

# URSUS Environmental

Wildlife and Environmental Resource Consulting

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## Strathcona Elk Range Restoration Monitoring (BCRP Project # 05.W.Ca.01)

Prepared by:  
Joe Materi, R.P.Bio.  
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Prepared for:  
Ministry of Environment  
Environmental Stewardship - Vancouver Island Region  
1812 Miracle Beach Drive  
Black Creek, B.C.  
V9J 1K1

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- 2005 Final Report -**

**Executive Summary**

This is the fourth year of elk habitat enhancement monitoring in Strathcona Provincial Park sponsored by the Bridge Coastal Fish and Wildlife Restoration Program (BCRP). The current report summarizes monitoring-related activities from April 2005 through March 2006. A total of 13 sites were enhanced between 2002 and 2004, encompassing roughly 10 ha in each of the Thelwood and Elk River Valleys. Enhancement trials over that period focused on increasing forage production by:

- enlarging existing gaps in the forest canopy (6 sites totaling 15.0 ha);
- pruning tree limbs of conifers within the above sites;
- cutting deciduous trees and shrubs to stimulate coppicing (parts of 2 of the above sites totaling 4.0 ha);
- scarification and seeding (4 sites totaling 3.0 ha); and
- planting preferred browse species (4 sites totaling 1.5 ha).

Enhancement sites range from 220 m to 330 m elevation, with most occurring within the Dry Maritime Variant of the Coastal Western Hemlock Biogeoclimatic Zone. All are located within 80 km of the City of Campbell River.

Monitoring over 2005 documented vegetation responses and elk use of treatment areas following enhancement. Specific objectives were to:

- 1) estimate post-treatment forage production at the four sites scarified and seeded with native or agronomic seed mixes;
- 2) determine survival rates of winter browse plantings at the largest treatment area, enhanced in 2002;
- 3) conduct post-treatment winter pellet group counts and track counts to document elk and elk predator occurrence; and
- 4) establish permanent "control" winter pellet group transects within the Thelwood study area.

Based on the monitoring results from this year and previous years, it was concluded that both agronomic and native seed mixes rapidly boost elk forage production over baseline levels. Pre-treatment forage production of 900 to 1,100 kglha (dry weight) was increased to 2,300 to 3,000 kglha in the 2nd year post-enhancement. It was found that forage production in native-seeded areas was higher than agronomic mixes after four growing seasons (3,300 kglha vs. 1,430 kg/ha). In addition, the early results of seeding trials suggest that forage production of native grass-seed mixes is considerably higher when seeded in autumn rather than spring.

Post-treatment monitoring has documented only limited success in attempting to establish or increase browse abundance and/or diversity through plantings. Third year survival rates of 55 % were recorded where mixed potted stock was installed to increase elk browse in the largest and most successful of the browse planting treatment areas (Site 5). The highest third-year survival rates were recorded among Saskatoon and big leaf maple plantings (100 % and 75 %, respectively).

Winter pellet group counts documented some elk use in all treatment units. However, the counts showed that the intensity of elk use in a given treatment unit may vary widely from one year to the next. The most variable treatment unit (Site 1) recorded annual counts of 100 to 191 pellet groups/km annually while the most consistent unit (Site 4) ranged from 25 to 45 pellet groups/km.

Winter track counts revealed that the intensity of elk use in treatment units may vary widely over the course of a given winter, in response to snow conditions, predator occurrence, and possibly other factors. Based on tracking observations, woody debris from spacing treatments does not appear to impede elk winter access within mixed forest stands and coniferous stands enhanced around existing canopy gaps. It may be an issue in coniferous stands receiving "blanket" spacing treatments, which were not centred on canopy gaps.

Continuation of clipping studies at the three native-seeding sites was recommended for the next three growing seasons, to adequately document differences in production between spring- and autumn-seeded trials. Extending winter pellet group counts and winter track counts in the Thelwood Valley was also recommended for the next three years, to better understand variability in elk use of treatment areas. An aerial census of elk in the Thelwood Valley was proposed for the late winter of 2007-2008, to update information on herd size and composition, as well as cow/calf ratios. Use of BC Parks existing IPAC and GPS technology was recommended over successive summers to prepare detailed site maps of all treatment areas, and the sampling locations within them. This would facilitate long-term monitoring, should interest in doing so arise.

Over the longer-term, consideration should be given to expanding elk habitat enhancement activities to other parts of the Elk Valley (up to 70 ha), the Thelwood Valley (up to 50 ha), and possibly the Wolf River Valley within Strathcona Provincial Park. In concert with recently produced elk interpretive signs provided through BCRP funding through this project, development of elk-viewing trails and platforms should be considered for the Thelwood Valley. A study investigating stand treatments to enhance snow interception cover for wintering elk should be considered among worthy projects for future habitat-related research.

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## **1.0 INTRODUCTION**

### **1.1 Project History**

Elk winter range enhancement has been carried out for several decades in the B.C. Interior. However, relatively little is known about habitat enhancement or restoration techniques suitable for Vancouver Island and the adjacent Mainland coast, where a Blue-Listed subspecies of elk occurs (Roosevelt elk; *Cervus elaphus roosevelti*). Some winter forage enhancement trials were carried out in the Campbell River watershed during the mid-1980's through the Habitat Conservation Fund (Janz 1982; Davies 1986). However, these were of short duration and had little follow-up monitoring. In 1993, BC Hydro commissioned a wildlife restoration study for the Campbell River drainage which outlined some possible means of enhancing elk winter range in park and non-park land (Blood 1993).

In 2000, the creation of BC Hydro's Bridge Coastal Fish and Wildlife Restoration Program (BCRP), a compensation program addressing footprint impacts of hydro development, provided biologists with an opportunity to conduct operational trials on a range of enhancement techniques within Strathcona Provincial Park, on Vancouver Island (Figure 1). Project planning was initiated in 2000 with the identification of potential sites and review of available techniques (Materi and Blood 2000). A detailed five-year implementation and monitoring plan was developed for 10 potential work zones in Strathcona Provincial Park in 2001 (Materi 2001). The BCRP Program funded enhancement of 6 sites in 2002, 4 sites in 2003, and 3 sites in 2004. This report summarizes monitoring activities in the project area conducted between April of 2005 and March of 2006.

### **1.2 Project Rationale**

Since completion of the Strathcona Dam in 1958, about 31 km<sup>2</sup> (3,100 ha) of previously forested valley bottom habitat has been inundated in the Upper Campbell / Buttle system. Although no pre-flooding studies of habitat conditions were conducted, Canada Land Inventory mapping suggests the habitat capability for Roosevelt elk would have been high on the inundated lands. Preliminary estimates in Blood (1993) indicate that flooding reduced the total watershed's carrying capacity for elk by about 75 to 100 individuals. That investigator recommended that compensation measures be *"intensive and involve large areas of the remaining winter range in the area"*.



**Figure 1. Study area context.**

**Scale 1: 600,000**

Providing suitable winter range is a key factor in the long-term persistence of elk herds on Vancouver Island (Nyberg and Janz 1990). Winter and early spring can be periods of severe nutritional stress because most types of forage are generally of low quality at those times of the year. Although elk can digest forage of lower nutritional quality than deer, their social nature necessitates access to more concentrated forage resources than deer. This factor, and the fact that snowfall is considerably lower in valley bottoms than at higher elevation, makes rich valley bottom stands and swamps important winter habitats for elk. BC Hydro has recognized the loss of valley bottom habitats to flooding as a factor limiting ungulate production in the BCRP Strategic Plan for the Campbell River watershed (BC Hydro 2000). The Strathcona Provincial Park Master Plan (BC Parks 1993) acknowledges that critical ungulate winter ranges have also been affected by other non-conforming activities park (e.g. mining, highways).

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## 2.0 GOALS AND OBJECTIVES

### 2.1 Project Goals

Since its initiation in the year 2000, this project's primary goal has been to improve winter range in Strathcona Provincial Park to ensure the long-term persistence of its Roosevelt elk herds. The development and refinement of enhancement techniques for this subspecies that can be applied in other coastal locations is considered a key secondary goal. Raising public awareness and interest in the park's wildlife resources in general, and Roosevelt elk in particular, constitute the third major goal of the project.

### 2.2 Project Objectives

In previous years, the project objectives focused on increasing forage production by:

- enlarging gaps in the forest canopy (6 sites totaling 15.0 ha);
- pruning tree limbs of retained conifers within the above sites;
- cutting deciduous trees and shrubs to stimulate coppicing (parts of 2 of the above sites totaling 4.0 ha);
- scarification and seeding (4 sites totaling 3.0 ha); and
- planting preferred browse species (4 sites totaling 1.5 ha).

