BALD EAGLE NESTING RESULTS

OYSTER RIVER TO MENZIES BAY, VANCOUVER ISLAND

2009

The Bald Eagle is among the most charismatic and widely known species of wildlife in North America. Bald Eagles occur in large numbers along the west coast of Canada and are symbolic of the natural world. In an effort to understand the habitat needs of Bald Eagles, between 1987 and 1995 biologists with the Canadian Wildlife Service, the BC Ministry of Environment and several forest companies worked together to catalogue over 3,000 Bald Eagle nest sites around Vancouver Island, the southern Gulf Islands, and in the lower Fraser Valley. In the late 1990's, supported by BC Hydro and administered by BC Nature, the Wildlife Tree Stewardship Program (WiTS) was created as an on-line Atlas and data-base of Bald Eagle nest information. Through WiTS, volunteer citizen scientists monitor nesting eagles and contribute their observations back to the program.

The information presented here is a summary of what we know to date about the locations and nesting success of Bald Eagle in the Campbell River area along the east coast of Vancouver Island within the Strathcona Regional District. The study area begins at Oyster River and extends north, through the City Campbell River, to Menzies Bay.

CONSTRAINTS TO BALD EAGLE REPRODUCTIVE SUCCESS

The health and body condition of Bald Eagles as they enter the nesting season plays an important role in nesting success.

The primary constraints to Bald Eagle nesting success are food supply, health of the eagles, availability of nesting and perch trees, and disturbance by human activity.

Food Availability

Bald Eagles are opportunistic feeders that spend much of the non breeding season wherever there is food. Bald Eagles congregate along rivers during the salmon runs; they consume waterfowl, gulls, road-kills, and are frequently found at landfills (Shannon 2008; Elliott et al. 2006; Hancock 2003; Stalmaster 1987; personal observations). Through the nesting season, Bald Eagle egg and chick survival depends on a reliable source of food that meets the energy needs of the rapidly growing chicks, and the adult eagles as they both tend to their nests and fly between their nests and the food source (Shannon 2008). Examination of remains below Bald Eagle nests suggests a predominance of birds being eaten (Norman et al. 1989, Vermeer et al. 1989). Observations by Gill (Elliott et al. 2005) suggest a diet mainly of fish, and observations by Shannon (Shannon 2008) suggest significantly higher fledgling rates where chicks were fed predominantly birds and mammals. In more remote areas, such as the west coast of Vancouver Island, Johnstone Strait, and the Queen Charlotte Islands food supply is thought to be the most limiting factor to nesting success. In these sites there are many nesting attempts initiated in the early spring which fail during the time of rapid chick growth (Elliott et al. 1998) In Clayoquot Sound, while there was low nesting success overall, the most successful nests were in proximity to supplemental food sources near settlement, logging camps and fishing resorts (Moul 1998). Along the east coast of Vancouver Island, Bald Eagles appear to be nesting inland with increasing frequency (personal observations). While trends have not been analysed, there may be a correlation with northerly spread of the Eastern Cottontail Rabbit, which was introduced to southern Vancouver Island in the early 1960s (Ingram 2004). Saturation of coastal breeding habitat may also be playing a role. As prime waterfront breeding habitats are filled, if breeding is to occur, then the only choice is to move inland to agricultural areas or adjacent to large riparian systems. Shannon (2008) observed greater nest attendance and a greater nesting success rate with eagles nesting inland.

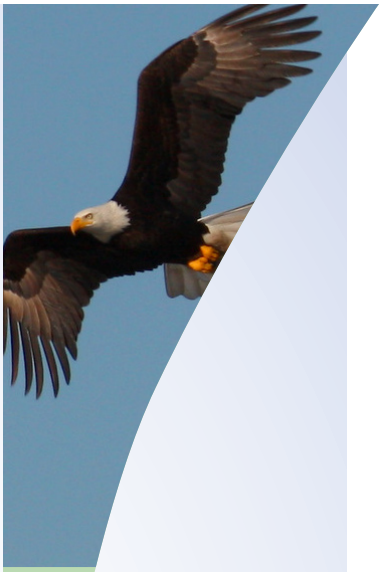
Health and Chemical Contamination

The health and body condition of Bald Eagles as they enter the nesting season likely plays an important role in nesting success. Eagles wintering at land fills have a good possibility of consuming unhealthy or contaminated food (Elliott et al. 2006). During the 1990s, there were several incidents of eagle poisonings related to ingesting waterfowl contaminated with carbofuran and fensulfothion that they had in turn consumed on flooded agricultural fields (Elliott et al. 1996). In many areas of North America, precipitous declines in the numbers of Bald Eagle in the 1950s and 1960s were linked to chemical contamination, particularly by DDE, the metabolite of DDT that affects egg shells. This was likely less of an issue in the Strait of Georgia, although Elliott et al. (1996) calculated that DDE had some effect on the area's eagle population. Elliott and Norstrom (1998), examined nest success in relation to a variety of chemical contaminants and reported that by the mid-1990s,

concentrations of DDE, PCBs and dioxins were less than associated with serious reproductive problems. Gill and Elliott (2003) reported that low nest success around the Crofton pulp mill were associated with low prey deliveries to nests, possibly in concert with elevated contaminant exposures. Mercury contamination is considered once again to be a global problem with releases from fossil fuel, particularly coal burning. Some Strait of Georgia eagles had high mercury exposures and at least one was acutely poisoned (Weech et al. 2003). More recently, contamination with brominated flame retardant chemicals has become a new global problem with rapidly increasing concentrations reported in heron and cormorant eggs from the southern Strait of Georgia (Elliott et al. 2005). Possible effects on top predators, particularly eagles, are being investigated (McKinney et al. 2006, Elliott et al. 2009).

