

# **Yeo Island Wolf Home Site Recommendation**

**A proposed solution to the potential conflict between the home site requirements of wolves and areas targeted for timber harvest**

Prepared for

**The Heiltsuk Nation,  
Western Forest Products,  
Raincoast Conservation Society**

by

**Paul C. Paquet**

Faculty of Environmental Design, University of Calgary,  
Calgary, Alberta. Canada. T2N 1N4. ppaquet@sk.sympatico.ca

and

**Chris Darimont**

Department of Biology. University of Victoria.  
PO Box 3020, Victoria, British Columbia. Canada. V8N 3W5. cdarimon@uvic.ca

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# YEO ISLAND WOLF HOME SITE RECOMMENDATION

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## EXECUTIVE SUMMARY

This document describes the ecology of home site use by wolves in coastal British Columbia and beyond. Using the Yeo Island home site as a case study, we provide a protocol for resolving potential conflicts between home site requirements of wolves and areas targeted for timber harvest.

Wolf home sites are important and comparatively small areas where wolves reproduce. Wolves maintain natal and secondary den sites, a series of rendezvous sites, and surrounding areas between April and October. Important reproductive and rearing activities occur in an area only approximately 15-km<sup>2</sup> within a total annual home range of 250-km<sup>2</sup> or more. Re-use of established home sites over several years has been observed in many studies, suggesting the value of these areas for reproduction.

The Rainforest Wolf Project located a home site on Yeo Island during summer 2001. Interviews with local Heiltsuk people inform us that this area (“Wolf Beach”) likely has functioned as a home site for several human generations.

Development Plans by Western Forest Products (WFP) show several planned clearcuts and a road system through the home site (Figure 1). If development proceeds, wolves may abandon this area. Loss of a productive site may reduce reproductive output. Conversely, because of strong site attachment, wolves may be less willing to abandon the area (immediately). Remaining at the site could elevate the risk of mortality due to road access (vehicular collisions, hunting, and poaching).

The removal of old-growth habitat on Yeo Island and other coastal areas is predicted to cause reductions in Sitka black-tailed deer, the primary prey of wolves. Wolves occurring on islands are likely more sensitive than mainland conspecifics, due to isolation by water barriers.

Based on a review of scientific literature, management guidelines in other areas, and details specific to this case, we strongly recommend a 2-km buffer zone from industrial activity from all identified locations within this home site (Figure 1). Failure to implement this recommendation will almost certainly disturb Yeo Island wolves. The seriousness of human disturbance is ultimately a human judgement and, as such, some may consider any alteration of the normal activities of wolves to be undesirable. This buffer zone would be recognised as the first protected area on Yeo Island, comprising only roughly 10% of the island, and would further signal willingness by WFP towards Ecosystem Based Forest Management .

**Purpose of Document**

This document serves to familiarise land use planners about the ecology of home site use by wolves in coastal British Columbia and beyond. Further, a protocol is provided for resolving conflicts between home site requirements of wolves and areas targeted for timber harvest. This case study was prepared for the Heiltsuk First Nation, WFP, and the Raincoast Conservation Society (RCS), but will also serve as a document for broader circulation. Our clients are the wolves of Yeo Island.

**Background Information**

Wolf home sites are important and comparatively small areas where reproductive activities take place. Pups are born, fed, raised, and protected in the natal and secondary den sites, a series of rendezvous sites, and surrounding areas.

## Home site description

A den is an underground burrow or other sheltered place used by wolves. Wolf dens may be burrow systems, hollow logs, spaces between roots of trees, caves or crevices in rocks, abandoned beaver lodges, or expanded mammal burrows. A source of fresh water is usually nearby (Joslin 1967; Haber 1968; Clark 1971; Stephenson 1974; Person and Bowyer in press). All home sites documented in coastal British Columbia (n = 13; Darimont and Paquet 2000, unpublished data) and adjacent southeast Alaska (n = 22; Person and Bowyer in press) were in low elevation old-growth forests within 100-m of fresh water and under the roots or fallen trunks of large diameter trees. Many were next to beaver ponds or streams with active beaver colonies.