Activities carried out over the 2005 funding year concentrated on documenting vegetation responses and elk use of treatment areas following enhancement. Specific monitoring objectives in 2005 were to:

- 1) estimate post-enhancement forage production at the four sites seeded between 2002 and 2004;
- 2) investigate post-enhancement winter use by elk at the four sites in the Thelwood Valley;
- 3) establish 2 "control" winter pellet group transects within the Thelwood study area; and
- 4) determine survival rates of winter browse plantings at the largest treatment area, which was enhanced in 2002.

It should be noted that this project has also assisted BC Parks in meeting its wildlife management objectives within the Strathcona Provincial Park Master Plan. In particular, the project as a whole has involved restoring impacted habitats, conducting management-oriented research and providing information to the public on a vulnerable (i.e. Provincially "Blue-listed") species.

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## **3.0 STUDY AREA**

### **3.1 Location**

All enhancement sites are within 80 km of the City of Campbell River. Four sites are located adjacent to Thelwood Creek, which drains into Buttle Lake (Figure 2) and nine are located in the Elk River Valley, which drains into Upper Campbell Lake (Figure 3). Both Buttle Lake and Upper Campbell Lake function as reservoirs for the BC Hydro's power generation facilities at the Strathcona and Ladore Dams.

### **3.2 Terrain and Climate**

The study area is situated in mountainous terrain within the Leeward Island Mountains Ecoregion. Valley-bottom elevations in the study area range from approximately 220 m to 330 m. Elevations between 200 m and 600 m on this part of Vancouver Island fall into the Moderate Snowpack Zone described by Nyberg and Janz (1990). Within this zone, accumulations are usually shallow but persistent. However, "critical" snowfall accumulations (i.e. those >45 cm deep and persisting for four weeks or more) occur every 5 to 15 years on average. Review of snowfall data from a reporting station on Highway 28 near Crest Lake (elev. 270 m) indicates snow accumulations greater than 45 cm occurred in 19 of 30 years between 1955 and 1985 (MoE Water Management Branch 1985).

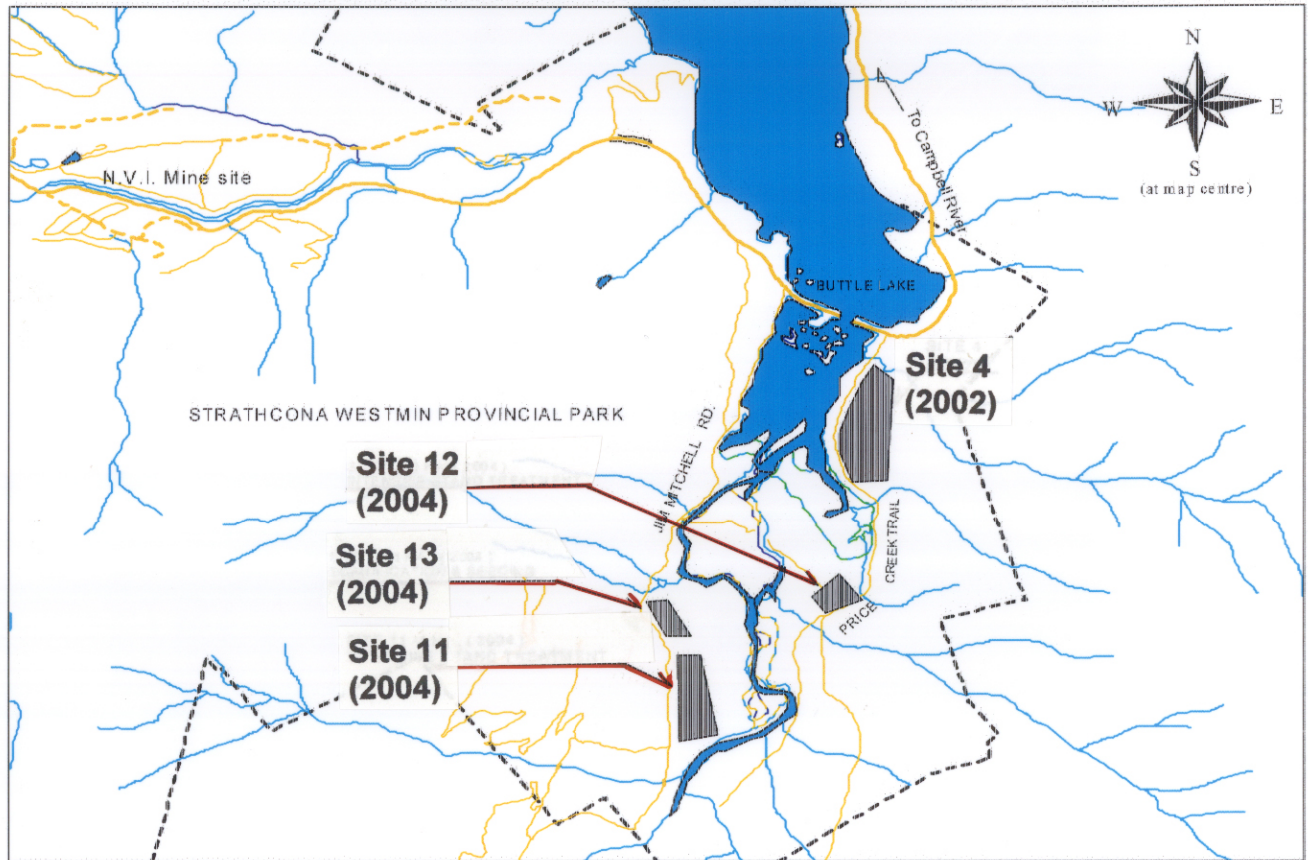
Two variants of the Coastal Western Hemlock (CWH) Biogeoclimatic Zone are present in valley bottoms within the study area. The Dry Maritime Variant, or CWHxm2, extends from the valley floor to about 300 m elevation (Figure 4). The Submontane Very Wet Maritime Variant, or CWHvm1, ranges from 300 m to 650 m elevation, and is moister than the CWHxm2 Variant (Green and Klinka 1994). As most elk winter range is in the CWHxm1, enhancement activities were focused within that Variant.

### **3.3 Treatment Area Overviews**

#### ***Thelwood Valley***

Stands enhanced within the Thelwood Valley are approximately 50 years old. They were initiated following a wildfire in 1958 which consumed about 2000 ha. Salvage logging operations were conducted in the burned areas in subsequent years (Blood 1988). The four treatment units within this valley included coniferous, deciduous and mixed forest types. Coniferous stands occur mainly on alluvial fans and are dominated by Douglas-fir (Figure 5). Deciduous stands occur on high-bench floodplains, and are nearly pure stands of red alder (Figure 6). They apparently supported old-growth western redcedar prior to 1958, the year the reservoir was created.

