red-legged Frog (*Rana aurora*) and Long-toed Salamander (*Ambystoma macrodactylum*). All these species, except the Western Red-backed Salamander that was only found at the Vancouver Island sites, were widespread on the southern Gulf Islands.

In the future, both extensive and intensive surveys are recommended for the Sharp-tailed Snake. The extensive surveys should focus on likely habitats, based on the results of the 1996 surveys, within the southern portion of the Coastal Douglas Fir Biogeoclimatic Zone. The surveys should be carried out during optimal seasonal periods for detecting the snakes in spring and fall. An intensive study should be carried out at a known site to obtain detailed information on movements, activity, life history and critical habitats. The artificial cover objects used, especially those made of tar roofing, were highly effective in attracting Garter Snakes (all three species), as well as Sharp-tailed Snakes. Artificial cover objects, which allow the sampling of snakes with little disturbance to the natural habitat, hold promise as a possible technique for intensive sampling and longterm monitoring of the Sharp-tailed Snake.

Grizzly Bear

Himmer, Stefan. 1996. *Kingcome River and Wakeman River grizzly bear inventory: Progress Report No. 1. August 1996. (Kingcome Grizzly PA-96-275-IN). Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 2 pp.*

Preliminary field reconnaissance was completed in the summer of 1996 to test the viability of using the DNA mark-recapture methodology on coastal grizzly bears. Hair capture stations were set up along the Kingcome and Wakeman Rivers at several locations. Hair captured during the preliminary field season was sent for analysis, to ensure that the technique would work. Biologists also scoped out the area to determine the feasibility of setting up a grid system to lay out hair capture stations, and they assessed accessibility and the logistical considerations of setting up a field camp in a remote coastal location. Baits appeared to work well and numerous hair samples were obtained from the 8-10 sites set up along the two drainages. The workplan and modelling to determine grid cell size was completed in order to initiate work for the following field season. (no report - workplan only)

Roosevelt Elk

Keystone Wildlife Research. 1997. *Vancouver Island Elk Inventory Assessment. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 20 pp.*

The objectives of the aerial surveys in the Nimpkish Valley on Vancouver Island were: (1.) to accurately estimate the total population in the area using mark/recapture methods and, (2) to determine if sightability models could be reliably employed to estimate the population size without the use of marked animals. Approximately 300 elk were estimated to be in the Nimpkish Valley based on prior experience in the area. Thirty were captured and fitted with radio collars in September and December 1996. Twenty-five of those collared animals remained in the census area. Seven survey units were defined averaging 69 km² in size. All of the units were not searched during each two day survey period. Six surveys were conducted in the area between January 30 and March 28, 1997. Most of the units were surveyed by helicopter 4-6 times. Twenty-two of the 25 collared animals were seen 64 times and a total of 447 unmarked animals were also counted during the 6 survey sessions. The maximum number counted on a single two-day survey was 143. The Bowden mark/resight model generated a population estimate of 197 animals (95% CI 156-248). That estimate does not include the entire population in the valley since some animals moved outside of the area during the survey period. The survey area bounds should be enlarged to enclose all of the marked animals.

Information was also collected to determine the sightability of elk in the valley. Overall 53% of the collared elk were seen. For the elk which were missed, 18% were in habitats where they could not be seen even after location with the radio equipment and 28% could be seen but were missed during the normal intensity search used on a standard inventory survey. We classed collared animals which could not be seen as using non-detectable habitat (NDH). For others which were using open habitats, a high proportion (65%) were detected during a standard search. Population estimates incorporating corrections for sightability were also generated for each of the 6 surveys. Using 6 of the seven survey units, the estimates ranged from 86 to 174. Those estimates rely on parameters generated for interior elk populations (Idaho) where sightability was expected to be higher than in coastal habitats. Recalibration of the model using local data should produce more accurate estimates. Sixty-eight sightability trials were generated by the first six surveys and five more surveys will be required to obtain 100 trials. The largest and least predictable source of variability is the proportion of elk in the NDH category. The number of animals using non-detectable habitats may be related to and predicted by the observed habitat use among the animals which are seen during each survey. That relationship will be most important in building a reliable sightability model for elk on Vancouver Island. The relatively high sightability observed to-date (53-65%) suggests that developing reliable sightability models may be possible and should be explored further.