Dens may be found at locations other than where pups are born. For example, investigators have identified “secondary” dens, and dens are sometimes found at rendezvous sites (Haber 1968; Clark 1971; Chapman 1977). Den sites within a given pack's home range may be concentrated in a small area, e.g., 5 dens within a 15-km<sup>2</sup> area (Carbyn 1974). Research on wolf dens has been conducted in Alaska (Rausch 1969; Stephenson 1974; Chapman 1977; Ballard and Dau 1983), Canada (Mech and Packard 1990; Matteson 1993), and Minnesota (Fuller 1989; Ciucci and Mech 1992). In other studies, wolf den characteristics and den site selection have been topics peripheral to the main objectives of research (Murie 1944, and Haber 1977 [Alaska]; Joslin 1967 [Ontario]; Banfield 1954 and Clark 1971 [Canadian Arctic]; and Carbyn 1974 [Canadian Rockies]).

Wolves visit and prepare one to several den sites within their home range as much as 4-5 weeks before giving birth (Jordan et al. 1967; Clark 1971; Stephenson and Johnson 1973). Although not confirmed, most researchers believe the availability of a stable food source and security from predation (including human predators) helps determine den location (Paquet and Carbyn in press). As parturition nears, the pregnant female remains in the vicinity of the selected den (Young and Goldman 1944; Mech 1970). In southeast Alaska and coastal BC, pups are usually born during the last two weeks of April (Person and Bowyer in press; Darimont and Paquet unpublished data)

The natal den serves a brief but an important purpose by providing protection from the elements and potential predators for the first few weeks of life. Temperature and humidity in the den are generally moderate and stable, compared with the outside environment. Even after pups emerge from the den and begin to eat semisolid food regurgitated by adults, at 3-4 weeks (Mech 1970), wolf dens temporarily remain the centre of activity, the point from which adults go out to hunt and to which they return with food for the young.

Often two or more dens are located within a few hundred meters of each other with other dens several kilometres away (Banfield 1954; Clark 1971). Reported movements of pups from natal dens to secondary dens averaged 3 km ( $n = 14$ ) and ranged from 0.3 to 11.2-km (Chapman 1977). Recorded dates for the movement of pups to a secondary den or a rendezvous site are between early June and early July, when pups are 4-10 weeks old (Haber 1968; Paquet personal observation).

Rendezvous sites are areas where pups are left, usually with an adult, while pack members forage. Rest and play dominate the activities at rendezvous sites. They are characteristically centred near open, grassy areas that are bordered by trees or thickets with sources of water within 50 meters (Joslin 1967; Pimlott et al. 1969; Van Ballenberghe et al. 1975). In coastal areas, estuaries provide ideal habitat for coastal rendezvous sites (Darimont and Paquet 2000, personal observation). Abandonment of rendezvous sites appears to occur during September or October at all latitudes (Pimlott et al. 1969; Clark 1971; Voigt 1973; Van Ballenberghe et al. 1975). In coastal BC, rendezvous sites near salmon streams are often used until runs are exhausted (late October and beyond; Darimont and Paquet personal observation).

Re-use of established natal dens and rendezvous sites has been observed to occur in as many as 15 consecutive years (P. Paquet personal observation). Several authors report natal den and rendezvous sites being used four consecutive years (Clark 1971; Voigt 1973; Carbyn 1974). Voigt (1973) found one rendezvous site was used at least five times, and four others at least three times, during a period of nine years. Den use was traditional in 86% (6) of the denning alpha females studied for >1 year (Chapman 1977). Rendezvous sites may be occupied twice within the same year (Pimlott *et al.* 1969). Mech and Packard (1990) discovered evidence that suggested wolves might have used a den site over several centuries.

Sensitivity to disturbance by humans

Wolves are sensitive to disturbance in home sites and are known to abandon them due to human activities (Chapman 1977; Ballard *et al.* 1987; Person and Ingle 1995; Paquet *et al.* 1996; Weaver *et al.* 1996). The degree of human influence probably varies according to the environmental context. If a particular habitat is highly attractive, wolves appear willing to risk exposure to humans, at least within some limits (Paquet *et al.* 1996). As levels of disturbance increase, favourableness of habitat likely takes on greater importance. For example, we know that wolves select home sites near intense human activity when denning areas are limited, where innocuous human activity occurs (Chapman 1977), or abundant artificial food sources are available (Paquet *et al.* 1996; Krizan 1997).