**Figure 2. Location of 2002-2004 Thelwood Valley enhancement sites.**



**Scale 1:32,000**

500 0 500 Meters

**Site Treatments**

**Site 4 - Intensive Stand-tending**

**Site 11 - Intensive Stand-tending**

**Site 12 - Intensive Stand-tending**

**Site 13 - Scarification & Native Grass Seeding**

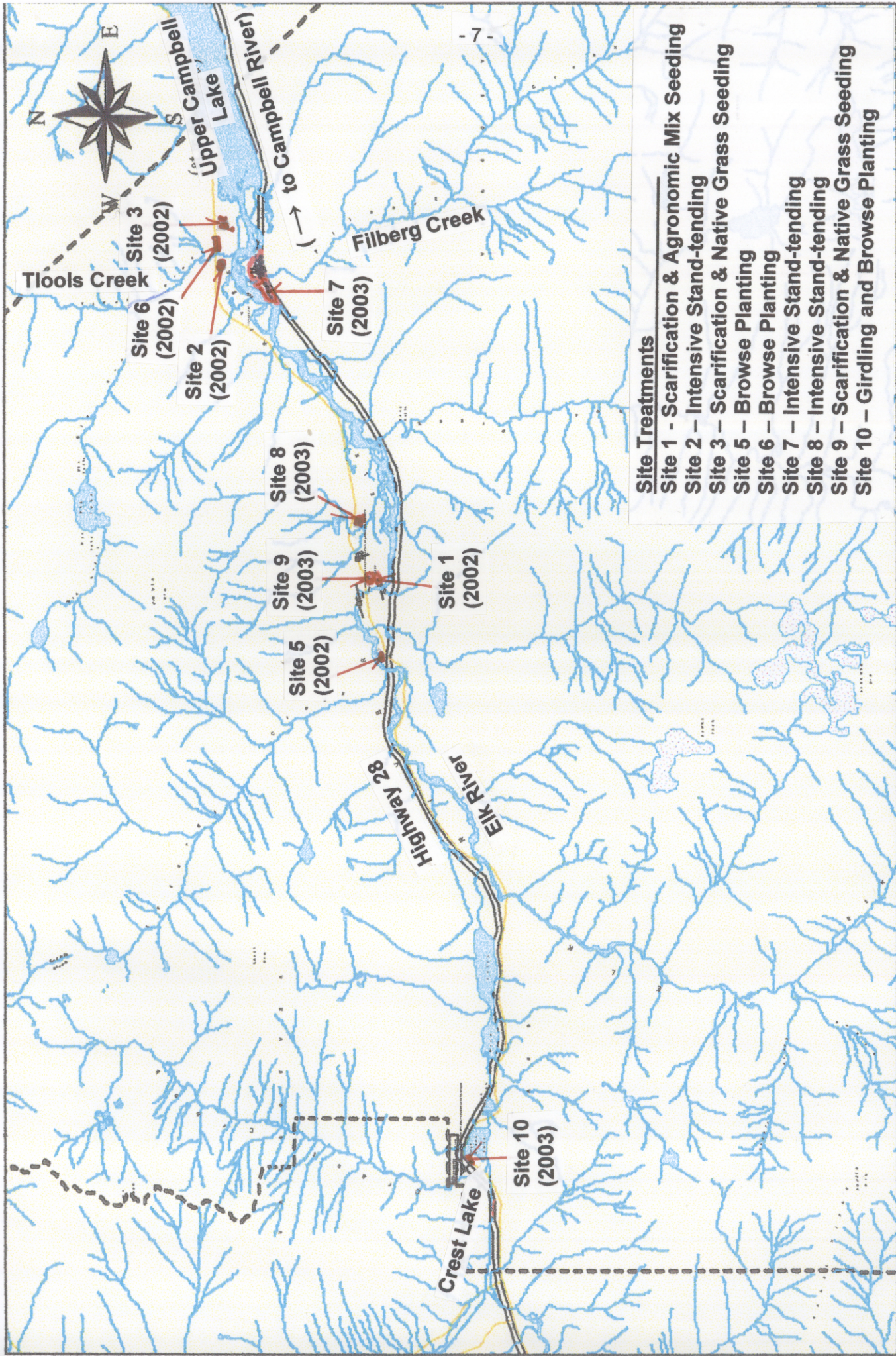
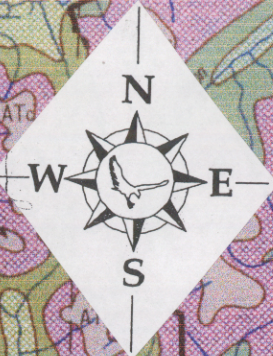


Figure 3. Location of 2002-2004 of Elk Valley enhancement sites.

Scale 1: 70,000

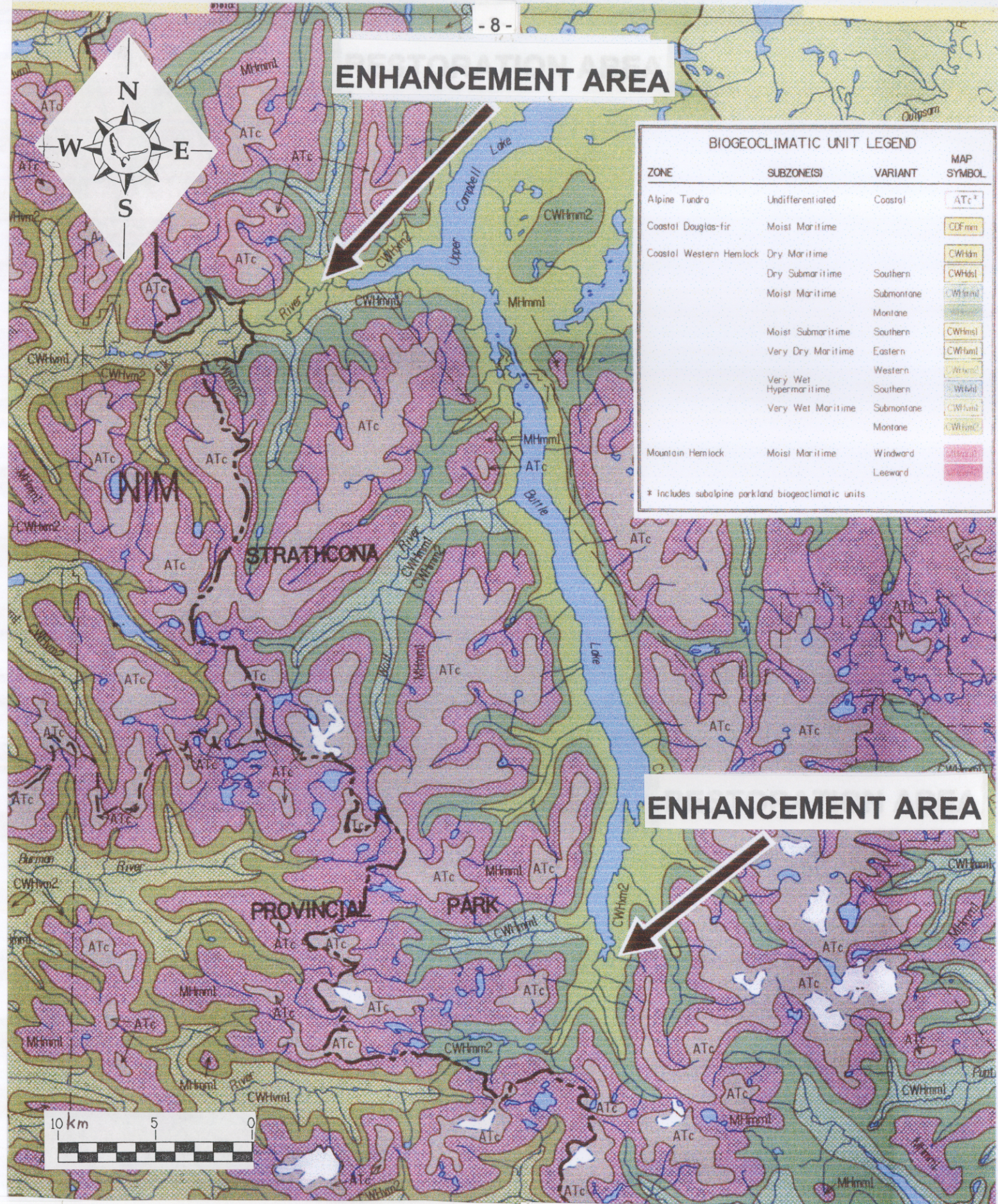
1 0 1 Kilometers

# ENHANCEMENT AREA



BIOGEOCLIMATIC UNIT LEGEND			
ZONE	SUBZONE(S)	VARIANT	MAP SYMBOL
Alpine Tundra	Undifferentiated	Coastal	ATc*
Coastal Douglas-fir	Moist Maritime		CDFmm
Coastal Western Hemlock	Dry Maritime		CWHdm
	Dry Submaritime	Southern	CWHds
	Moist Maritime	Submontane	CWHmm
		Montane	CWHsm
	Moist Submaritime	Southern	CWHms
	Very Dry Maritime	Eastern	CWHvm
		Western	Wvm
	Very Wet Hypermaritime	Southern	Wvm
	Very Wet Maritime	Submontane	CWHvm
Mountain Hemlock	Moist Maritime	Windward	MHwm
		Leeward	MHlm

\* Includes subalpine parkland biogeoclimatic units



# ENHANCEMENT AREA

Figure 4. Biogeoclimatic zonation in the study area.

Scale 1: 250,000

Fig. 4. Biogeoclimatic Zonation in the Study Area.



**Figure 5. Coniferous forest on alluvial fan in the Thelwood Valley prior to receiving thinning and pruning treatments.**



**Figure 6. Deciduous-dominated forest in the Thelwood Valley prior to scarification and seeding trial.**

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The dearth of coniferous regeneration in the Thelwood Valley's extensive alder flats has been attributed to the scarcity of potential seed sources (Blood 1988), particularly shade-tolerant cedar and hemlock trees. However, competitive exclusion by red alder seedlings also seems likely. Mixed coniferous-deciduous stands occur along streamside benches and alluvial fans (Figure 7).

Levels of human activity in the Thelwood Valley have been fairly low in recent decades. The Price Creek Trail, which follows the eastern side of the Thelwood Valley before gaining elevation, is generally not heavily traveled by hikers except for a brief period during summer. On the western side of the valley, a gravel road was constructed in the mid 1960's, providing access to a mining adit, the Jim Mitchell Lake Trailhead, and a small powerhouse operated by the Boliden-Westmin Resources mining operation.