Black Bear

MacHutchon, A.G. 1997. Black bear inventory working plan, Clayoquot Sound B.C. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 48 pp.

A black bear inventory was conducted in Clayoquot Sound, B.C. by B.C. Ministry of Environment, Lands and Parks, Region 1, funded through the FRBC Wildlife/Wildlife Habitat Inventory Program as part of the Clayoquot Inventory Project. This work plan outlines the objectives of the black bear inventory and methods for achieving those objectives over a two year period (1997-1999). The primary purpose of the inventory is to obtain baseline data on black bear population characteristics, habitat use and food habits within Clayoquot Sound. Methods are outlined for population characteristics; food habits; habitat use; and communication of study progress and final results. Annual work plans and a budget forecast for 1997-98 are also included.

The overall goal of the project is to obtain information on black bear distribution and abundance within Clayoquot Sound which will provide population estimates for management purposes and future comparisons. Specific objectives are:

1. to establish baseline data on black bear population numbers and density;
2. to evaluate relative differences in black bear population abundance among watersheds'
3. to establish baseline population dynamics data on sex composition and litter size;
4. to document the traditional use and ecological knowledge of black bears in Clayoquot Sound by the Nuu-Chah-Nulth people;
5. to assess relative seasonal differences in black bear habitat use and abundance in relation to existing and proposed large scale terrestrial ecosystem mapping;
6. to determine the seasonal food habits of black bears (e.g., food) within defined habitats of Clayoquot Sound;
7. to compare black bear numbers with habitat capability estimates from exiting 1:250 000 scale Broad Ecosystem Unit mapping;
8. to evaluate the DNA mark-recapture technique as an estimator of black bear density or population numbers on Vancouver Island;
9. to examine genetic variability with in the Clayoquot Sound black bear population.

Ecosystem Mapping

Madrone Consultants Ltd. 1997. Inventory of proposed woodlots: Saltspring Island and Ladysmith. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 30 pp. Maps available, MELP Regional office Nanaimo.

Five parcels of land comprising two woodlots were mapped for natural ecosystems at a scale of 1:5000, and a preliminary wildlife inventory was conducted. 1. The Ladysmith woodlot comprises three parcels. The largest parcel (parcel a) had significant wildlife values, especially for Roosevelt Elk, a blue-listed vertebrate species, as well as for black bear, many birds and other wildlife. A relatively rare wetland ecosystem, the aspen-spirea (AS) ecosystem was also identified in this area. The following management recommendations were made: a) the area provides an important travel corridor for elk and other wildlife, and this travel corridor (identified on the map) should be fully protected from any future development; b) because of the high wildlife values identified, protection of this whole area to serve as a wildlife refuge should be considered; c) if further development occurs, more information on current Roosevelt Elk use, and access planning to protect existing wildlife values, especially elk, is very important; d) the relatively rare ecosystem, aspen-hardhack (AS), and a small pocket of old growth forest (DS7) should be fully protected and buffered from any proposed activities; e) the dry rock outcrops with skeletal soils are easily damaged and should be left undisturbed; f) spring field work should be conducted to identify if there are any rare plants. Ladysmith parcels 109 and 115 appeared to have no significant ecological values, and appear to be suitable for management of timber, provided ecologically sustainable forestry practices are applied. They have some good recreational potential and are currently used by local residents. This recreational use should be permitted to continue. The RO units in parcel 115 should be field checked in spring for possible rare plants. The Saltspring Woodlot comprises two parcels. Both have some high ecological values. The highest values are concentrated in the Bruce Peak parcel. The warm grassy slopes (DG) with scattered dry forests and sporadic small wetlands support high wildlife values, which warrant some further investigation, and could harbour some rare plants. The DG ecosystem itself is likely quite rare and, although somewhat disturbed and needs to be more fully assessed (perhaps by the CDC). It is possible some rare plants may occur in this type. The area also has some potential to support nesting by western bluebirds. A rare, red-listed butterfly (Bremner's Silverspot) appeared quite common in the Bruce Peak parcel. It could also occur in the southern parcel although we did not observe it. The following recommendations are made: a) thin and space dark young stands (stage 4) which occur to improve forage and provide future winter habitat for deer; b) there are few existing vets or snags, but areas for future wildlife trees should be set aside. Active planning to manage fore the provision of snags and coarse woody debris (CWD) in future rotations is also needed; c) all the ponds and wetlands are of high value to wildlife and should be surrounded by permanent forested buffers; d) we suggest further spring/early summer sampling of wetlands for invertebrates; e) the moister forest units are limited in extent and should be given high priority in planning. A relatively large proportion would be left in protected areas/reserves. Localized inclusions of skunk cabbage and slough sedge ecosystems should be protected within these; f) forestry activities should be concentrated on the mesic

