

# Bald Eagle Reaction to Construction on Back Island, Alaska

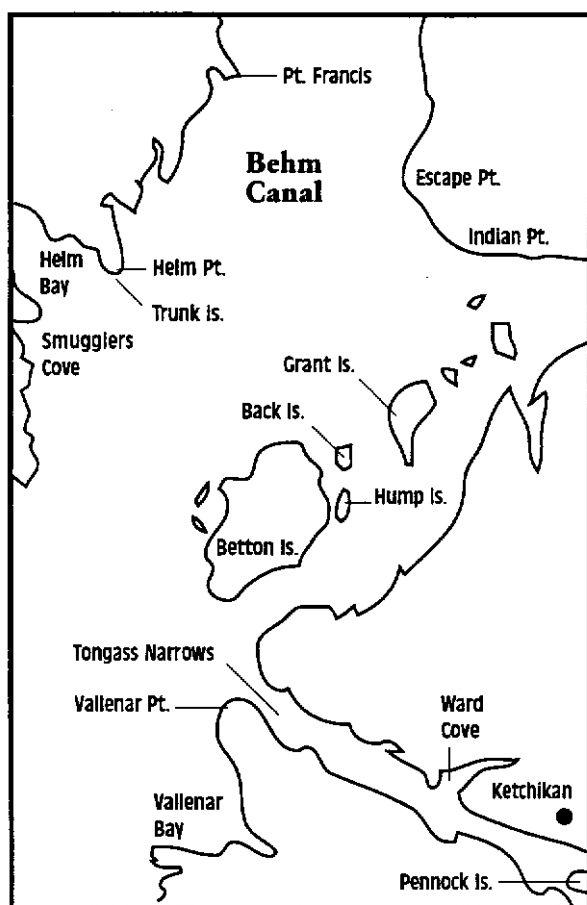
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## Introduction

In March of 1986, the U.S. Navy announced its selection of Back Island in Behm Canal, Southeast Alaska, as the preferred site for a proposed submarine acoustic measurement

Figure 1. Back Island in Western Behm Canal.



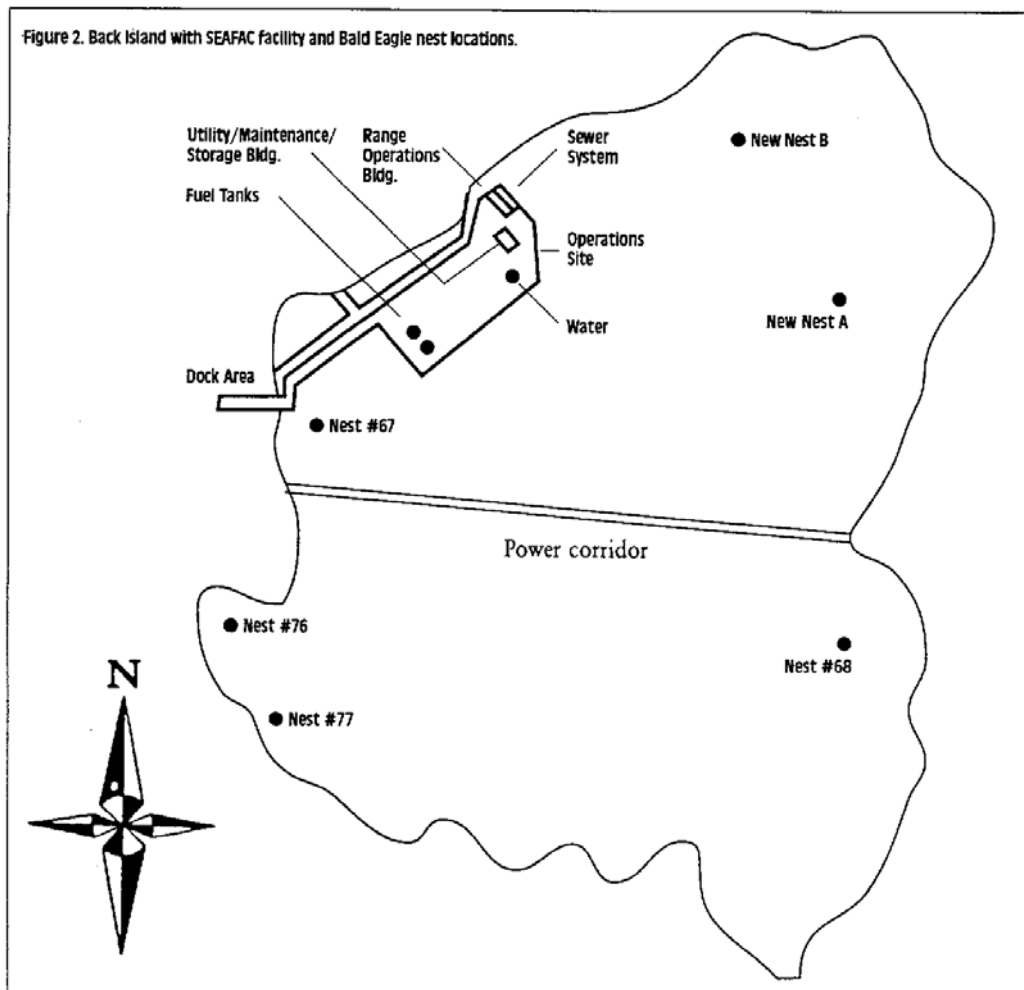
facility, or SEAFAC. Back Island, the site of the facility, constitutes 120 acres of island habitat. It is located within the Tongass National Forest, about 13 air miles north-northwest of the city of Ketchikan, Alaska. The island lies along the southern shore of western Behm Canal, between Betton Island to the southwest and Grant Island to the northeast (Figure 1). The interior of Back Island is forested mostly with western hemlock (*Tsuga heterophylla*) and western red cedar (*Thuja plicata*). Old-growth Sitka spruce (*Picea sitchensis*) dominate portions of the shoreline, providing suitable sites for eagle nesting and perching. *Vaccinium* spp. and salal (*Gaultheria shallon*) dominate the shrub layer.