### ***Elk River Valley***

Although the Elk River Valley is situated in the oldest Provincial Park in British Columbia (established in 1911), stands representing early and mid-sera1 stages of forest succession are common within it. The presence of old railroad grades through forests of the lower valley suggest stands here are perhaps 60 to 80 years old, as rail logging generally gave way to truck logging by the 1940's. As in the Thelwood, treatment units selected in the Elk River Valley support coniferous, deciduous and mixed forest types. Coniferous stands commonly occur along well-drained alluvial fans and side slopes. They are dominated by Douglas-fir, with a minor occurrence of western redcedar. Deciduous-dominated stands comprised of black cottonwood, willow and red alder trees occur along riparian areas and in disturbed areas. Mixed coniferous-deciduous stands are largely restricted to river bench forests with rich and deep soils. They generally contain more cedar and big leaf maple than neighbouring valley slope forests (Figure 8).

Levels of human activity in the lower Elk Valley had been quite high up to 2003, when the popular ERT Logging Road was decommissioned. A major BC Hydro transmission line was constructed through the Elk Valley to supply power to the community of Gold River in the 1960's, and related maintenance activities (e.g. helicopter flights, brush control) occur periodically in the area to this day. The road along the south side of the valley to Gold River was paved in the 1970's, with the attendant yearly increases in commercial and tourist traffic. Because campground facilities are limited within the lower Elk Valley, and the main access has been decommissioned, this part of the valley has seen relatively low levels of recreational use in recent years.



**Figure 7. Mixed forest in the Thelwood Valley prior to thinning, pruning and browse rejuvenation treatments.**



**Figure 8. Coniferous-deciduous mixed forest in the Elk Valley following scarification and seeding treatment.**

#### 4.0 MONITORING METHODS

Details of enhancement techniques used within each treatment unit have been previously described in BCRP Final Reports for the 2003 and 2004 funding years (i.e. Materi 2003; Materi 2004). These reports have been archived online at the BCRP Website ([www.bchydro.com/bcrp/](http://www.bchydro.com/bcrp/)).

The experimental nature of the treatments, and their potential value to forest and other land managers, justified a significant monitoring effort to document both vegetation responses to treatment and elk utilization of treatment areas. While the 2005 field program was more modest than in previous years, it continued the multi-faceted approach to monitoring, including the following activities:

- winter pellet group counts
- browse planting survival survey
- herbage production clipping study
- winter track counts

A summary of monitoring activities by site is given in Table 1, below.

**Table 1 - Site-specific monitoring activities during the 2005 funding year.**

Treatment Site Identification	Winter Pellet Group Counts	Browse Planting Survival Study	Herbage Production Clipping Study	Winter Track Counts
1	√		√	
2	√			
3	√		√	
4	√			√
5	√	√		
6				
7	√			
8	√			
9	√		√	
10	√			
11				√
12	√			√
13	√		√	

#### 4.1 Winter Pellet Group Counts

One of the primary methods for monitoring elk use of treatment areas is through annual winter pellet group counts. Such counts have been carried out in treatment areas each spring since 2002.

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The counts involve walking fixed-width transects ranging from 120 m to 400 m in length. This method is preferred over others using circular plot transects because of anticipated difficulties in relocating plot centres over time. The size of each treatment area was used as a general guide to the total length of winter pellet group count transects.

Where possible, the orientation of transect segments followed cardinal directions to aid in relocating **start/stop** and turning points. During the counts, all elk winter droppings observed within 1 m on either side of the transect centerline were recorded. The pellets were removed from transects to prevent double-counting in subsequent years. Replacement of flagging and stakes was routinely carried out during the counts, to help keep the transects visible for future counts. Metal spikes were added at transect **start/finish** points and turning points to facilitate relocation with a metal detector, if required. A count of deer pellets was also noted on each transect, to better understand habitat partitioning by the two ungulate species.

The counts were generally conducted as early as possible in the spring, to avoid green-up of the forest floor. However, some treatment areas with difficult access (e.g. Site #2) had to be visited in early June, due to high water conditions.

Permanent winter pellet group count transects were established at 12 of the 13 enhancement sites. Site #6, a browse planting area along the decommissioned ERT Logging Road, was excluded because it serves as major movement corridor along the lower Elk River Valley (biasing elk use estimates based on habitat enhancement activities alone). Late identification of treatment areas precluded gathering of pre-enhancement pellet group data at another site in the Elk River Valley (the seeding area at Site #9).

To better understand the background variation in pellet group counts, two "control" (or baseline) transects were established in the Thelwood Valley in the spring of 2005, in habitats similar to the areas seeded and spaced.

#### **4.2 Browse Planting Survival Survey**

A survival survey of browse plantings installed at Site 5, the largest browse planting area, has been carried out each spring since 2003. Similar surveys planned for Site 4 in the Thelwood Valley and Sites 6 and 10 in the Elk Valley were abandoned in 2004, after back-to-back summer droughts killed all but a handful of the plantings at these sites.

Over 300 shrubs were planted at Site 5 in 2002 including: big leaf maple, thimbleberry, Scouler's willow, Sitka willow, Saskatoon, black cotton-wood and red-flowering currant. The survey involved recording all planted shrubs with leaves or viable leaf buds and estimating their maximum height to the nearest decimeter (10 cm).

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### 4.3 Herbage Production Clipping Study

Clipping studies to estimate the annual production of herbage within the four sites scarified and seeded have been carried out each summer since 2002. At two of the four sites treated in this manner, scheduling allowed the estimation of baseline herbage production (i.e. prior to scarification). In 2002 through 2004, first year post-treatment production was estimated at all sites by selecting two sampling stations representing the highest and lowest production, and two others representing average production. These four locations became the permanent location of sampling in subsequent years.

At the end of the growing season, all palatable forage within four 1 m x 1 m quadrats was described as % cover, then clipped and placed in a paper bag. The proportion covered by individual plant species was estimated using comparison charts in Luttmerding et al. 1990. Back in the office, paper bags were transferred to an oven at 300 °C to dry the samples. The dry weight from each site's four quadrats was averaged, and this average was extrapolated to total area treated in order to estimate herbage production for a given site.

### 4.4 Winter Track Counts

Winter track counts within the four Thelwood Valley treatment sites were carried out over mid- and late-winter of 2005-2006 to assess:

1. the relative intensity of elk / deer use in specific locations over the course of the winter;
2. the presence / relative abundance of elk predators; and
3. the extent to which woody debris from spacing treatments restricted elk winter access to the sites.

The counts were generally undertaken within 3 or 4 days of a snowfall event, so that animals would have several days to move around the site. One count took place about 20 days after the last snowfall, during an extended period of sub-freezing temperatures in mid-winter. A track count planned for the early winter period had to be cancelled due to rapid melting. The counts involved tallying all large mammal tracks crossed while walking through a given treatment area. Tracks were identified as either adult or juvenile animals. A hip chain was used to determine the total distance traveled so results could be standardized as the number of tracks/km.

## 5.0 RESULTS AND DISCUSSION

### 5.1 Vegetation Monitoring

#### *Herbage Production Clipping Study*

Scarification and seeding trials, started in 2002, involved an agronomic mix that was seeded in the spring (Site 1 in 2002) and three seeded with native grass mixtures. One of the native-seeding areas was seeded in the spring (Site 3 in 2002) and two were seeded in the autumn (Sites 9 and 13, seeded in 2003 and 2004, respectively).

Cumulative results of clipping studies conducted in seeding areas from 2002 through 2005 are presented in Table 2. It should be noted that, due to spring seeding at Sites 1 and 3, collection of pre-enhancement data at these locations was not undertaken, as spring sampling would have grossly underestimated baseline forage production. Based on baseline information from fall-seeding areas, pre-enhancement herbage production at Sites 1 and 3 was expected to be in the vicinity of 900 – 1,100 kg/ha.

Site 1, the only site to use an agronomic seed mix, is situated in an area with relatively low soil nutrient levels and fairly rapid drainage. Table 2 indicates that forage production there peaked in the second growing season post-enhancement (2,440 kg/ha dry weight). This was due largely to the proliferation of one grass species, late perennial ryegrass. Its disappearance in the third growing season resulted in large decline in production, down to 1,030 kglha. In 2005, a modest rebound in production occurred at Site 1, up to 1,430 kg/ha. The latest increase was attributable mainly to the expanded coverage by clovers (red clover and alsike clover) in the agronomic mix, although seeded fescues are also increasing their coverage, albeit more slowly.