(HK) and more productive submesic sites; g) the grassy slopes of the DG unit are ecologically disturbed but are of high recreational value, and are utilized by at least one rare invertebrate, Bremner's silverspot as well as possibly Western Bluebird. Spring fieldwork is recommended; h) maintenance of habitat connectivity with areas outside of the woodlot boundaries needs to be considered in any forestry operations.

White-tailed Ptarmigan

Martin, K. and C. Hitchcock. 1997. Vancouver Island White-tailed Ptarmigan inventory, Progress report May 1997, winter surveys and GIS work. Principal investigator, Dr. Kathy Martin, UBC. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 27 pp.

Little is known about the ecology of White-tailed Ptarmigan on Vancouver Island, especially in winter. It is during this period of its annual life cycle that birds are most likely dependent upon forested habitats for food and thermal cover. Mainland ptarmigan populations typically separate from breeding sites and dispersal is a regular part of their life history. Based on what is known of mainland populations, we expected that for island populations that (1) we would see movements from summer breeding sites to winter sites; (2) birds would join up in winter flocks, and females would move further than males; (3) chicks would remain with females in the early winter, and then make the longest dispersal movements; (4) birds would move to sites with more deciduous shrubs, such as willow, alder and huckleberry; and (5) the birds in the South Island locations would need to move farther to find suitable winter sites and have associated higher mortality. Forty-one birds (14 male, 20 female and 7 chicks) were radio tagged in 6 major areas: three on the South Island (McQuilla/EI Capitan, and 5040 Peak) and three in the region of Strathcona Park, in the Mid Island (Kings Peak, McBride Ridge, and Albert Edward/Jutland). During five winter flights, birds were relocated, elevation, aspect, slope and habitat description was made for each relocation of a radioed bird. When birds were seen, we recorded whether birds were alone or in a flock and the type of activity they were engaged in. Habitat type and elevation of locations of radio-tagged Vancouver Island White-tailed Ptarmigan over winter (1996/97) in mid-winter indicated that birds increase their use of mountain hemlock and in late April move back into alpine tundra. The use of coastal western hemlock was rare. Locations of birds ranged from approximately 4000 m to 5100 meters.

Forest Owls

Matkoski, W.R. 1997. Nimpkish Owl Inventory (FRBC #PA-96-421-IN/TR) 1996 Annual Report. Prepared for J. Deal, Habitat Forester, Canadian Forest Products Ltd., Englewood Logging Division, Woss, B.C. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 50 pp.