Availability of Nesting and Perching Trees

Preventing the loss of nesting and perching trees is a key component in assuring the long term viability of the eagle population. Along the east coast of Vancouver Island, throughout the Gulf Islands and in the Lower Fraser Valley, development pressure for residential properties has led to the loss of many nest and perch trees. Bald Eagles build large nests, often two metres across and weighing more than 500kg (Stalmaster 1987). In the past, the most common eagle nest trees were veteran Douglas-fir, often with tops that were damaged by winds or lightning strikes. These dominant trees generally have wide spaced branch structures with a diameter at breast height of from one to two metres. The preferred location of these trees is near the shore with commanding views of the ocean, the source of their food supply (Stalmaster 1987). As coastal forests are cleared for residential construction, lone veteran nest trees are at increased risk for wind-throw, are considered as hazards and are often cut down. Between 1990 and 1999, from Qualicum Beach to the Campbell River on Vancouver Island, 17 of 253 known nest trees were lost (8 due to wind-throw and disease; 9 due to being cut). In the same area, between 2000 and 2009 a further 33 nest trees were lost (23 due to wind-throw and disease; 10 due to being cut). In the Willow Point area of Campbell River, all the known nest trees in two nesting territories have been cut down. As eagles lose their preferred veteran nest trees, they nest in smaller less suitable trees where nest failure due to collapsing tree limbs is common. For instance, in Campbell River young grand firs (usually with a diameter at breast height of less than one metre) are being used as eagle nest trees with greater regularity. Often the health of these trees is already in decline, and once in decline, grand firs die back quickly. Continued tree crown failures are typical under the added weight of a Bald Eagle nest. These trees may be deemed hazardous then tagged for removal.



Bald Eagles are most susceptible to disturbance when human activity patterns near their nest are changed

Disturbance

Bald Eagles are most susceptible to disturbance when human activity patterns near their nest are changed. In remote areas, the presence of a hiker, a forestry worker, a biologist, or even a boat landing at the shore a few hundred metres from a nest tree, may be all that is needed to flush them from their nest. While Bald Eagles living in more populated areas, such as the Strait of Georgia, appear to habituate to the proximity of human settlement and activity, each pair is unique. Some eagles choose to nest by busy highways and seem totally oblivious to constant noise and traffic, though may be highly disturbed by someone walking near the base of their nest tree. Eagles nesting in a residential neighbourhood may not appear to notice the local residents working in their gardens, but might be very disturbed if someone starts ripping off and replacing a roof. Bald Eagles most often will abandon their nests if disturbed early in the nesting season, before bonding with their chicks.

Guidelines to behaviour in the vicinity of eagle nests may be found in a provincial Develop with Care publication available through the WITS website at http://www.wildlifetree.org/docs/DWC-eagles.pdf

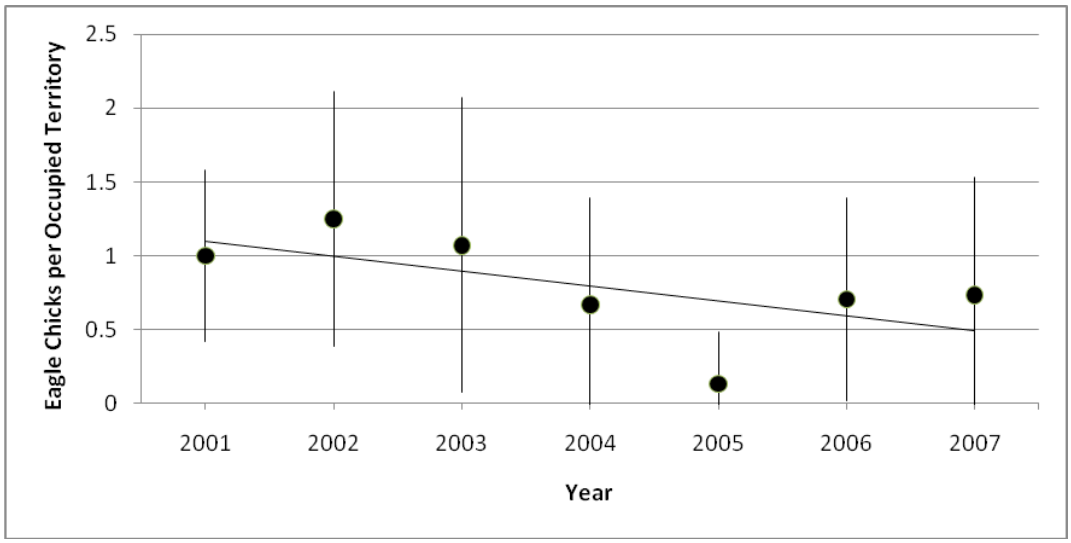


Figure 1: Average number of Bald Eagle chicks per occupied territory (± one standard deviation), Oyster River to Menzies Bay on Vancouver Island from 2001 to 2007.

METHODS

Using ground based observations, nest tree monitors with the WiTS program follow a scientific method laid out by Sergej Postupalsky in 1974. This method involves a minimum of two nest observations per year. A first observation, to record nest activity, is timed for early in the nesting season when the presence of birds near a nest should represent the commitment to a nesting attempt. At this time, the presence of birds on or near a nest would receive an "Active" score. At the same time, if the birds were in the immediate area, though clearly not focused on the nest site in question, a score of "Occupied Territory" would be given with the assumption that the pair was defending an area and likely nesting in an alternate nest. For Bald Eagles nesting in the Campbell River area, the activity period would fall between 15 March and 30 April. The second observation scores the success of the nesting attempt and is timed to be within the last two to three weeks before chicks would leave the nest. In the Campbell River area the productivity period would fall between 15 June and 31 July.

The importance of the timing in the two visit method centres on eliminating bias when scoring nesting success or failure. For example, if a nest is empty late in the nesting season, unless there was a previous observation earlier in the season there would be no way to determine if the nest was not used that year or if a nesting attempt had failed early and the adult birds had left. If a site visit is made mid season, and chicks are present, it is not possible to predict if the chicks will survive to the point when they would naturally leave the nest.

RESULTS AND DISCUSSION

Known Nest Trees

At the end of the 2009 nesting season there were 67 known Bald Eagle nest sites along a 56km stretch of the east coast of Vancouver Island from Oyster River, north to Menzies Bay (Tables 1, 2 and 3, Maps 1, 2 and 3). In the past ten years the numbers of know nests has increased from 35 to 67. While this could represent a trend of increasing population, it more likely represents increased search effort and record keeping.

Bald Eagles are a monogamous species, and will defend a nesting territory for many years (Stalmaster 1987). Along the British Columbia Coast, Bald Eagles defend a nesting territory of approximately one kilometre of coastline. For reasons not completely known, most pairs of Bald Eagles have more than one nest in their territories and they will often switch nests from year to year. By considering the nest usage pattern and the distances between nests, the 67 nesting sites have been divided into 46 nesting territories. The one kilometre circles on Map 1, 2 and 3 are centred on either the nest location or an average centre point of nests thought to make up a nesting territory. In the natural world, Bald Eagle nesting territories are never precise circles and will vary in size depending on habitat conditions. In areas where fish are often concentrated, nesting territories are expected to be smaller and closer together. In locations of urban development nesting territories may be absent altogether.