At the oldest native grass seeding trial location, Site 3, average production has increased each year. In 2005, forage production had increased to 3,300 kglha, an approximate three-fold increase over 2002 (940 kglha dry weight). In the first two growing seasons, production increases at Site 3 were largely the result of the expansion of seeded grasses. However, in recent years, forage production has been augmented through the re-colonization of forbs and shrubs, particularly Canada thistle and thimbleberry. Both of these plants are consumed by elk, but only thimbleberry would be available for elk in fall and winter. Since the Site 3 trial started in 2002, estimated carrying capacity for elk has increased there from approximately 150 elk-days of use to over 500. It would currently support about 25 days use by a wintering herd of 20 animals.

Table 2. Estimated elk forage production and carrying capacity at seeded enhancement sites: 2002 - 2005.

Enhancement Area	Pre-enhancement	1 <sup>st</sup> Year Post-enhancement	2 <sup>nd</sup> Year Post-enhancement	3 <sup>rd</sup> Year Post-enhancement	4 <sup>th</sup> Year Post-enhancement
<b>Site 1 - Hydro R-o-W (agronomic mix – spring seeding)</b>					
Average Production (kg/ha) (± 90 % Conf. Interval)	no data	690 (± 70)	2,440 (± 170)	1,030 (± 120)	1,430 (± 800)
Estimated Forage Available (kg)	no data	353	1294	519	815
Site Carrying Capacity (Elk-days of use)	no data	60	219	88	138
<b>Site 3 - Tiols Cr. East (native mix – spring seeding)</b>					
Average Production (kg/ha) (± 90 % Conf. Interval)	no data	940 (± 550)	2,270 (± 760)	2,450 (± 800)	3,300 (± 1,180)
Estimated Forage Available (kg)	no data	865	2088	2254	3036
Site Carrying Capacity (Elk-days of use)	no data	147	354	382	515
<b>Site 9 – Abandoned ERT Camp (native mix – fall seeding)</b>					
Average Production (kg/ha) (± 90 % Conf. Interval)	1,100 (± 130)	1,200 (± 950)	2,960 (± 1,510)	--	--
Estimated Forage Available (kg)	825	900	2,220	--	--
Site Carrying Capacity (Elk-days of use)	140	153	376	--	--
<b>Site 13 – Jim Mitchell Lake Rd North (native mix – fall seeding)</b>					
Average Production (kg/ha) (± 90 % Conf. Interval)	880 (± 670)	1,940 (± 770)	--	--	--
Estimated Forage Available (kg)	528	1164	--	--	--
Estimated Carrying Capacity (Elk-days of use)	89	197	--	--	--

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The large increase in forage production recorded at Site 9 in 2005 (1,700 kglha) was somewhat surprising, given the relatively poor quality of soils there. The second year post-enhancement production was considerably higher at this autumn-seeded site than the spring-seeded site in the same valley (2,960 kg/ka vs. 2,270 kglha at Site 3). Site inspections suggest that more plants are able to develop seed heads in their first growing season with autumn seeding, probably as a result of earlier germination and abundant moisture.

Site 13 possesses rich and relatively moist soils similar to Site 3, but unlike the latter, was seeded in the fall. At 1,940 kglha, this site recorded the highest first year post-enhancement production of the four trial sites, about 700 kglha more than Site 9 and 1000 kglha more than Site 3.

In addition to forage production, Table 2 also includes an estimate of the number of elk-days of use each site could have supported, if all available forage was consumed by elk. A site's carrying capacity was determined by averaging the dry-weight production at each 1 m<sup>2</sup> clipping station in a given site, then multiplying it the area of that site (again, in m<sup>2</sup>). Estimating elk-days of use from the clipping data made use of a formula derived by Beck and Peek (2000) for estimating the carrying capacity of elk on summer ranges in Nevada. The anticipated duration of elk on local winter ranges is essentially the same as that used by these researchers for summer ranges. Continuous occupation of ranges from October through May is equates to 210 days. The formula used was as follows:

Elk Carrying Capacity (K) = Available Forage (kg)/0.025 DMI x 236 kg x 210 days

Where: DMI= 2.5 % Dry Matter Intake  
(the percentage of body weight consumed daily);

236 kg = average weight of a cow elk; and  
210 days = length of time on winter range (Oct. - May)

Using the above assumptions, a single elk-day of use is equivalent to approximately 5.9 kg dry weight of forage. This value compares favourably to published daily winter intake rates of another large ungulate, the moose. Persson et al. (2000) reported average daily dry-weight winter intake rates for moose as ranging between 4.2 kg and 5.5 kg.

Looking at Table 2 from the perspective of elk carrying capacity, it can be seen that the estimated carrying capacity with the agronomic mix (Site 1) increased over four growing seasons from 60 elk-days (2002) to 138 (2005). The carrying capacity at a site in the same valley using native seed (Site 3) was raised from 147 elk-days to 515 over the same period. Pre-enhancement data suggests the baseline carrying capacity of Site 9 was in the vicinity of 140 elk-days. Two growing seasons after enhancement, the carrying capacity of Site 9

was increased by a factor of approximately 2.5 (376 elk-days). Site 13 demonstrates that fall seeding on rich floodplain soils can result in a two-fold increase over the baseline carrying capacity after a single growing season.

### ***Browse Planting Survival Survey***

Over 300 native shrubs were installed in 2002 to enhance browse abundance and diversity at Site 5, an abandoned gravel pit near Highway 28. With the exception of a few draught-affected willows, virtually all the browse plantings at this site survived the first winter (survival rate of 95 % in Table 3 below). By the spring of 2003, it was apparent that most of the plantings were rooted well enough to resist being pulled out by browsing elk. As a result, protective fencing was removed that summer. An extended period of drought in the summer of 2003 resulted in considerable mortality of the shrub plantings. As indicated in Table 3, the overall survival rate dropped to just 50 % when inspected in the spring of 2004. Roughly half of the cottonwood, willow and maple plantings succumbed to the prolonged dry conditions of the previous year. However, despite the challenging growing conditions of 2002 and 2003, virtually all Saskatoon shrub plantings appeared to be in good vigour. Red-flowering currant was expected to do well at Site 5, but few survived into the second year. With the browse fencing down, numerous plantings showed evidence of winter use by elk, and the 2004 winter pellet group count was 180 % higher than the pre-restoration count.

Results from the spring 2005 browse planting survival survey at Site #5 indicate that most of the shrubs which survived through two successive droughts in 2003 and 2004 persisted into 2005. In fact, the moist conditions that prevailed over the spring of 2005 rejuvenated some maple browse plantings that had previously been recorded as dead in 2004. As a result, the overall survival rate is marginally higher than that recorded the previous year (55 % vs. 50 % in 2004). The vigour of individual browse plantings ranged from good to poor, with most in the latter category. Interestingly, large diameter willow and cottonwood cuttings installed in 2004 for riparian restoration, under a different BCRP Project next to the site, grew more vigorously than the potted stock this project installed in 2002.

Inspections of browse plantings in other areas showed much lower rates of success. Despite their installation in relatively moist soils, none of the nearly 700 Sitka willow cuttings installed at Site #10 were still alive in the spring of 2005. At Site #4, only a dozen or so of the 100 potted shrubs planted in 2002 were still viable. Several of the clustered browse plantings along a decommissioned part of the ERT Logging Road (i.e. Site #6) were still present, however, many of the plantings were in very poor condition due to repeated heavy browsing and difficult growing conditions (i.e. stony soils).

**Table 3. Results of spring 2005 browse planting survival survey at Site #5.**

<b>Browse Species</b>	<b># Planted in 2002</b>	<b>1st Year Survival (%)</b>	<b>2nd Year Survival (%)</b>	<b>3<sup>rd</sup> Year Survival (%)</b>
Cottonwood	103	98	48	44
Willow species	123	89	54	52
Big Leaf Maple	69	98	62	75
Saskatoon	11	100	100	100
Thimbleberry	4	100	25	25
Currant	11	100	9	9
<b>Overall</b>	<b>321 plants</b>	<b>95 %</b>	<b>50 %</b>	<b>55 %</b>

## **5.2 Elk Utilization Monitoring**

### **Winter Pellet Group Counts**

Winter pellet group counts provide a straightforward means of monitoring elk responses to the habitat enhancement techniques trialed in this project. Results of the spring 2005 pellet group counts (Table 4) indicate that wintering elk were present in all of the treatment zones. However, intensity of use varied considerably, from a low of 14 pellet groups/km at Site 7 to a high of 129 pellet groups/km at Site 1.

Focusing on enhancement sites with previous count information (10 sites), Table 4 shows that three counts were higher than the previous year, five were lower, and two were essentially the same. The pellet group count at the only agronomic seeding area, Site #1, was moderately higher in 2005 vs. 2004. This result was unexpected because herbage production had declined precipitously there in 2004 when a short-lived grass species in the seeding mix died back (see Table 2, 3<sup>rd</sup> Year Post-enhancement). It seems likely that enhancement at adjacent Site 9 and nearby transmission line clearing attracted additional elk use, extending their stay in the vicinity of Site 1.