From February 28 to May 31, 1996, an owl inventory was conducted on Canadian Forest Products Ltd.'s T.F.L. #37 on northern Vancouver Island. There was a total of 263 owl detections, 45 which were Northern Pygmy-owls, 50 Northern Saw-whet Owls, 131 Western Screech-owls, 35 Barred Owls and 2 were Great Horned Owls. The 1996 inventory was the second of a three year study which began in 1995 and will conclude in 1997. The peak time for owl detections was from 21:30 to 22:29 (PDT), with slight variations for each individual owl species. The number of owl detections peaked at 1.5 to 2 hours after sunset. About 57.4% of the owls were detected in the CWHxm Biogeoclimatic zone/subzone, 26.6% were detected in the CWHvm1, 15.2% in the CWHvm2 and 0.8% in the MHmm1. Thirty-one percent of the owl detections originated from second-growth forests, 69% from old-growth forests. Barred Owls responded less during minor wind, precipitation and fog conditions compared to the other owl species inventoried. All 5 owl species showed a tendency to respond to their own species' taped owl calls. Results of the inventory will be used for owl management strategies. As well, summarizing and analyzing the additional information collected during the inventory revealed some behavioral tendencies which may provide a basis for further owl research.

Northern Goshawk

*McLaren, E. 1997. "Queen Charlotte" Goshawk (*Accipiter gentilis laingi*) population inventory summary for Vancouver Island, British Columbia (1996/97). Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 26 pp.*

The Ministry of Environment, Lands and Parks Wildlife Program, undertook an intensive inventory of "Queen Charlotte" Goshawk (*Accipiter gentilis laingi*) on the northern part of Vancouver Island, British Columbia between April 1996 and March 1997. Repeat surveys were conducted for the third year within three forest types: 1) contiguous old growth; 2) contiguous second growth (>40 yrs); and 3) fragmented forests. Additionally, surveys were conducted in new areas, encompassing these three forest types. Goshawks nests were located using two standardized Resource Inventory Committee (RIC) methods: 1) broadcasting goshawk vocalizations every 400m along parallel line transects; and 2) stand-watches (visual searches for goshawks soaring above the forest canopy). All goshawk detections resulted in an intensive nest search in a 300m radius around the detection. In total, 901 call stations and 67.9 standwatch hours were conducted between May and August. Using these survey techniques, 15 goshawks were detected and five new goshawk territories were found, corresponding to an average survey success of 1.11 detections per 100 call stations and 7.36 detections per 100 stand-watch hours. Additionally, three new territories were found not using call stations or stand-watches. Of the total eight new territories found in 1996, three were located in contiguous old growth forests, four in fragmented old growth forests and one

in a fragmented second growth forest. Reoccupancy of known goshawk territories was high this year with 91% showing signs of goshawk activity. Nest productivity averaged 1.7 fledglings for all active nests on Vancouver Island. In 1996, radio-telemetry was initiated with a total of eleven adults captured and tagged, eight females and three males, using box traps with Rock Doves (*Columba livia*) and mist nets with Great Horned Owls (*Bubo virginianus*) as lures. Goshawk detection rates were higher this year than in 1995, however the number of new territories found per unit of effort still suggests that goshawk populations are low on Vancouver Island. Habitat data for nest sites was comparable to data found in 1995 with goshawks tending to select larger Western Hemlock (*Tsuga heterophylla*) and Douglas Fir (*Pseudotsuga menziesii*) trees in a forest stand, on the middle or bottom portion of slopes in forests that have relatively closed canopies and open understories. When the relative abundance of prey species for goshawks is compared for the repeated survey areas between 1995 and 1996, Stellar's Jays (*Cyanocitta stelleri*), Varied Thrush (*Ixoreus naevius*) and Red Squirrel (*Tamiascurius hudsonicus*) detections were greater in 1996 and Blue Grouse (*Dendragapus obscurus*) and woodpecker detections were lower. The high number of nesting goshawks this year may coincide with the higher Red Squirrel numbers, a hypothesis developed in 1995 suggesting that goshawk reproduction is strongly dependent upon Red Squirrels as a food source.