Bald Eagle Nesting Productivity

Across North America, measuring the production of young at Bald Eagle nests is based on a common method that records the number of chicks raised to fledging in each occupied territory (See Postupalsky 1974). Over the past ten years, record keeping in the Campbell River area has been sporadic and often the timing of observations has not followed the prescribed methodology. Nest records not meeting the methodology are highlighted in Tables 1, 2 and 3, and were eliminated from statistical analysis. When using statistical analysis to infer trends in nesting productivity, in order to meet the requirement of homogeneity of variance, the sample of nesting records considering was further reduced to data from 2001 to 2007 (Fowler and Cohen 1995). In the Campbell River area, from 2001 to 2007, on average 51% of the nesting attempts were successful. While this is lower than the 65% measured in the Qualicum Beach to Deep Bay area, it is not statistically beyond what might be expected in random variation (Chi square, probability 0.95). Over the same period, in the Campbell River area there was an average of 0.7 eagle chicks produced per occupied nesting territory. Across this period the production of young eagles shows a significant downward trend (Figure 1, Spearman Rank Correlation Coefficient, probability 0.95). While 0.7 chicks per occupied territory is equal to the amount thought necessary to sustain a local population (Sprunt et al. 1973), it is lower than the 0.97 chicks per occupied territory measured over the same period in the Qualicum Beach to Deep Bay area on Vancouver Island, and also lower to nesting productivity measured in three other local area in the 1990s (Table 4).

Along the British Columbia Coast, Bald Eagles defend a nesting territory of approximately one kilometre of coastline.

Territory	Nest_ID	Nest Site Name	Pre 2000	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SRD-T54	BAEA-110-529	Upper Campbell River	No records					0C	0C				
SRD-T55	BAEA-110-504	Elk Falls Pipeline - A	N/A-1994										
	BAEA-110-505	Elk Falls Pipeline - B	N/A-1987										
	BAEA-110-506	Elk Falls Pipeline - A	N/A-1987										
SRD-T56	BAEA-110-520	Orange Point	No records				A		OT	OT			
SRD-T57	BAEA-110-522	Duncan Bay	No records				A	0C	0C				
	BAEA-110-530	Duncan Bay - B	No records						OT	OT			
	BAEA-110-532	Duncan Bay - C	No records										
SRD-T58	BAEA-110-507	Middle Point South	1C-1996			1C	A	A	OT	ND			
	BAEA-110-508	Middle Point North	A-1987			N/A				OT			
SRD-T59	BAEA-110-524	Middle Bay (South of Creek)	No records			1C		0C	N/A	N/A			
SRD-T60	BAEA-110-526	Race Point - A	No records			ND							
	BAEA-110-511	Race Point - B	No records		2C		2C	A	OT	1C			
	BAEA-110-531	Race Point - C	No records										
SRD-T61	BAEA-110-509	Race Point West - A	No records		N/A		N/A			ND			
	BAEA-110-510	Race Point West - B	No records		1C	A			2C				
SRD-T62	BAEA-110-518	Mid DL 29 - A	A-1996			A	A	OT	OT	N/A			
	BAEA-110-519	Mid DL 29 - B	No records			OT		N/A	OT	1C			
	BAEA-110-015	Huntingford Point - B	No records										
SRD-T63	BAEA-110-517	Huntingford Point	No records			A		OT	OT	OT			
SRD-T64	BAEA-110-516	Menzies Bay	No records					2C	OT	1C			
SRD-T65	BAEA-110-515	Menzies Creek (0.5 km S of)	A-1996										
SRD-T66	BAEA-110-550	Stephenson Point	1C-1996										
	BAEA-110-549	Nymphe Cove	N/A-1996										
SRD-T67	BAEA-110-512	Wilfred Point	A-1996										

Code descriptions: N/A - Not Active, NF - Not Found, Cut - Tree cut down, TD - Tree Down (natural causes), ND - Nest down, A - Active nest site, OT - Occupied nesting territory, 0C - Failed nesting attempt, 1C - One chick, 2C - Two chicks

Note: Cells with shading represent data that do not satisfy the two site visit method. These records may be improved with new information.