The spring 2005 pellet group count results from Site #3, the oldest native grass seeding trial, are interesting because they suggest declining elk use in an area where herbage production has increased for three consecutive years (Table 2). It is possible that mild conditions over the preceding winter allowed elk to forage more widely than in the winter of 2003-2004. However, no pattern of decreased use was discernable in treatment among units considered more sensitive to snowfall accumulation (i.e. Site 10 in the Elk Valley; Sites 11 and 12 in the Thelwood Valley).

**Table 4. Summary of winter pellet group counts: 2002 - 2005.  
(Spring 2005 results shown in bold font)**

	Site	Pre-enhancement (pellet groups/km)	1 <sup>st</sup> Winter Post-enhancement (pellet groups/km)	2nd Winter Post-enhancement (pellet groups/ km)	3 <sup>rd</sup> Winter Post-enhancement (pellet groups/ km)
1	Scarification & Seeding	100	191	106	<b>129</b>
2	Stand-tending	26	60	91	<b>46</b>
3	Scarification & Seeding	51	48	97	<b>29</b>
4	Stand-tending	25	30	43	<b>45</b>
5	Browse Planting	33	no data	93	<b>42</b>
7	Stand-tending	20	9	<b>14</b>	--
8	Stand-tending	23	37	<b>23</b>	--
9	Scarification & Seeding	no data	<b>75</b>	--	--
10	Browse planting	105	<b>85</b>	--	--
11	Stand-tending	25	<b>24</b>	--	--
12	Stand-tending	26	<b>73</b>	--	--
13	Scarification & Seeding	40	--	--	--
A	Control transect for Stand-tending	<b>10</b>	--	--	--
B	Control transect for Seeding	<b>7</b>	--	--	--

**Notes:**

No data for 1<sup>st</sup> Winter Post-enhancement at Site #5 due to browse protection fencing

No Pre-enhancement data for Site #9 as location was finalized in mid-summer.

Site 6 excluded from pellet counts due to use as an elk movement corridor.

Interestingly, despite the failure of virtually all browse cuttings installed at Site 10 in 2004, it continued to show very high levels of elk winter use there in 2005. This may reflect enhanced production of existing (i.e. non-planted) browse plants following girdling of alder trees at the site, which had previously formed a dense canopy.

It may be useful to separate the winter pellet group (wpg) count data, somewhat arbitrarily, into the following categories of use:

Low Use = 1 - 25 wpglkm  
Moderate Use = 26 - 50 wpglkm  
High Use = 51 - 75 wpglkm  
Very High Use = > 76 wpglkm

Applying this scheme to the five oldest treatment units, all enhanced in 2002, it is evident that elk winter use fluctuates considerably from year to year. The factors contributing to this variability are not understood at this time, but both climatic and behavioural factors may be at play. Site 1 is somewhat of an exception, in that elk winter use has been consistently very high, from pre-treatment times to 2005. Elk use at Site 2 was low-to-moderate before stand-tending, became high for the two following winters, then dropped to moderate levels. Site 3 showed moderate-to-high levels of use prior to seeding and maintained that same level over the first winter post-seeding. Use of Site 3 then increased to very high levels in the second winter before dropping to moderate levels in 2005. Elk winter use of Site 4 has gradually increased from low to moderate levels of use, while Site 5 has shown the wide fluctuations evident at Sites 2 and 3.

Considering the limited data set, and wide fluctuations shown among annual winter pellet group counts, caution should be exercised in drawing conclusions regarding the success of trials on this basis alone. Reliance on a single count obviously does not reflect elk use under the full range of winter conditions. This may make interpretation of data from the Elk Valley especially problematic, since there is evidence to suggest that almost twice as many animals are concentrated on traditional winter ranges under moderately severe winters than during mild ones. Differential weathering of winter droppings further complicates interpretation of baseline conditions. To address these issues, a number of "control" transects were established in untreated areas of the Thelwood Valley in 2005, where elk inventory results have been more consistent. To help reduce variability, it is recommended that any future pellet group counts be restricted to the Thelwood Valley, where there appears to be a single migratory herd using a relatively compact and well-defined winter range.

Table 5 extrapolates pellet group data from transects to entire enhancement areas, and provides a first approximation of actual winter use in terms of elk-days. When combined with estimates from Table 2, the relationship between forage availability and elk use can be investigated. Assumptions required to derive estimates of actual elk use include the following:

- 1) transect lines were randomly selected;
- 2) defecation rates of elk are relatively constant; and
- 3) pellet groups are distributed evenly across individual habitat types.

**Table 5. Estimated elk-days of winter use based on pellet count data. (2005 derivations in bold font)**

Site ID	Estimated Elk-Days of Winter Use from wpg Estimated Carrying Capacity from Herbage Quadrats			
	Pre-enhancement	1 <sup>st</sup> Winter Post-enhancement	2nd Winter Post-enhancement	3rd Winter Post-enhancement
1	24-30	46-57	25-32	31-39
<b>1</b>	--	<b>60</b>	<b>219</b>	<b>88</b>
2	42-52	96-120	146-182	<b>74-92</b>
3	20-26	19-24	39-49	<b>12-15</b>
<b>3</b>	--	<b>147</b>	<b>354</b>	<b>382</b>
4	60-75	72-90	103-129	<b>108-135</b>
5	10-12	0 (fenced)	28-35	<b>13-16</b>
7	32-40	14-18	<b>22-28</b>	--
8	58-73	93-117	<b>58-72</b>	--
9	--	<b>21-26</b>	--	--
<b>9</b>	--	<b>153</b>	--	--
10	21-26	<b>17-21</b>	--	--
11	40-50	<b>38-48</b>	--	--
12	25-31	<b>70-88</b>	--	--
13	10-12	--	--	--
<b>13</b>	<b>89</b>	--	--	--

**Notes:**

<sup>1</sup>Upper limit based on elk defecation rate published in Neff (1968).

Based on pellet group count data, Elk Valley treatment areas are estimated to have supported between 248 and 312 elk-days of use over the winter of 2005 (Table 5). This equates to approximately 10 to 12 days for a resident group of 25 individuals. Taken together, Sites 2 and 8 accounted for over 50 % of the winter use within treatment sites of the Elk Valley in 2005. Thelwood Valley treatment areas are estimated to have supported between 216 and 271 elk-days over the same period. This is equivalent to maintaining the wintering herd of 23 animals there for approximately 9 to 12 days. Site 4 accounted for 50 % of the winter use within the Thelwood Valley in 2005.

Comparing estimates of elk winter use in seeded areas (i.e. Sites 1, 3, 9 and 13) to the calculated carrying capacity of these sites (Table 5) suggests elk rarely consume all the forage produced in a given year. An exception is seen on Table 5 for Site 1 during the first winter post-enhancement, when virtually all that season's production was consumed. Though not reflected in Table 5, a similar situation occurred at Site 3, again in the first year post-enhancement. It is possible that first year grasses are more palatable to elk or more digestible, or both. Other plausible explanations include elk avoidance of areas heavily grazed the previous year or weather-related effects such as snow crusting over.

### **Winter Track Counts**

As snowfall accumulations were highly ephemeral over the early part of the winter of 2005-06, track counts were only conducted over the mid- and late-winter period, between January and March, 2006. The Thelwood Valley was favoured over the Elk Valley for this activity because:

- 1) all sites, representing the major types of treatment, could be searched in a single outing;
- 2) the valley's north-south orientation was expected to result in snowfall on a more frequent basis than the Elk Valley; and
- 3) aerial surveys from 2002 – 2004 produced more consistent estimations of herd strength than in the larger Elk Valley.

Track counts sampled two major snowfall events in the Thelwood Valley in early 2006. The first took place on January 29<sup>th</sup>, providing accumulations of approximately 20 - 25 cm. The second took place on March 9<sup>th</sup>, and was heavier, resulting in accumulations of 30 - 40 cm. Daily freeze-thaw cycles following the second event resulted in a heavy crust on the snow during the track count.

The results, summarized in Table 6 below, show at least some elk activity in all of the Thelwood treatment units this winter. Activity was recorded in all four treatment units in mid-winter, but only one unit in late winter, when crusty snow would have made elk movements more energetically expensive.