Plans for the SEAFAC facility consist of an underwater measurement site, located in the center of western Behm Canal; a static site, located to the northwest of Back Island; and supporting shore facilities on Back Island. The shore facilities consist of the

operations area on the northwest side of the island and the dock area on the west side. The dock is a 268-foot long, 16-foot wide pile supported pier (Figure 2). The shore facility required the clearing of approximately 15 acres, which included the approach to the dock, access road to the operations area, operations area and clearing for security

fences. Clearing of the 15 acres began in November, 1989.

During the planning stages of this project, it was recognized that construction and operation of the acoustic measurement facilities could potentially affect Bald Eagle activity on Back Island. In Alaska, the Bald Eagle is protected under the Bald Eagle Protection Act (16 USC 668-668d). The act makes it illegal to take, possess, disturb or molest eagles, eagle parts, eggs or nests. The Bald Eagle and its habitat have been given additional protection through a Memorandum of Understanding between the Forest Service (FS) and the Fish and Wildlife Service (FWS). In 1985, the FWS (Alaska Region, U.S. Department of the Interior) and FS (Alaska Region, U.S. Department of Agriculture) drafted an interagency agreement outlining the responsibility of each agency to protect and manage Bald Eagles and their habitat within National Forests in Alaska (Samson 1998). This Memorandum of Understanding specifically addresses disturbance associated with blasting within one-half mile of eagles or active nests. Construction of the road, dock and facility would all occur within a one-half mile radius of nest #67. Thus, a "Back Island Bald Eagle Monitoring Plan" was developed in 1989 between the FS and FWS.



## Methods

The Monitoring Plan was developed to address the behavioral responses of resident breeding Bald Eagles to the activities associated with construction of the facility and was to be implemented during construction of the road, dock and facility. Field observation data were to be collected regarding the responses of eagles to various construction activities. The observer was to be responsible for determining the reproductive period of a nest, monitoring coastline for possible changes in nesting location, identifying a nest's occupancy status, interpreting eagle behavior in conjunction with construction activities, recording eagle behaviors during the monitoring periods and determining if the reproductive success of a nest were in jeopardy. Background information in the plan states that human activity near nest sites may result in reproductive failure by Bald Eagles (Stalmaster et al. 1985). Stalmaster has also suggested that human disturbance can disrupt breeding by reducing the occupancy, activity, success and/or productivity of nests or by causing total desertion of the nesting territory (Stalmaster 1987). In birds of prey, the impacts of disturbance have been documented, including nesting failures (Boeker and Ray 1971) and lowered nesting success (Wiley 1975, White and Thurow 1985).