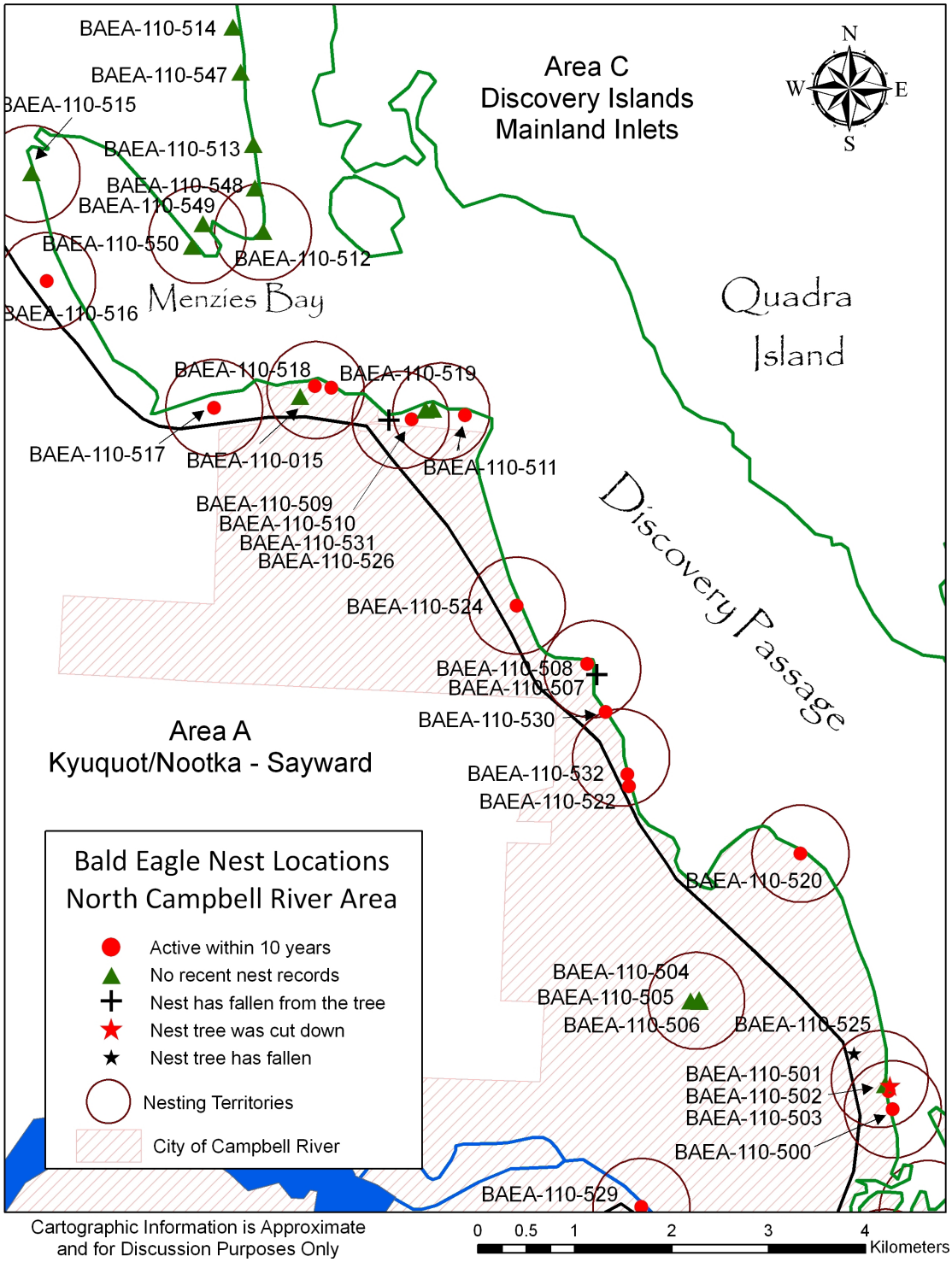


Table 1: Wildlife Tree Stewardship (WITS) Records for Bald Eagle Nesting Territories in Campbell River North

Map 1. Bald Eagle Nest Locations in the North Campbell River Area

Territory	Nest_ID	Nest Site Name	Pre 2000	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SRD-T30	BAEA-106-276	Simms Creek - Cottonwood Dr	No records				1C	1C	0C	0C	1C		
SRD-T31	BAEA-106-249	Galerno Road - A	Cut-1990										
	BAEA-106-250	Galerno Road - B	2C-1995		A	OT	N/A		OT		OT		
	BAEA-106-270	Galerno Road - C	No records		2C	2C	ND		OT		N/A		
	BAEA-106-251	Ash Street	2C-1999	1C	OT	OT	0C	2C	OT	OT	1C	0C	0C
SRD-T33	BAEA-106-252	Carnegie Street - B	0C-1995		2C	1C	0C	1C	0C	0C	OT	OT	
	BAEA-106-266	Carnegie Street - A (cut pre 1990)	Cut < 1990										
SRD-T34	BAEA-106-253	Centennial Park - A	TD-1999										
	BAEA-106-254	Centennial Park - A	N/A-1999	2C						Cut			
	BAEA-106-277	Centennial Park - C	No records					1C		0C	1C		OT
SRD-T35	BAEA-106-327	Greenwood Street - 8th Avenue	No records									N/A	A
	BAEA-106-345	Old Peterson Road - Nunn's Creek	No records								1C	A	
SRD-T36	BAEA-106-330	Shetland Road	No records								ND		
	BAEA-106-331	Shetland Road - B	No records										0C
SRD-T37	BAEA-106-256	Nunn'S Creek - A	0C-1995			ND	ND		ND		ND	TD	
	BAEA-106-258	Nunn's Creek - B	A-1995			ND	ND				OT		
	BAEA-106-273	Nunn's Creek Park	No records			2C	0C	1C	OT				
SRD-T38	BAEA-106-257	Campbell River Estuary - A	Cut-1994										
	BAEA-106-259	C R Estuary - B Spit Road	A-1995	OT	OT	ND	ND					TD	
	BAEA-106-260	Campbell River Estuary - C	1C-1999	OT		ND	ND						NF
	BAEA-106-261	Campbell River Estuary - D	No records	OT	OT	OT	2C	2C	OT	TD			
	BAEA-106-310	Campbell Rvier Estuary - E	No records								1C		
SRD-T39	BAEA-106-308	C R Estuary (near soccer field)	No records							OT	1C		
SRD-T40	BAEA-106-255	Quinsam Fish Hatchery	OT-1995			N/F	N/F						
SRD-T50	BAEA-110-014	Baikie Island - South A	No records						A	2C	0C		2C
	BAEA-110-016	Baikie Island - South B	No records								OT		
SRD-T51	BAEA-110-521	Baikie Island - North	No records		N/F	1C	1C	0C	0C	OT	0C		
	BAEA-110-523	Central Campbell River Estuary	No records		N/F	OT	OT		OT	1C	OT		
SRD-T52	BAEA-110-500	N Campbell River - C	No records		1C	0C	1C	0C	1C	1C	1C		
SRD-T53	BAEA-110-501	N Campbell River - B	No records		0C	0C	N/A	OT	OT	OT			
	BAEA-110-502	N Campbell River - A	No records				N/A	OT	OT	OT			
	BAEA-110-503	N Campbell River - D	A-1994	OT	OT	OT	Cut						
	BAEA-110-525	Hudson Farm	No records							1C	2C	TD	