Mid-winter elk use was most concentrated within the cleared Site 13 (83.0 tracks/km), where three beds were also noted. The absence of any calf tracks at this site suggests all mid-winter activity here was attributable to the three bulls seen in the area in recent years. Site 12, a stand-tending treatment unit on the opposite side of the Thelwood Valley, also recorded a very high intensity of elk use at this time of the year (54.0 tracks/km). Several smaller elk tracks were recorded within Site 12, suggesting use by a group of cows with young. Mid-winter elk use at the two conifer-dominated stand-tending units, Sites 4 and 11, was low (2.7 and 3.0 tracks/km, respectively). A small cow-calf group (3 – 6 individuals) was heard in the forest between Sites 4 and 12 during the mid-winter track count.

Mid-winter use by deer was highest at Site 12 (52.0 tracks/km) and moderately high at Site 13 as well (33.0 tracks/km). Considerably more deer than elk use was recorded at Site 11 in mid-winter (15.0 vs. 3.0 tracks/km), and one deer was encountered at the north end of this treatment unit. A single deer track was recorded in Site 4 in mid-winter. It should be noted that no tracks of ungulate predators were detected within any of the sites in mid-winter.

**Table 6. Summary of mid- and late-winter track counts in the Thelwood Valley: January to March, 2006.**

Site ID	Treatment	Roosevelt Elk tracks/km		Black-tailed Deer tracks/km	
		Mid-Winter	Late-Winter	Mid-Winter	Late-Winter
4	Intensive stand-tending within existing canopy gaps	2.7	31.8	0.9	0.0
11	Intensive stand-tending with blanket treatment (coniferous forest)	3.0	0.0	15.0	6.0
12	Intensive stand-tending with blanket treatment (mixed forest)	54.0	0.0	52.0	0.0
13	Clearing, scarification & seeding (native grass seed mix)	83.0	0.0	33.0	11.1

Late-winter elk occurrence in 2006 was restricted to a single treatment unit in the Thelwood Valley, Site 4. The intensity of use was lower than that recorded for either Sites 12 or 13 in mid-winter, but was still relatively high (31.8 trackslkm). Interestingly, no calf tracks were observed in late-winter there. Deer tracks were recorded during the same period in two different treatment units, Sites 11 and 13. Levels of deer use were fairly low in both locations (6.0 and 11.1 trackslkm, respectively). With crusty snow conditions hampering ungulate movement, it was interesting that both wolf and cougar tracks were recorded in the area during the late-winter period. Wolf tracks were observed at Sites 4, 11, and 12, while cougar tracks were only seen within Site 4.

The infrequent occurrence of snowfall in previous years precluded collecting a large pool of track count data for comparison. However, a significant cover of snow persisted for in the Thelwood Valley over January and February of 2004. Mid-winter track counts in that year indicated moderate-to-high levels of elk use at Site 4 (53.0 trackslkm in late January; 22.5 /km in early February). A cow-calf group of 8 individuals was reported in Site 4 by BC Parks personnel in mid-January of that year, and 15 individuals were observed there during the early March 2004 aerial survey. The results from March of 2006 indicate elk continue to frequent Site 4 in late winter, three years after it was enhanced.

The track count data collected thus far suggests woody debris does not restrict elk winter access where intensive stand-tending was centred on existing canopy gaps, as at Site 4. Though significant debris piles can result from heavy spacing and pruning treatments in such areas, elk appear to find efficient routes between spacing work zones fairly quickly. Track and winter pellet count data from Site 12 suggest debris generated from "blanket" spacing treatments (i.e. those not centred on existing canopy gaps) in mixed coniferous-deciduous stands is not restrictive either. However, we have yet to observe much elk winter use in conifer-dominated stands subjected to "blanket" spacing treatments, even though snow depths are generally lower there than in the mixed stands that have been spaced. It is possible that the dearth of elk sign in coniferous stands is more strongly related to the low browse values than the amount or arrangement of spacing debris. More study is recommended to determine if blanket spacing restricts elk winter access.

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## 6.0 CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Summary of Conclusions

1. Both agronomic and native seed mixes rapidly boost elk forage production over baseline levels, from 900 to 1,100 kglha (dry weight) pre-enhancement to 2,300 to 3,000 kglha in the 2nd year post-enhancement.
2. Forage production in areas using native grass seed mixes was higher than the area using an agronomic seed mix after four growing seasons (3,300 kglha for the former vs. 1,430 kglha for the latter).
3. Early results of native grass seeding trials suggest forage production is considerably higher when seeded in autumn rather than in spring.
4. Post-treatment monitoring has documented only limited success in attempting to establish or increase browse abundance/diversity through plantings. Third year post-enhancement survival rates of 55 % were recorded where mixed potted stock was installed to increase elk browse in Site 5, the most successful of the browse planting treatment areas.
5. The highest third year survival rates in Site 5 were recorded among Saskatoon and big leaf maple browse plantings (100 % and 75 %, respectively).
6. Winter pellet group counts documented some elk use in all treatment units. However, counts showed that the intensity of elk use in treatment units often vary widely from one year to the next. The most variable treatment unit (Site 1) recorded annual counts of 100 to 191 pellet groups/km while the least variable unit (Site 4) ranged from 25 to 45 pellet groups/km annually.
7. Winter track counts revealed that the intensity of elk use within treatment units may vary widely over the course of a given winter, in response to snow conditions, predator occurrence, and other factors.
8. Based on tracking observations, woody debris from spacing treatments does not appear to impede elk winter access within mixed forest stands and coniferous stands enhanced around existing canopy gaps. It may be an issue in coniferous stands receiving "blanket" spacing treatments (i.e. those not making use of existing canopy gaps).
9. Tracks of wolves and cougars were observed infrequently in the Thelwood Valley over the winter of 2005-2006, and no kill-sites were seen, suggesting elk predators occur at relatively low densities there.

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## **6.2 Recommendations for the Near Term**

1. In order to adequately document differences in production between spring- and autumn-seeded trials, clipping studies should continue to be carried out in late summer for next three growing seasons.
2. To better understand variability in elk use of treatment areas, winter pellet group counts and winter track counts should continue to be carried out on annual basis for the next three years. However, such work should be confined to the Thelwood Valley herd, where there is a single migratory herd using a relatively compact and well-defined winter range.
3. An aerial census of elk should be conducted in the Thelwood Valley in late February or early March of 2008, to update information on herd size/composition and cow/calf ratios.
4. To facilitate long-term monitoring, BC Parks should make use of existing IPAC and GPS technology to prepare detailed site maps of all existing treatment areas, and the sampling locations within them.
5. Given the poor field performance of the IPAC device in wet weather to date, GPS mapping work should be completed during the summer months.

## **6.3 Recommendations for the Medium-to-Long Term**

1. Provided monitoring data continue to document elk use of treatment areas seeding and spacing/pruning areas, additional enhancement sites should be identified in the Elk Valley, with a view to achieving the Province's long-term goal of 80 ha of enhanced habitats in this valley (Jones 1983).
2. Re-establishment of an elk herd in the Thelwood Valley was the goal Provincial wildlife officials in the early 1980's. With the natural re-colonization of this valley, the current focus should be optimizing habitat for the long-term maintenance of the herd. Blood (1988) estimated the Thelwood Valley could support up to 39-76 wintering elk. To approach this number, additional enhancement sites covering perhaps another 50 ha would need to be identified on floodplains and alluvial fans in the Thelwood Valley.
3. With a relatively confined valley and sizeable wintering elk herd, opportunities to develop interpretation facilities (e.g. trails and viewing platforms) should be explored in the Thelwood Valley.

4. Aerial surveys have noted occasional winter elk presence in the Wolf River Valley, which is tributary to the Buttle Lake Reservoir and within the Strathcona Provincial Park boundary. In 1965, this valley supported 15-20 elk (Jones 1983), suggesting habitats there have declined over time and may benefit from techniques developed during the current study. A study should be conducted into the feasibility of conducting elk habitat enhancement in the Wolf River Valley.
  
5. Some cover enhancement techniques have been investigated during the recent work, but the main focus has been improving forage production. Initiation of a longer-term study investigating stand treatments to enhance snow interception cover should be incorporated into future habitat enhancement plans in the study area.