The tension between attraction and repulsion is probably expressed differently by individuals, packs, and populations. Attraction to an area is a complex sum of physiography, security from harassment, positive reinforcement (e.g., easily obtained food), population density, and available choice. Moreover, the response to a particular disturbance seems to depend on disturbance-history (E. Zimen personal communication); a critical concept in understanding the behaviour of long-lived animals that learn through social transmission (Curatolo and Murphy 1986; S. Minta personal communication).

Reported cases of experimental and unintentional human disturbance show that wolves characteristically respond to human presence near their pups by barking and howling, leaving the area, moving the pups, or abandoning the home site.

Even the presence of researchers at den sites to conduct pup counts has caused den abandonment. Severity and continuity of disturbance might be the most critical factors influencing abandonment of homesites. Human disturbance of wolves at levels and type characteristic of National Parks probably does not have a significant impact on survival of wolf pups, nor does it seriously affect the ecological relationships between wolves and their prey (Chapman 1977). In only one of 51 cases examined by Chapman (1977) were pups abandoned. Pup mortality because of human disturbance has not been reported.

Potentially, human disturbance may lead to a decreased nutritional intake of pups by disrupting hunting by adults, or by causing wolves to move to areas of low prey availability. Infrequent disturbances probably do not affect feeding regimes. Movements from “preferred” den sites because of human disturbance could change prey availability. Whether the magnitude of the moves associated with human disturbance is sufficient to seriously alter prey availability is not known. Also, some pups could perish from accidental causes such as drowning when moved between homesites.

Thiel *et al.* (1998) observed high levels of tolerance and even habituation to human disturbance among some packs in Denali National Park and areas within the lower 48 states. However, it is important to note that these packs all had a significant “ambient disturbance baseline”, unlike wolves that live in areas less frequented by humans. Also, this tolerance and habituation predisposes wildlife to legal and illegal hunting.

**Details  
Specific to  
Yeo Island  
Home Site**

To best evaluate the possible consequences of timber harvest in an area used intensively by wolves, a comprehensive examination of all potential effects is necessary. Only in this context only can we consider recommendations regarding the protection of home sites.

Carrying  
capacity for  
deer

The main prey of coastal wolves is the Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) (Kohira and Rextad 1997; Darimont and Paquet 2000). Changes in the abundance or distribution of deer may affect populations of wolves. Wolf populations are known to decline as prey numbers decline (Gasaway *et al.* 1983; Peterson *et al.* 1984; Fuller 1989).

Mounting evidence suggests that large-scale clearcut logging in the Pacific Northwest removes, ostensibly forever, the old forests and the associated ecological characteristics with which deer and wolves have evolved over millennia (Wallmo and Schoen 1980; Alaback 1982; Schoen *et al.* 1988). Clearcuts offer deer a potentially abundant but often less nutritious (Van Horne *et al.* 1988; Hanley *et al.* 1989; Happe *et al.* 1990) food supply that may not be readily accessible due to snow or logging residue (Lyon and Jensen 1980; Wallmo and Schoen 1980; Harestad *et al.* 1982). More notably, available evidence suggests that clearcutting eventually changes productive old-growth forests into even-aged, second-growth stands of much lower habitat value for deer. Starting in the mid-successional or “stem-exclusion stage” (15-35 years), the dense canopy severely limits forage. These conditions may persist for 150 to 200 years if no additional harvesting occurs. However, under short-rotation, even-aged management, some understory plant species may never regenerate (Wallmo and Schoen 1980; Alaback 1982; Schoen *et al.* 1988). This loss in structure and function can be considered permanent. To this situation, Schoen *et al.* (1984) applied the term “nonrenewable old-growth habitat (for deer)”.

Access related mortality Forage along roads attracts deer (Romin and Bissonette 1996). Wolves use roads as travel routes, particularly when these thoroughfares become less active with vehicles (Thurber *et al.* 1994). It is thought that wolves use logging roads as efficient routes to access vulnerable prey (McNay and Voller 1995).