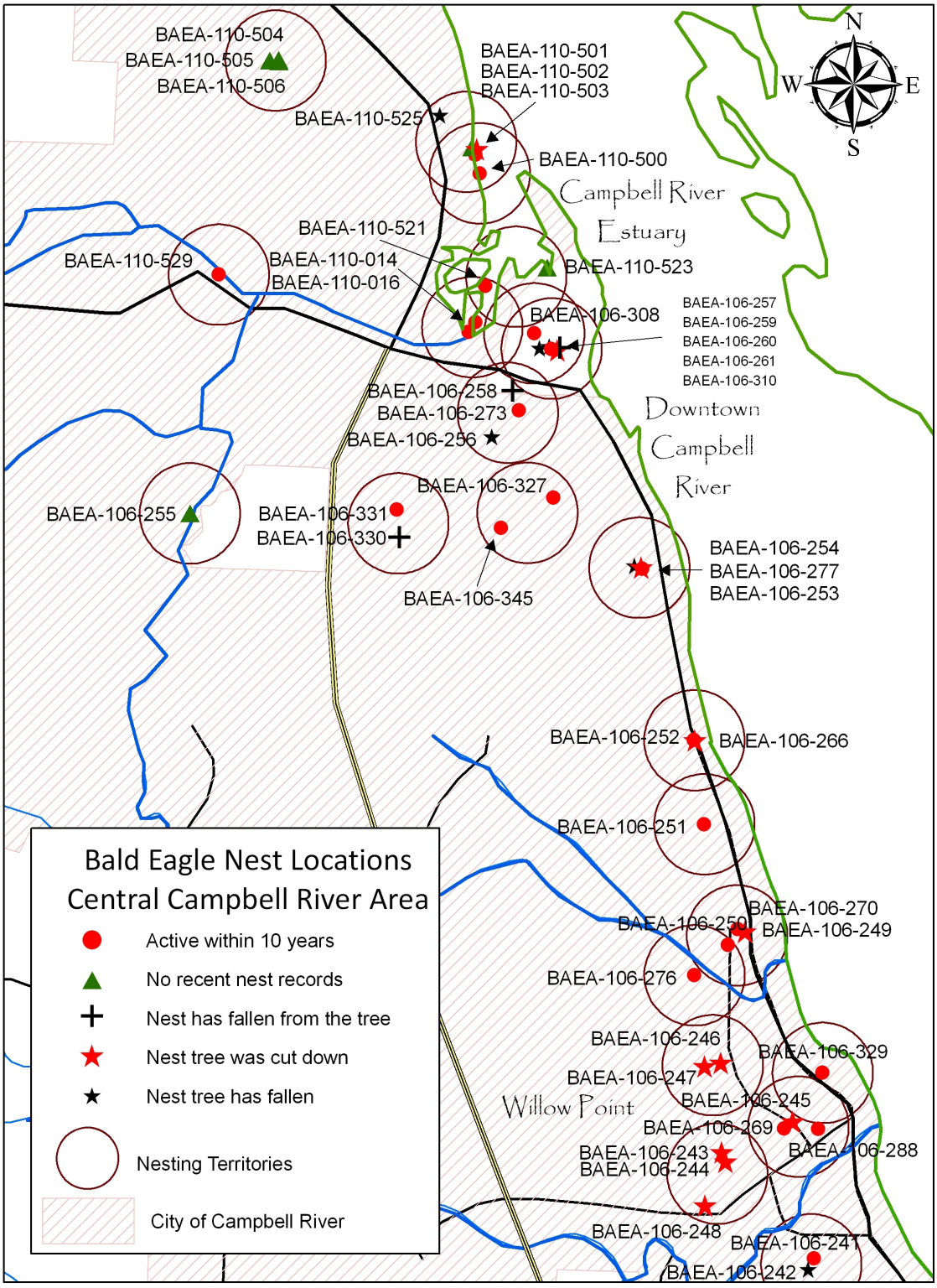


Table 2: Wildlife Tree Stewardship (WITS) Records for Bald Eagle Nesting Territories in Central Campbell River

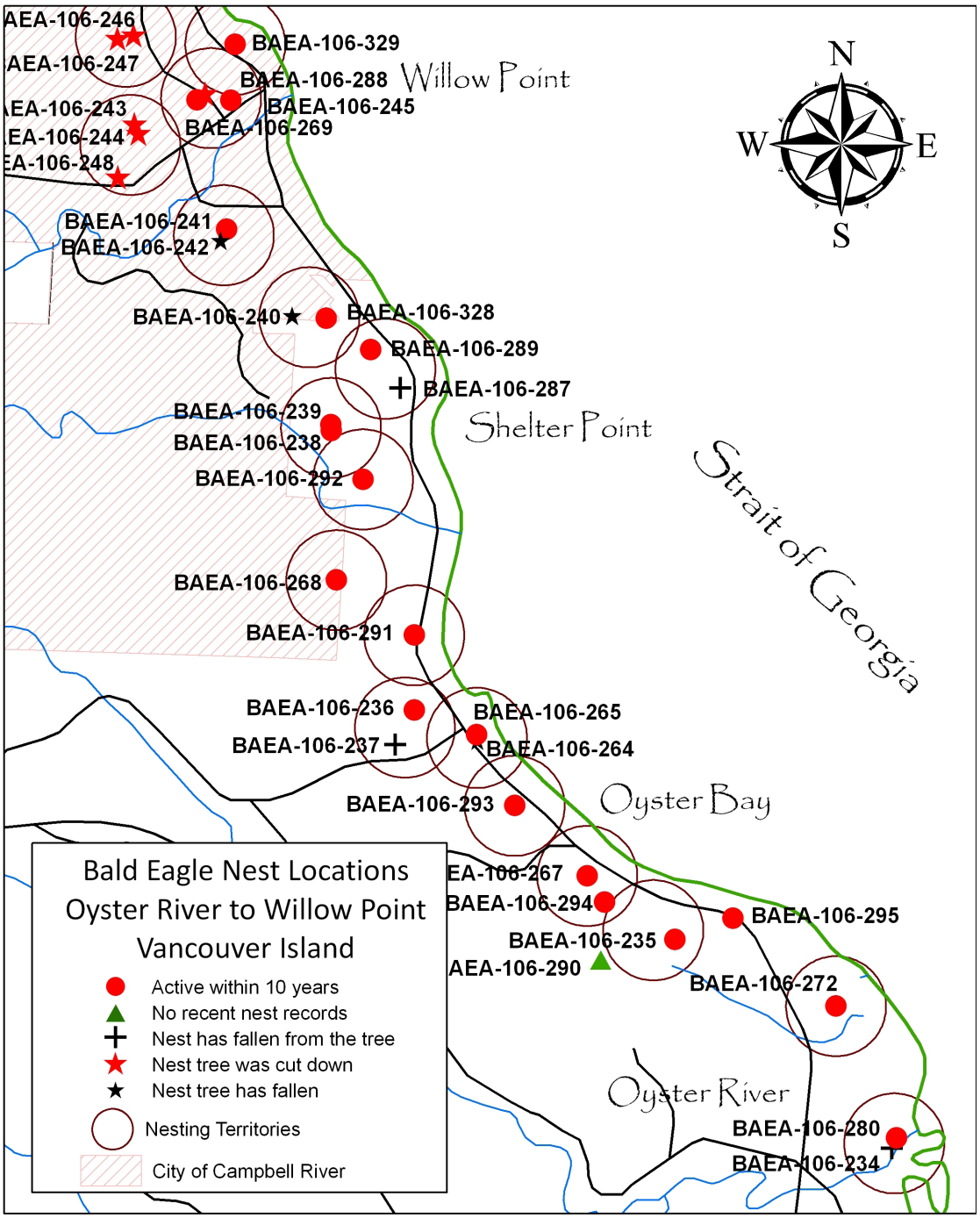
Map 2: Bald Eagle Nesting Location in the Central Campbell River Area