Marten and Ermine

Mowat, G. C. Shurgot, and K. Poole. 1997. *Using track plates and remote cameras to detect marten in coastal cedar hemlock forests. Timberland Consultants Ltd., Nelson, B.C. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 30 pp.*

We demonstrate that both cameras and track-plates can be useful for detecting marten and other small mammals in a coastal rainforest setting. With minor modifications the methods presented in Fraker and Gazey (1997) and Zielinski and Kucera (1995) can be used successfully in this environment. Working in the winter presents several challenges due to rain, hence avoiding the rainy season would simplify work. We suggest other field workers consider longer checking periods and the use of a lure in conjunction with bait to increase efficiency, as employed in this study.

Our work suggests that marten may use younger stands in this environment to a greater extent than elsewhere, perhaps because there is no snowfall to impede the use of younger stands in winter. Baker (1992) also found greater use of regenerating stands by marten on Vancouver Island and she suggested that this may be due to increased abundance of deer mice (*Peromyscus* spp.) and woody debris found in these stands. Marten prey more heavily on deer mice on Vancouver Island than elsewhere where food habits have been studied (Nagorsen et al. 1989).

In work done in the Sub-Boreal Spruce biogeoclimatic zone near Smithers, B.C., Lofroth (1993) showed that marten selected for several structural features at the stand level, however they did not select for individual species of trees. The coastal environment provides a good opportunity to test marten selection of stand types for purely structural reasons; even the effects of snow accumulation can be excluded at lower elevations. This kind of work would be best done using intensive radio telemetry; using track plates to measure habitat selection confounds selection with the effects of bait, lure, and site selection. The cost of acquiring large sample sizes is also prohibitive. Stronger inference on habitat quality can be drawn by measuring the fitness of the populations living in different habitats.

Alpine Avifauna

Ogle, S. and K. Martin. 1997. *The use of alpine habitats by fall migrating birds on Vancouver Island, 1996/97. Principal investigator, Dr. Kathy Martin, UBC. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 19 pp.*

Alpine habitats have long been considered ecologically insignificant, contributing little to biological diversity. There is generally little concern for the alpine because of the perception that ample protection is afforded by parks and reserves, and that many unprotected areas are conserved by their inaccessibility. Remoteness and neglect by researchers has also limited our understanding of the community dynamics of alpine fauna. Recent increases in recreational use and alterations to surrounding montane forest habitats potentially threaten alpine species and habitats, prompting a greater need to examine their ecological value. During the latter two years of an FRBC-sponsored inventory of Vancouver Island White-tailed Ptarmigan, conducted by the University of British Columbia and the Canadian Wildlife Service, information was collected opportunistically on the use of alpine habitats by a variety of wildlife species, especially migrating birds. We found that avian species diversity in the alpine is surprisingly high in late summer and fall, and that some species make extensive use of the alpine during fall migration. This report summarizes the bird observations for 1997, showing both temporal and spatial patterns of use by avian species. A species account highlights those birds which most commonly made use of alpine and sub-alpine areas for both 1996 and 1997. The intent is to raise awareness of the ecological value of the alpine, particularly as habitat for birds migrating from higher latitudes and lower elevations.

Species that were encountered frequently during 1996/97, or were of special interest because they were migrants or exhibited migratory behaviour included: Shorebirds (Spotted Sandpipers, Baird's Sandpipers, and phalaropes); Waterbirds (Barrow's Goldeneye, Ring-necked duck, Scaup, Greater White-fronted Geese, and Sandhill Cranes); Raptors (Bald and Golden Eagles, Sharp-shinned and Cooper's Hawks, and Merlin); Band-tailed Pigeon; Rufous Hummingbird; Woodpeckers (Northern Flickers, Red-breasted/Red-naped Sapsuckers); Americana Pipit; Black Swift; Corvids (Common Raven, Gray and Stellar's Jays); Chestnut-backed Chickadee; American Dipper; Red-breasted Nuthatch; Winter Wren; Ruby-crowned

and Golden-crowned Kinglets; Thrushes (American Robin, Hermit Thrush, Varied Thrush, Swainson's Thrush, and Townsend's Solitaire), Warblers (Yellow-rumped, Orange-crowned, and Wilson's Warblers); Sparrows (Golden-crowned, White-crowned, and Savannah Sparrows, Dark-eyed Juncos); Finches (Red Crossbill, Pine Siskin, Rosy Finch and Snow Buntings).