Humans also use logging roads to increase their hunting efficiency. Person *et al.* (1996) and Person and Bowyer (in press) showed that wolf harvest was significantly and positively correlated with the linear kilometres and density of roads in southeast Alaska. Wolves killed by hunters and trappers were located closer to roads and less often in productive old-growth forests. A large and growing proportion of wolves are killed directly from the road system (currently 44%) (Person *et al.* 1996; Person and Bowyer in press).

Several other North American studies have suggested a strong relationship between road density and activity or survival of wolves. Wolves that recolonized Wisconsin selected areas with low road density (<0.45-km/km<sup>2</sup>) (Mladenoff *et al.* 1995). Moreover, wolves generally do not persist in areas with average road densities greater than 0.6-km/km<sup>2</sup> (Thiel 1985; Jensen *et al.* 1986; Fuller 1989). The absence of wolves in densely roaded areas is thought to be due to increased human-caused mortality (Van Ballenberghe *et al.* 1975; Mech 1977). Even in areas where wolves are protected from legal hunting and trapping, humans who use roads kill a considerable number of wolves (Fritts and Mech 1981; Fuller 1989; Paquet 1993).

## **Chronology of Relevant Events**

- Pre 2000:** Wolves commonly observed on beaches near Yeo Island home site by Heiltsuk first Nation people. Locals report their ancestors seeing large packs running the beach.
- Summer 2000:** Wolf Project members found sign and observed behaviour indicating that wolves were denning near the east or Bullock Channel side of Yeo Island. Neither natal dens nor rendezvous sites were located.
- January 2001:** We reported evidence for current or historical homesites in Ingram Lake, Takush, and Lockhart Gordon watersheds on the mainland, and on Pooley, Roderick, and Yeo Islands (Darimont and Paquet 2000). We expressed concern that current or imminent forestry activities may adversely affect these six areas. In this document, we proposed a precautionary buffer from all industrial activities of at least 2-km from the known or estimated den sites.
- June 06, 2001:** Wolf Project members located the natal den on the east side of Yeo Island within WFP's Tree Farm License 25 (Figure 1)..
- July 2001:** Coastal Wolf Project sent a letter to WFP to inform the company that we had found an active homesite. In this letter, we stated that it was located in a proposed cutblock and next to the proposed road. We confirmed our willingness to discuss the design and implementation of proactive measures with WFP and Heiltsuk representatives as soon as possible.
- August 02 2001:** Researchers Chris Darimont and Chester Starr guided Laurence Brown (WFP Engineer) and Brett Waterfall (Heiltsuk Forestry Representative) to the homesite. The group toured the natal and two secondary dens. While in Bullock Channel, the group saw two pups on the beach in the homesite area.
- August – mid October 2001:** Coastal Wolf Project researchers continue to monitor the activities of the Yeo Island Pack. A litter count of six is made. Use of different rendezvous sites is noted. Notably, the pack is often seen at or near the mouth of a salmon-bearing creek south of the natal area (Figure 1). The pack was consuming significant amounts of spawning salmon.

## **Recommendation and Rationale**

The seriousness of human disturbance is ultimately a human judgement and, as such, some may consider any alteration of the normal activities of wolves to be undesirable. Interpretation of the wolf-human interaction is confounded by multiple factors that influence how wolves use the landscape and react to people (Mladenoff *et al.* 1995; L. Boitani personal communication; L. Carbyn personal communication; E. Zimen personal communication). Due to the wolf's inherent behavioural variability, it is unlikely that all wolves react equally to human induced change. Moreover, many extraneous factors contribute to variance in behaviour of individual wolves. Because we have developed no reasonable expression of those differences, assessments are usually applied at the pack and population levels.

Thus, our following recommendation reflects our current knowledge and the fundamental principles of Conservation Biology. We adhere to the "precautionary principle", which recognizes the inherent uncertainty in managing natural systems and stresses the sound judgment in erring on the side of caution.