Territory	Nest_ID	Nest Site Name	Pre 2000	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SRD-T01	BAEA-106-234	Oyster River - B	No Records	2C	ND	OT	OT	OT	OT				N/A
	BAEA-106-280	Oyster River - A	OT-1995	OT	0C	A	OT	OT	0C	0C			OT
SRD-T02	BAEA-106-272	Kuhushan Point	No Records				2C	A	0C	0C	OT		
SRD-T03	BAEA-106-295	Bennetts Point	No Records							OT	OT		1C
	BAEA-106-235	S Oyster Bay - A	0C-1995										OT
	BAEA-106-290	S Oyster Bay - C	No Records										
	BAEA-106-294	S Oyster Bay - D	No Records							1C	A		N/A
SRD-T04	BAEA-106-267	S Oyster Bay - B	No Records		A	2C	1C	0C	0C	N/A	N/A		1C
SRD-T05	BAEA-106-293	Sailor Road	No Records							1C			1C
SRD-T06	BAEA-106-264	Oyster Bay - A	TD-1994										
	BAEA-106-265	Oyster Bay - B	No Records			N/A	2C						
SRD-T07	BAEA-106-236	York Road - B	Active-1995		3C	3C	N/A	1C	0C	2C	2C		A
	BAEA-106-237	York Road - A	Active-1995	ND							ND		
SRD-T08	BAEA-106-291	Lynwood Road	No Records					1C	0C	1C	0C		
SRD-T09	BAEA-106-268	Storie Creek - Leeming Road	No Records		1C	2C	3C	1C	1C	0C	0C		
SRD-T10	BAEA-106-292	McGimpsey Road	No Records								1C		
SRD-T11	BAEA-106-238	Peak Drive - A	Active-1995		N/A		1C						
	BAEA-106-239	Peak Drive - B	Active-1997			2C	N/A	A	OT	OT			
SRD-T12	BAEA-106-287	Heard Road - South 19A	No Records						A	ND			
	BAEA-106-289	Crawford Road	No Records							1C	2C		
SRD-T13	BAEA-106-240	Jubilee Highway	Active-1995			TD							
	BAEA-106-328	Finch Road	No Records									OT	
SRD-T14	BAEA-106-241	Twillingate Road - A	OT-1995		N/A	N/A	1C	0C	0C	1C	0C	OT	A
	BAEA-106-242	Twillingate Road - B	Active-1995		1C	1C	TD						
SRD-T15	BAEA-106-243	Erickson Road - A	Cut-1994										
	BAEA-106-244	Erickson Road - C	Active-1995			N/A	Cut						
	BAEA-106-248	Erickson Road - D	N/A-1999	2C		N/A	0C	Cut					
SRD-T16	BAEA-106-245	Erickson Road - B	Cut-1994										
	BAEA-106-269	Harrogate Road	Active-1999	0C	1C	2C	2C	0C		N/A	N/A		N/A
	BAEA-106-288	Larwood Connector	No Records							1C	2C	1C	A
SRD-T17	BAEA-106-329	Willow Point	No Records									A	A
SRD-T18	BAEA-106-246	Cambridge Road - A	Cut-1990										
	BAEA-106-247	Cambridge Road - B	Active-1999	1C	1C	2C	2C	1C	0C	0C	0C		Cut

Code descriptions: N/A - Not Active, NF - Not Found, Cut - Tree cut down, TD - Tree Down (natural causes), ND - Nest down, A - Active nest site, OT - Occupied nesting territory, 0C - Failed nesting attempt, 1C - One chick, 2C - Two chicks

Note: Cells with shading represent data that do not satisfy the two site visit method. These records may be improved with new information.

Table 3: Wildlife Tree Stewardship (WITS) Records for Bald Eagle Nesting Territories in South Campbell River and Strathcona Regional District Area - D



Map 3. Bald Eagle Nest Locations from Oyster River to Willow Point on Vancouver Island

Health and Vitality of the Bald Eagle Population and Local Natural Systems

The success and vitality of Bald Eagles, one of the top predators in the food chain, is a good measure of the the health of the natural systems in any local area. Without the top predators the natural checks and balances of nature give way to unnatural abundances and ill health of many species lower in the food chain. In the Campbell River area the natural beauty, the abundance of wildlife and other natural resources are key elements when people consider locations as desirable places to live. As in many other locations in British Columbia, human population growth in the Campbell River area has the potential to weaken or destroy the very qualities that make the area desirable. As the human population moves increasingly beyond the natural capacity of the land to provide for the population, costs of living increase as goods and services are imported. Studies in other areas demonstrate a vast cost effectiveness of retaining natural systems and ecosystem services as compared to replacement with infrastructure and technology (see Olewiler 2004). The apparent downward trend in Bald Eagle nesting success is an early warning sign of ecosystem imbalance in the Campbell River area and should not be taken lightly.

LEGISLATION PROTECTING BALD EAGLE NESTS

Section 34 of the Provincial Wildlife Act provides year-round protection for Bald Eagle nests. This legislation does not protect the surrounding habitat. Nest trees and eagle nesting success often suffer due to disturbances, vegetation removal, and water table changes in the vicinity of nest trees. Excellent recommendations on protecting Bald Eagle nest trees may be found in a provincial Develop With Care publication available through the WITS website at http://www.wildlifetree.org/docs/DWC-eagles.pdf To increase the protection of eagle nest trees, many Local Governments have included Bald Eagle nest protection in their Official Community Plans (OCPs) and developed bylaws that protect the habitat surrounding nest trees. These local bylaws are often in the form of Development Permit Areas (DPAs).