Cougar

Robinson, H. 1997. 1997 North Island cougar ecology project: trapping season summary. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 40 pp.

This project was initiated by the Ministry of Environment to provide an inventory of cougars (*Puma concolor*) on northern Vancouver Island. Trapping of cougars began January 8, 1997 and is ongoing. From January 8 to March 31, 135 truck/trapping days resulted in 20 capture attempts, 11 treed and 8 cougars collared. Of the eight collared individuals, one kitten shed her collar after only three days, one study animal is presumed to have starved to death, and one female died of injuries incurred during her capture. Five collars remain on the air. All study animals are adult females, three are known to be traveling with kittens. Goals for next year include integration of the project with work being done by the University of British Columbia Department of Animal Science, continued trapping and investigation into the potential use of hair sampling as a means to census the population.

Roosevelt Elk

Ross, S. 1997. Roosevelt Elk Inventory Project in Clayoquot Sound, summer 1996. Wilcon, Wildlife Consulting Ltd., Tofino, B.C. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 40 pp.

Abstract

An inventory of Roosevelt elk in Clayoquot Sound was conducted in the summer of 1996 with the purpose of providing preliminary information about the distribution and habitat use of Roosevelt elk in Clayoquot Sound. The objectives of the study are to gather historical and present local knowledge about the occurrence of elk in Clayoquot Sound that exists within aboriginal and non-aboriginal communities; and to conduct a field reconnaissance of elk habitat use and distribution in key watersheds. The project was done in a cooperative manner with Nuu-Chah-Nulth First Nations. Interviews were conducted with local people (aboriginal and non-aboriginal) and a field reconnaissance was completed for seven watersheds. Records of elk occurrence were obtained for fourteen valleys within the Sound and eight locations adjacent. The Ursus, Bedwell and Moyeha watersheds are identified as areas with the highest numbers and most frequent occurrence of elk in the Sound. Rutting activity was recorded in the Ursus and Moyeha watersheds. Basic distribution patterns of elk in Clayoquot Sound over time and space are mapped. Based on the inventory results, more intense studies of Roosevelt elk ecology in Clayoquot Sound are recommended. In addition, continued integration of First Nation communities into future inventory projects in the Sound are suggested.

Woodlot Wildlife

Urban, D. and A. Hopwood. 1997. 1996/97 Wildlife survey and enhancement strategy for Woodlot Licence 082 near Courtenay, B.C. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 48 pp.

The purpose of this study was to survey shrews, mice and voles, woodpeckers, terrestrial salamanders, snakes, deer, bats, marten, and owls on a 98 ha Woodlot Licence, in the CWHxm biogeoclimatic subzone -near Courtenay, B.C. The work was done between- July 1996 and February 1997. Resource Inventory Committee methodologies were used to assess presence or absence of most of the species and to assess woodpecker sign. Bats could not surveyed due to scheduling problems. The frequency of occurrence of woodpecker sign was compared among three site series (01, 03 and 06), and between two site series (01, 06) for shrews, mice and voles. Of the species that are known to occur within the Georgia Depression ecoprovince and the biogeoclimatic zone CWH, the following were found on the woodlot: deer mouse, dusky or wandering shrew, Pileated Woodpecker, Hairy Woodpecker, Red-breasted Sapsucker, Northern Flicker, western redbacked salamander, Columbia black-tailed deer, marten, and Western Screech Owl. More woodpecker sign was found in site series 03 and less in site series 06 than expected by chance and no difference was found in the numbers of mice and shrews between the site series. However, the strength of conclusions of relative habitat use or species absence based on the surveys may be weak because of the low sampling effort allotted to each. Nonetheless, the data provided the Woodlot Licensee with preliminary information on the species that use the woodlot and their habitat requirements to initially implement operational forestry strategies which will minimize impact to wildlife. This study should be considered an exploratory study on applying rigorous scientific inventory methodologies to a small-scale forest management situation.