The agreement called for monitoring of eagle nest #67 and all active nests on the west side of the island. Nest #67 was emphasized because it is 200 feet from the facility and it had been active since 1986. Observations, in lesser detail, were to be recorded on all other nests located on other portions of the island: #68, #76, #77 (a remnant nest) and two new nests found in 1990, numbered A and B.

Aerial surveys of Back Island have been conducted from 1986-90. Those surveys gathered information on nest location, activity and productivity. The proposed development of SEAFAC was the impetus for the surveys. Historical nesting data of Back Island is given in Table 1. Data were not available for 1987.

Table 1. Historical Bald Eagle nesting by year on Back Island collected by aerial survey.

Nest Number	1986	1988	1989	1990
67	A	A, N	A, N	I
68			A	*
76		T	A	I
New nest A				A, I
New nest B				I

A = Active (bird or egg on the nest).

N = Nestling(s) (nestlings seen or heard).

I = Inactive (no birds or eggs on nest).

T = Territorial activity (adults perched near nest).

\* = No data (no data available).

Monitoring of nesting territory establishment, nest reconstruction, nest activity (adults sitting in the nest or evidence of eggs), nesting and fledgling(s) stages of development began February 21, 1990 and extended to August 31, 1990. Prior to collecting

observation data, a general reconnaissance of the island was completed to determine locations of the Bald Eagle pairs. Behavioral information was collected and activities such as perching, foraging, vocalizing and flying were noted for each eagle forming a territorial pair. Nest #67 and #76 were observed at the same time because of location. New Nest A and new Nest B were observed together, also because of location. Observation time for #68 was less because of distance from the SEAFAC facility. A nesting territory was defined as a confined locality where nests are found, usually in successive years and where no more than one pair has ever bred at one time (Steenhof 1987). The observations were designed to begin prior to nest establishment so the field observer could become familiar with the locations of Bald Eagle nests, Bald Eagle behavior and locations for observations. Field observations were collected an average of two days per week, three to six hours per day. In winter, hours were often shortened due to weather and amount of daylight.

Observations of eagle behaviors for example perching, foraging, vocalizing and behavior associated with disturbance, were primarily made from a 17-foot Boston Whaler boat, though some observations were made from helicopter or on the ground. Ground observations were generally conducted only when necessary to verify boat observations of activity of nearby nests and adjacent nests on Betton Island. The Betton Island nests, used as a control, were not randomly selected but were chosen on the basis of logistics.

Two aerial surveys were flown during 1990 for Back Island and Betton Island. The purpose of the surveys was to determine Bald Eagle nest occupancy/success and verify nest locations. The objective of the first survey, flown May 24, was to count the number of pairs associated with nesting territories and the number of pairs with eggs. The goal of the second survey, flown July 17, was to count the number of successful pairs and the number of fledgling-age young.

A sound level meter was used to monitor noise levels on the ground associated with construction activities near new Nest B. The sound meter was used once.

## **Results**

Construction of the road, dock and facility began in the fall of 1989. Eagle observations began in February, which coincided with the dock construction phase. During that time noise levels were high due to pile driving activities associated with the dock construction. Three Bald Eagle nests were known to occur at the onset of the monitoring project and two additional nests were identified during the monitoring process (Figure 2). Eagle nest tree #67, located on the western shore of Back Island, is about 200 ft from the road construction. Nest #76 is located approximately 800 ft from the facility on the SW point of the island. Nest #77 is located 45 ft south of nest #76, was identified as a remnant and was not observed on a regular basis. Because alternate nests are often within a few yards of each other #77 may be an alternate for nest #76. Eagle nest tree #68 is located on the eastern shore of Back Island about 1600 ft away from the site and about 500 ft from the power corridor.

The nesting success of the resident Bald Eagles on Back Island and adjacent Betton

Island are shown in Table 2. All three Betton Island nests exhibited all stages of reproduction through nestling success. In contrast, no nests on Back Island advanced to the nestling stage. An association exists between ranking of disturbance and degree of nesting advancement. Ranking of disturbance was determined by field observation of construction activities within each territory. Each nest was ranked from most disturbed (1) to least disturbed (6). Nest #67 which was closest to the facility and experienced the most disturbance, ranked number one.