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## **7.0 ACKNOWLEDGEMENTS**

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**APPENDIX I. FINANCIAL STATEMENT**

**BCRP Project #05.W.Ca.01  
Strathcona Elk Range Enhancement Monitoring**

**Summary of Project Expenditures - 2005 Budgeted vs. Actual  
(excluding GST)**

<b>Item</b>	<b>Approved 2005 BCRP Budget</b>	<b>Actual Project Costs</b>	<b>Budget Surplus</b>
<b><u>Labour</u></b>			
Contract Biologist	11,200.00	<b>11,200.00</b>	0.00
<b><u>Expenses</u></b>			
Contract Biologist - Vehicle Charge-out	1,200.00	<b>1,200.00</b>	0.00
Expendable Field Supplies	200.00	<b>124.12</b>	75.88
Meals & Accommodation	400.00	<b>209.40</b>	190.60
Interpretive Signage (1 sign)	1,125.00	<b>1,125.00</b>	0.00
<b><u>Administration</u></b>			
Contract Admin	<u>2,000.00</u>	<b><u>2,000.00</u></b>	<u>0.00</u>
<b>Total BCRP Portion</b>	<b>\$ 16,125.00</b>	<b>\$ 15,858.52</b>	<b>\$ 266.48</b>

## APPENDIX II. PERFORMANCE MEASURES – ACTUAL OUTCOMES

### Project type

Maintenance or restoration of habitat forming process.  
- other upland habitat enhancement for wildlife.

### Primary habitat benefit targeted by project

Improve functional area of habitat.

### Primary Target Species

Roosevelt elk (*Cervus elaphus roosevelti*)

### Targeted Outcomes

To Improve **10,000** m<sup>2</sup> of Lowland Deciduous habitat.  
To improve **70,000** m<sup>2</sup> of Lowland Coniferous habitat.

### Actual Outcomes

Improved **6,000** m<sup>2</sup> of Lowland Deciduous habitat.  
Improved **64,000** m<sup>2</sup> of Lowland Coniferous habitat.

### APPENDIX III. CONFIRMATION OF BCRP RECOGNITION

BCRP support for the Strathcona Elk Range Enhancement Monitoring Project was acknowledged in the following ways over the **2005** Funding Year:

#### September, 2005

Field tour announcement appearing in the September issue of the Campbell River Fish & Game **Association** acknowledged BCRP funding of elk habitat enhancement work. Unfortunately, the tour had to be cancelled as no CFFGA members showed up for the October **15<sup>th</sup>** tour (**e-mail** correspondence attached).

#### January, 2006

Article in the Campbell River **Mirror** acknowledges the support of BCRP in elk habitat enhancement (article attached).

#### March, 2006

One interpretive sign to be installed in an existing kiosk at the Elk River Viewing Area within Strathcona Provincial Park recognized the key role of BCRP in providing sole funding for the elk habitat enhancement project (pdf version of sign attached).

**Main Identity**

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**From:** "Joe Materi" <ursus01@telus.net>  
**To:** "Renouf, Shane" <Shane.Renouf@cascadiafp.com>  
**Sent:** Thursday, September 08, 2005 8:17 AM  
**Subject:** Fw: CR Fish & Game Association

----- Original Message -----

**From:** [Joe Materi](#)  
**To:** [Renouf, Shane](#)  
**Sent:** Thursday, September 08, 2005 9:14 AM  
**Subject:** Re: CR Fish & Game Association

Hi Shane,

Thanks for getting back to me...Here's a blurb you can pass on to your newsletter editor:

Biologist Joe Materi of Ursus Environmental will be running a field tour of BC Hydro-funded elk winter range enhancement on Saturday, October 15th, 2005. Enhancements were carried out between 2002 and 2004 in Strathcona Provincial Park, and the project is now in the monitoring phase. The group will depart from the Campbellton Esso/McDonald's at 9:30 AM heading for the first of several treatment sites. Expected return time is 4:30 PM. Coffee and treats provided. Please bring warm clothing and a lunch. For more info contact Joe at 250-753-0097 or [ursusnanaimo@telus.net](mailto:ursusnanaimo@telus.net).<sup>16</sup>

----- Original Message -----

**From:** [Renouf, Shane](#)  
**To:** [Joe Materi](#)  
**Sent:** Thursday, September 08, 2005 8:53 AM  
**Subject:** RE: CR Fish & Game Association

Hi Joe,

I do not anticipate any problem giving the letter of support, but I have to review it with our executive at our meeting next Tuesday. I will send the letter soon after.

Thanks for the offer of the tour. I will post it in our newsletter if you can give me some details of time and place.

Shane

---

**From:** Joe Materi [<mailto:ursus01@telus.net>]  
**Sent:** Thursday, September 08, 2005 8:50 AM  
**To:** Renouf, Shane  
**Subject:** CR Fish & Game Association

Hi Shane,

I'm following up on my request for a letter of support from the Fish & Game Association for my proposed wildlife overpass study on the Salmon River Diversion. Just a reminder that the deadline for funding applications is approaching.

Also, I'm wondering if any of your members would be interested in attending a tour of my elk winter range enhancement project in Strathcona Park this fall. It would be a full day outing covering different treatment types, so I would probably need to pick a weekend date in October. Feel free to call me at 250-753-0097 to discuss.  
 Many thanks.

3/17/2006

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### Elk enhancement showing results

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A pilot project to improve habitat for Roosevelt elk residing in Strathcona Provincial Park recently reached a milestone, advancing from the site treatment to the monitoring phase.



The project, funded under BC Hydro's Bridge Coastal Fish and Wildlife Restoration Program since 2000, involved field trials of techniques to boost food production for elk in the Elk River and Thelwood Creek watersheds. Treatments were aimed at increasing the amount and variety of elk winter and spring food plants because elk are often in poor condition in these seasons. In addition, the social nature of elk sometimes results in groups of 20 to 30 animals being confined to small areas for weeks at a time following a big snowfall in winter or early spring.

**n Results:** Biologist Don Blood (above) monitors elk food production in a small meadow created by clearing and seeding with a coastal native grass seed mix. Roosevelt elk herds (below) are expected to benefit from a recently completed winter range enhancement project in Strathcona Provincial Park.

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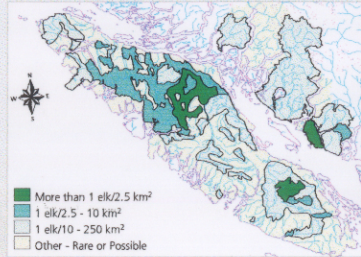
# Roosevelt Elk Habitat Restoration in Strathcona Park



Roosevelt elk bulls  
photo: Ursus Environmental

## Roosevelt Elk

In Canada, the Roosevelt elk subspecies inhabits only Vancouver Island and the Sunshine Coast, where it numbers less than 4,000 animals. It is also found west of the Cascade mountains to northern California. Elk are the largest land mammals on Vancouver Island, with males (or bulls) weighing up to 400 kg. They graze herbage and browse the tips of shrubs and trees. Females (or cows) can live up to 20 years, whereas bulls rarely survive more than 10 years in the wild.



Roosevelt elk population density in British Columbia  
source: B.C. Ministry of Water, Land and Air Protection



Elk River Valley  
photo: Ursus Environmental

## The Elk River Valley

With its extensive floodplain forests, scattered wetlands and east-west orientation, the Elk River Valley is well suited to support Roosevelt elk. Recent aerial surveys indicate a herd of 50 to 60 elk over-winter within this valley and neighbouring tributary valleys. Though group composition changes from time to time, the Elk River herd appears to be structured around two dominant mature bulls and their respective "harems" of cows and calves, each numbering from 20 to 25 animals. There is also a large contingent of subdominant and immature bulls waiting for their turn to challenge the dominant bulls for the right to breed.

The lower parts of this elk winter range have been affected by reservoir level changes and water diversion from the Heber River. Habitat quality in the upper parts of the range has declined as forest succession shaded the forest floor.



Elk roaming winter range in the lower Elk River Valley  
photo: Ursus Environmental



Browse planting: Installing willow whips to increase winter browse availability  
photo: Ursus Environmental



Stand-tending: improves winter forage production and elk access  
photo: Ursus Environmental

## Scarification & Seeding Trials

From the viewing area ahead, visitors can glimpse two ongoing enhancement trials involving scarification and seeding. The site under the transmission line involved seeding with an agronomic mix of grasses and legumes. The other, located about 100 m to the northeast, used a mix of coastal native grasses. Since monitoring began in 2003, results suggest that the native grass mixes outperform agronomic mixes, with forage production up threefold after four growing seasons.

## Habitat Enhancement Trials

To counter the decline of elk winter ranges in the park, a habitat enhancement plan was developed over 2000 and 2001. Nine sites in this valley, totalling 9.7 hectares, were enhanced between 2002 and 2004. Habitat enhancement techniques included:

- Scarification and Seeding (2.2 hectares) provides highly nutritious food in early spring, when elk need it most. Sites are cleared and prepared for seeding using an excavator.
- Intensive Stand-tending (4.2 hectares) involves cutting trees to allow more light to reach the forest floor, increasing food production.
- Browse Plantings (3.3 hectares), using native shrub plantings and locally-harvested cuttings, helps to boost the diversity and amount of elk winter foods.



Alaska brome seeding trial  
photo: Ursus Environmental