Bats

van den Driessche, R., M.H. Mather, L.H. Crampton and T.A. Chatwin. 1997. *An inventory of bats in Clayoquot Sound, Vancouver Island, British Columbia. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 30 pp.*

ABSTRACT

In 1996, we initiated a 3 year study to locate and identify bat species and their habitat requirements in Clayoquot Sound, west coast Vancouver Island, Canada. We used two bat sampling methods: mist netting, to determine species presence, and echolocation call monitoring to compare bat habitat use in different forest stands. We confirmed the presence of four and possibly five species of bats: Hoary Bat (*Lasiurus cinereus*), Big Brown Bat (*Eptesicus fuscus*), California Myotis (*Myotis californicus*), Little Brown Myotis (*M. lucifugus*) and possibly Yuma Myotis (*M. yumanensis*). Estimates of relative bat abundance were calculated based on the number of bat passes recorded by the echolocation call data recorders. Higher numbers of bat passes were found in open forests with a low density of shrub cover and western red cedar (*Thuja plicata*). The most dense forests usually contained high numbers of western red cedars. We suggest that forest structure affects the flying, and foraging activities of bats as dense stands and dense shrub cover reduces bat flight manoeuvrability. Relative bat abundance was negatively correlated with the number of snags. Although snags are known to be important as roosting sites, reasons for this result are unclear. In the subsequent two years of this study, we hope to determine what particular aspects of old-growth forests are critical to bats and to recommend habitat management criteria for them in Clayoquot Sound.

Vancouver Island Water Shrew

Waye, H. 1997. *Vancouver Island Water Shrew Inventory, summary of research, 1996 field season. Unpublished Report for the Ministry of Environment Lands, and Parks, Vancouver Island Region 1. as part of the Forest Renewal B.C. Wildlife/Wildlife Habitat Inventory Program, 50 pp.*

A series of waterways throughout Vancouver Island, representing various stream orders and biogeoclimatic subzones, was surveyed to examine the distribution, abundance, and habitat associations of the Vancouver Island Water Shrew (*Sorex palustris brooksi*). A trapline was established at each location, with 20 trap sites spaced 15 m apart following the stream edge; each trap site generally consisted of a snap trap, a pitfall, and occasionally a minnow trap. Over a total of 5493 trapnights, 3 *S. p. brooksi* were collected (two in pitfalls and one floating nest to a snap trap), along with 85 other shrews and 274 deermice. The water shrews were all collected near Lowry Lake, which drains into the north side of Great Central Lake, along a small, slow-moving stream with muddy banks and surrounded by low, water-loving species of plants.

Northern Goshawk - Queen Charlotte subspecies (*Accipiter gentilis laingi*)

Distribution

- boreal and temperate forests throughout the Holarctic (Squires and Reynolds 1997);
- *Accipiter gentilis* is found from Alaska to Newfoundland in North America, the subspecies *A. g. laingi* has a restricted distribution along the Pacific coast from Alaska to Washington (Johnsgard 1990);
- in BC, the *A. g. laingi* or the Queen Charlotte Goshawk has a localized distribution on the B.C. coastal islands (Queen Charlottes, Vancouver Island and Gulf Islands; Campbell et al. 1990)

Status

- *Accipiter gentilis atricapillus* Northern Goshawk, Blue-listed in BC, status considered 'vulnerable';
- coastal subspecies *Accipiter gentilis laingi* Queen Charlotte Goshawk, has been Red-listed in BC which gives it the status of 'threatened';
- has been listed as an 'Identified Wildlife' species which gives it further protection under the Forest Practices Code (Forest Practices Code of BC 1996); and,
- at a national level, the Committee on the Status of Endangered Wildlife In Canada (COSEWIC) have designated the "Queen Charlotte" Goshawk as Vulnerable.