All nest observations by WiTS Tree Stewards are made from either public locations or on private lands with permission from the landowner. WiTS Tree Stewards strive to be very respectful of private property and personal privacy.

Year	Number of known nests	Estimated number of Territories	Sample of Territories visited	% nest success	Young per Occupied Territory
2001	45	28	8	87.5	1.13
2002	50	30	12	75.0	1.25
2003	52	34	15	64.3	1.07
2004	55	36	20	40.0	0.50
2005	58	38	22	14.3	0.19
2006	63	39	20	65.0	0.75
2007	67	42	16	50.0	0.69
Average 2001-2007			16	51.4	0.71
Deep Bay to Qualicum Beach 2001-2009 1			18	65	0.97
South-east Vancouver Island 1991-1995 2.			41	64	0.95
Powell River area 1992-1995 2.			37	60	0.80
Fraser River Delta 1993-1996 2.			13	75	1.10

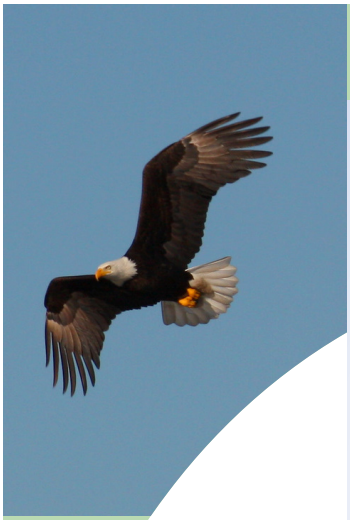
1. WiTS 2009 2. Elliott et al. (1998)

Table 4: The production of young Bald Eagles at sites between Oyster River and Menzies Bay (2001-2007) compared to four other areas around the Strait of Georgia

PROTECTING BALD EAGLE NESTS

Bald Eagle nests may be protected directly by legislation or indirectly due to being located in parks or conservation lands. Overall, most eagle nest trees are found on private land where the best protection is caring land-owners and neighbours. Section 34 of the Provincial Wildlife Act provides year-round protection for Bald Eagle nest trees, as long as there is a nest in the tree. This legislation does not protect the surrounding habitat, and nest trees and eagle nesting success has often suffered due to disturbances, vegetation removal, and water table changes in the vicinity of nest trees. To increase the protection of eagle nest trees, many local governments have included Bald Eagle nest protection in their Official Community Plans (OCPs) and have developed bylaws that protect the habitat surrounding nest trees. These local bylaws are often in the form of Development Permit Areas (DPAs). In the Strathcona Regional District, DPAs cover 200m around the base of each nest tree. This translates into construction timing restrictions in 12.6ha around each nest tree. In the area covered by this report this represents a total of 275.5 ha (taking into account the overlapping DPAs when nest trees are close together). The City of Campbell River, which is a much more urban environment, has DPA restrictions covering a 60m radius or 1.1ha surrounded each eagle nest tree. Within the City of Campbell River, 46 nest sites together have DPAs accounting for protection of 51.3 ha

Bald Eagles are big birds with a big lifestyle. They have huge weighty nests that can only be supported by the largest trees in the area and veteran trees may be required for long term breeding success. In urban areas with a perennial desire for growth and densification, it is unrealistic to think that current and recruitment nesting habitat can be adequately conserved even with DPAs, the application of smart growth principles, bylaws, or senior agency legislation (see Dawe and Martin 2007). To satisfy the goal of sustainable wildlife habitat, many groups, organizations and local governments are exploring transition strategies to help them move towards a sustainable, steady state economic model (see Resolution 2008-04. BC Nature Position Statement on Economic Growth at http://tinyurl.com/yelu4hg)



ADDITIONAL INFORMATION FROM WiTS

Specific information for all nest sites we know of may be found on the WiTS Atlas at www.shim.bc.ca/atlases/wits2/witsloginscreen.htm As the WiTS program has a responsibility to protect personal privacy and sites of special conservation concern, some information will only be released following signed information sharing agreements. Beyond public viewing there are two levels of Atlas access: 1) The naturalist level allows one to view all information on public viewing, but also allows volunteer monitors who have been trained in the WiTS procedures to add new nest observations; 2) A government or consultant level, (requiring a signed understanding of confidentiality limits), offers detailed information on nest locations, an inventory description of the surrounding habitat, land tenure, and photographs of the nest sites. All additions to the WiTS Atlas are screened by WiTS staff. While effort are made to keep records up to date and accurate, all information in the WiTS Atlas is dependent on what is provided back to the program by government, industry and the public.

On request, by donation, the WiTS program is able to provide summary information on specific sites or areas, as are presented in this report. Within the constraints of personal privacy WiTS may provide mapping shape-files and/or lists of nest coordinates. Most nest tree coordinates in the WiTS database were collected by hand held GPS and are at best +/- 10m. For planning purposes, WiTS records are an alert that a nest-site is in the area. When considering development permits restrictions and protective buffers, it is recommended that location coordinates be confirmed by a surveyor or an appropriately qualified professional.

REFERENCES

Dawe, N.K. and T. Martin. 2007. Conservation strategies: are we only addressing the symptoms? BC Nature 45:15.Dawe, N.K. and T. Martin. 2007. The real threat to biodiversity: infinite economic growth in a finite world. BC Nature 46:25.

Elliott, J.E., L.K. Wilson and B. Wakeford 2005. Polybrominated diphenyl ether trends in marine and freshwater birds from British Columbia, Canada 1979-2002. Environmental Science and Technology. 39:5584-5591.

Elliott, J.E., I.E. Moul and K.M. Cheng, 1998. Variable reproductive success of Bald Eagles on the British Columbia coast. Journal of Wildlife Management 62:518-529.

Elliott, J.E. and R.J. Norstrom. 1998. Chlorinated hydrocarbon contaminants and productivity of Bald Eagle populations on the Pacific coast of Canada. Environmental Toxiciology and Chemistry 17(6): 1142-1153

Elliott, J.E., L.K. Wilson, K.W. Langelier and R.J. Norstrom 1996a. Bald Eagle mortality and chlorinated hydrocarbon contaminants in livers from British Columbia, Canada 1989-1994. Environmental Pollution 94:9-18.