As an appropriate starting point, following are recommendations made by other scientists and those adopted by management agencies:

- Chapman (1977) is recognised as the most comprehensive work ever conducted regarding home site use and sensitivity. Based on sensory abilities of wolves, distances at which wolves reacted to human presence, distances pups were moved following human disturbance, and distances from human activity centres that wolves normally denned, Chapman (1977) recommended prohibiting access within a 2.4-km radius of homesites. Preventing disturbance before pups are born is especially critical. Site closure should begin four weeks before pups are born to through August 01 (Chapman 1977).
- Matteson (1993), after assessing den sites in the Rocky Mountains, recommended a radial buffer of 10-km.
- The US Forest Service has a standard and guide in the Tongass Land Management Plan revision that calls for 1200 foot forested buffers around active wolf dens. Road construction is prohibited within 600 feet of an active den. The guidelines apply only when the den is active (April 15-July 15) (D. Person personal communication).

- In the Rocky Mountain National Parks (Banff, Kootenay, Jasper, and Yoho) and Alberta Provincial Parks, human activities such as hiking, which are far less disturbing than logging, are forbidden within a 1.6-km radius of home sites. In addition entire valleys are closed seasonally to human activities (P. Paquet personal communication).
- Regulations governing wolf reintroduction to Yellowstone National Park restrict human visitation to 1.6-km around active homesites (Fritts *et al.* 1994).

There is variability in the above recommendations likely due to the judgement of evidence in each study, differing ecological conditions, and the nature of the commonest disturbance types in each area. Policies likely reflect recommendations by ecologists and the prevailing political-social-economic environment.

We may proceed by examining issues relevant to the home site on Yeo Island. Specifically:

**1. Nature of Disturbance**

*Intensity:*

The proposed logging activity in the homesite area would rate as intense relative to activities such as hiking and camping. Chainsaws, and explosives and machinery used to build roads have been shown to cause considerable and measurable stress in wildlife (Wasser *et al.* 1997). Notably, Person and Ingle (1995) reported that a pack in southeast Alaska abandoned a den area shortly after road building activity near the den began in July 1993. Moreover, the pack significantly reduced their year-round activity in the entire valley.

*Constancy and Duration:*

Proposed logging activity (especially hauling) likely would occur throughout most days of the week and months of the year. This could continue years into the future when cutblocks to the north of the homesite are harvested, and during subsequent harvest rotations.

**2. Possible Impacts**

*Vehicular mortality:*

Logging vehicles will likely collide with, and kill or injure, wolves on the proposed roads through their homesite area. Pups are especially prone to these accidents (P. Paquet personal communication). At least one wolf was killed on Yeo Island by a WFP vehicle (Darimont communication from Yeo Island Site Manager). The proposed road is a mainline, which is a high traffic road.

*Access-related mortality:*

Roads will continue to provide access to hunters and poachers. Extension of the mainline through a homesite used by wolves will elevate the probability of wolf mortality.

**3. Extent of habitat fragmentation**

Yeo Island has already been intensively logged and proposed plans show continued industrial forestry. The area with the homesite is the least fragmented of the island (Figure 1), thus offering the greatest value in a protected area on the island.

**4. Island Ecology**

Due to its island environment, wildlife species on Yeo Island are more vulnerable than those on nearby mainland areas. Water bodies are thought to be a barrier or obstacle to movement (Person and Bowyer in press; Darimont and Paquet in review), especially for juvenile animals.

**5. Historical use by wolves.**

The Heiltsuk people refer to the area in question as “Wolf Beach”. They also report continuity of wolf activity dating back several human generations, which suggests repeated and traditional use of this homesite. This strong site attachment indicates that wolves may be less willing to abandon the area (immediately) if proposed development occurs. Remaining at the site could elevate the risk of mortality due to road access. Conversely, loss of a productive site might reduce reproduction for the Yeo Island pack.

**Recommendation for the site**

We propose a complete prohibition of road building and tree falling within a 2-km radius of all homesite features (Figure 1). This prohibition should be in perpetuity because the disturbance type (logging) is not ephemeral as other disturbances may be (hiking, camping etc.).

The total area of the buffer zone is considerably less than an inland site because it includes Bullock channel and adjacent mainland areas, which are areas outside of current forest development plans. This buffer zone would be recognised as the first protected area on Yeo Island, and would signal a progressive and environmentally sensitive step by WFP.



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