Habitat (Queen Charlotte Goshawk)

- mature-to-old coastal forest
- structural stages 6-7

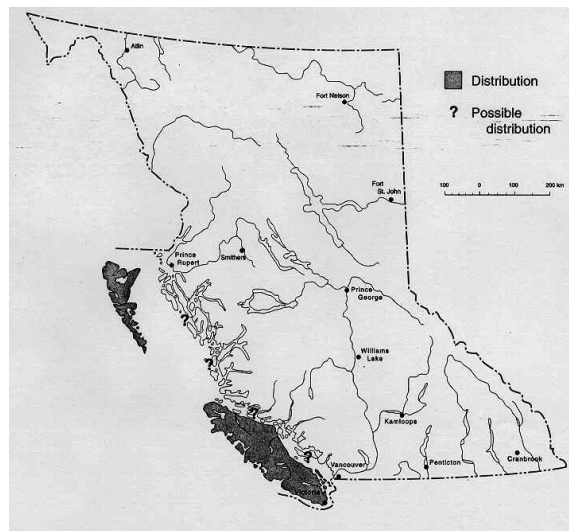
Ecology

Feeding

- feeds on large prey including birds (such as Steller's Jays, Varied Thrush, grouse woodpeckers, crows, American Robin) and mammals (mainly squirrels on Vancouver Island also evidence that they will eat bats);

- major prey are usually associated with old-growth forests or forest edges;

-birds generally avoid early seral forests



Nesting

- breeding and brood-rearing season lasts from April to Sept.
- 3-4 eggs are incubated for 30-32 days
- chicks fledge at approximately 35-42 days old
- after fledging, chicks stay near the nest for 30-50 days

Territories

- home range composed of nest sites, nest areas, post-fledging area and foraging area
- nest site includes a known nest tree and a 1 ha area around it
- nest area may contain several nest sites (goshawks usually have an 'alternate' nest site in their territory) is approx. 12 ha, characterized by several stands of large, old trees with dense canopy cover
- nest areas are the center of all breeding movements and behaviours from courtship through to fledging
- post fledging area (approx. 240 ha) surrounds the active nest and 1-2 alternate nest areas, roughly corresponds to the defended nesting territory
- post fledging areas are characterized by habitats which support goshawk prey (snags, coarse woody debris, forest openings) and extensive canopy cover which provides protection for fledglings learning to hunt
- foraging areas are approx. 2400 ha and include the post-fledging area foraging areas may include an array of land forms and forest cover types but areas with greater canopy cover, greater basal area, and more trees per hectare are used more frequently

- males breed and winter in the same general area while females show less fidelity to breeding territories and wander extensively in winter.

Identified Wildlife Recommendations for Goshawk Wildlife Habitat Areas

- Wildlife Habitat Area (WHA): 2400 hectares
- WHA includes nest areas and post-fledging area (PFA)
- PFA: 240 hectares
- PFA includes three suitable nest areas of 12 ha each
- WHA characterized as large trees with open understory, closed canopy (60% or greater), and low ground vegetation
- as much suitable vegetation as possible is to be included in the WHA
- known breeding sites defined as any nest site that is active or has been active in the past five years
- repeated observations of territorial behaviour from March to September within 500 m of each other may be interpreted as evidence of breeding

Landscape Unit Planning Considerations (Identified Wildlife Guidebook)

- 10% higher biodiversity emphasis at sub-regional planning exercises should be assigned to watersheds where goshawk management is of high priority