Elliott, J.E., K.M. Langelier, P. Mineau, and L.K. Wilson. 1996b. Poisoning of Bald Eagles and Red-tailed Hawks by carbofuran and fensulfothion in the Fraser River Delta of British Columbia, Canada. Journal of Wildlife Diseases 32:486-491

Elliott, K.H., L.S. Cesh, J.A. Dooley, R.J. Letcher and J.E. Elliott 2009. PCBs and DDE, but not PBDEs. Increase with trophic level and marine input in nesting bald eagles. Science of Total Environment 407:3867-3875.

Elliott, K.H., J. Duffe, S.I. Lee, P. Mineau, and J.E. Elliott 2006. Foraging ecology of Bald Eagles at an urban landfill. Wilson Journal of Ornithology. 118:380-390

Elliott, K.H., C.E. Gill, and J.E. Elliott 2005. The influence of tide and weather on provisioning rates of chick rearing Bald Eagles in Vancouver Island, British Columbia. Journal of Raptor Research. 39:1-10.

Gill, C.E. and J.E. Elliott 2003. Influence of food supply and chlorinated hydrocarbon contaminants on breeding Bald Eagles. Ecotoxicology 12: 95-111.

Hancock, D. 2003. The Bald Eagle of Alaska, BC and Washington. Hancock House, Surrey, British Columbia.

Ingram, J. 2004. Cottontails invade the valley. http://www.comoxvalleynaturalist.bc.ca/wild_side/2004/eastern_cottontail.html

McKinney,M.A., L.S. Cesh, J.E. Elliott, T.D. Williams, D.K. Garcelon and R.J. Letcher 2006. Brominated flame retardants and halogenated phenolic compounds in North American west coast Bald Eaglet (Haliaeetus leucocephalus) plasma. Environmental Science and Technology. 40:6275-6281.

Moul, I.E. 1998. Nest Inventory and Productivity Assessment for Bald Eagles in Clayoquot Sound, British Columbia. Prepared for BC Ministry of Environment, Lands and Parks (Region 1), and the BC Ministry of Forests (Research Branch). 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

Norman, d., A.M. Breault, and I.E. Moul 1989. Bald Eagle incursions and predation at Great Blue Heron colonies. Colonial Waterbirds 12:215-217.

Olewiler, N. 2004. The Value of Natural Capital in Settled Areas of Canada. Published by Ducks Unlimited Canada and the Nature Conservancy of Canada. 36 pp.

Postupalski, S. 1974. Raptor reproductive success: some problems with methods, criteria and terminology. Raptor Research Reports. 2:21-31.

Shannon, C.J. 2008. The Influence of Food Abundance and Nest Location on Behavior and Nest Success of Bald Eagles (Haliaeetus leucocephalus). PhD Thesis, University of California, Riverside.

Sprunt, A., W.B. Robertson, S. Postupalsky, R.J. Hensel, C.E. Knoder, and F.J. Ligas 1973. Comparative productivity of six Bald Eagle populations. Transaction of the North American Wildlife and Natural Resources Conference 38:96-106.

Stalmaster, M.V. 1983. The Bald Eagle. Universe Books, New York.

Vermeer, K., K.H. Morgan, R.W. Butler, and G.E.K. Smith. 1989. Population, nesting habitat, and food of Bald Eagles in the Gulf Islands. Pages 123-130 in K. Vermeer and R.W. Butler [Eds], The ecology and status of marine and shore birds in the Strait of Georgia, British Columbia. Special Publication, Canadian Wildlife Service, Ottawa, Ontario, Canada.

Weech,S.A., L.K. Wilson, K.M. Langelier and J.E. Elliott 2003. Mercury residues in livers of Bald Eagles (Haliaeetus leucocephalus) found dead or dying in British Columbia, Canada (1987-1994). Archives of Environmental Contamination and Toxicology. 45:562-569.

WiTS 2009. Bald Eagle Nesting Results: Deep Bay to Qualicum Beach, Vancouver Island. Federation of BC Naturalists, WiTS Local Area Report 2009:3

WiTS

Wildlife Tree Stewardship Program

BC Nature
c/o Heritage Centre,
1620 Mount Seymour Road
North Vancouver, BC,
V7G 2R9

Phone: (604) 985-3057
Fax: (604) 985-3059
E-mail: manager@bcnature.ca

WiTS Vancouver IslandCoordinator:
Ian Moul
wits.bc@shaw.ca

Electronic copies of this report are available at:

www.wildlifetree.org

Look under Programs and Resources / Reports

Acknowledgments

The WiTS program is administered by BC Nature (The Federation of BC Naturalists) in partnership with Environment Canada (Canadian Wildlife Service), and the BC Ministry of Environment. Funding for the program comes from the generous support of private donors, donations from consultants using the Atlas information, grants from foundations and public programs (most recently the Habitat Conservation Trust Foundation and Environment Canada's Eco-Action Program), and both cash and in-kind support from federal, provincial and regional governments. The WiTS program grew out of Bald Eagle inventory and monitoring work by Ministry of Environment Biologist, Rick Davies. Karen Morrison, Kerri-Lynne Wilson and Ron Speller were instrumental in setting up the WITS program in this area. Terri Martin made all of the original site visits. Most nest observations reported in the WiTS Atlas over the past 10 years were received from volunteer wildlife tree stewards Maj Birch, Jan Brettnacher and Laurel Delgatty.

This report was prepared by Ian Moul, RPBio., Coordinator for the WiTS program and Terri Martin, RPBio., Environmental Coordinator for the City of Campbell River. Jim Dubois (© www.Theineleganteagle.com) provided the photographs. Anne Murray, Bev Ramey, Dawn Hanna, Gretchen Harlow, John Elliott, Lisa Scott, and Sandra Gray provided information and valuable comments on earlier drafts of this document. The design and layout of this report was by Edith Ladu.

Recommended Citation:

WiTS 2010. Bald Eagle Nesting Results: Oyster River to Menzies Bay, Vancouver Island. Federation of BC Naturalists, WiTS Local Area Report 2010:1

HABITAT CONSERVATION TRUST FOUNDATION

BCnature FEDERATION OF BC NATURALISTS

Environment Canada Environnement Canada

BRITISH COLUMBIA The Best Place on Earth | Ministry of Environment