Table 2. 1990 Bald Eagle nesting advancement on Back island and adjacent Betton Island.

Island	Nest	Pair In territory From-To (month)	Work on nest Yes/No	Adult in nest From-To (month)	Eggs Yes/No	Nestling Yes/No	Rank of Disturbance* 1 = most; 6 = least
Becton	66	02-08	Yes	04-05	Yes	Yes	6
Betton	65	02-08	Yes	04-05	Yes	Yes	6
Betton	64	02-08	Yes	04-05	Yes	Yes	6
Back	Nest A	02-08	Yes	08	Yes	No	5
Back	68	02-08	Yes	05	No	No	4
Back	Nest B	02-08	Yes	No	No	No	3
Back	76	02-08	No	No	No	No	2
Back	67	02&07	No	No	No	No	1

\* Ranking of disturbance was determined by field observation of construction activities within each nesting territory.

Nest #67, with a ranking of 1, did not advance beyond territorial pairing. Nest #67 was never occupied in 1990. This is one of the oldest nests on the island and was active in 1986, 1988 (with nestlings) and 1989 (with nestlings) (Table 1). In 1987, no data were available. The nest is visible from the water and 200 ft from the road to SEAFAC. Because this road serves as an access road, high levels of activity have occurred since November, 1989, when clearing of the land and road building to the waste area began.

Blasting and drilling began December 6 1989 and continued periodically through February. Building of the access road began December 9, 1989. Although this area has been historically active, little eagle use was observed during the monitoring period. Of approximately 50 hr observation time of this nest, eagles were observed perched near the nest for only 3.5 hr and foraging near the nest for 3 hr. While there was intermittent territorial use, there was no nest reconstruction and no use was seen at the nest tree.

Nest #76 was not occupied in 1990, although there was an adult pair in the territory. The nest is visible from the water and on a prominent point in the SW section of the island. The dock area of SEAFAC is approximately 1,000 ft from the nest. High noise levels were associated with the construction of the dock which began March 12, 1990. The first piles were driven in March and drilling was completed May 2, 1990. Constant activity

was observed in the area in the form of approaching boat traffic, heavy construction and human activity. Boat traffic consisted of one jet boat, several smaller transport boats and barges off-loading equipment. One adult pair were observed in the territory since the beginning of observations. Of approximately 50 hr of monitoring time of this nest, an eagle pair was observed 43 hr perched in the territory. There was no nesting activity observed in 1990, although the nest was active in 1989 (Table 1).

New Nest B was identified in May 1990 in the operations section of SEAFAC. It is visible from the water, approximately 200 ft from the beach. The nest is 199 ft from the operations site waste area. Because the nest was not identified earlier, a 330-foot buffer was not provided, making it more vulnerable to disturbance. Construction activities began in the waste area November 14, 1989, with rudimentary road building after the trees were cut. After identification of the nest in May, the operation of equipment the last 200 ft of the waste area was restricted. Construction activities were monitored in June and noise levels 199 ft from the nest were measured at 75 decibels. Of the 50 monitoring hours of the nest, an eagle pair was observed 31 hours perched in the territory. No eagles nested in this territory, although nest reconstruction was observed in May 1990. This nest may be an alternate for nest #67. Or it may be what is referred to as a frustration nest, partial or entire nests constructed after breeding failure. This may have been constructed after the abandonment of #67. The area may also be the nesting territory of a Bald Eagle pair.



Nest abandonment leads to certain death of eaglets. Photo by Steve Cain.

An adult eagle was briefly observed in the nest in May, however, the nest did not produce young. Of the approximately 20 hr observation time of this nest, a pair of eagles were observed 16 hr perched in the territory. The nest was active in 1989 (Table 1). The nest is not visible from the water, is 800 ft from SEAFAC and 500 ft from the power corridor (Figure 2). Disturbance to this eagle pair was observed July 30, 1990. Heavy equipment was operating in the power corridor near the beach. As the area was approached by boat, the eagles were observed with heads thrown back, giving the scream call. The birds then flew around the operating heavy equipment. Two eagles from the territory of new Nest A joined them and all four eagles flew together, calling.

New Nest A was identified in May 1990 in the NE section of Back Island. It is visible from the water, approximately 150 ft from the beach. The distance from the end of the access road to this nest is 600 ft. There had been a Bald Eagle pair in the territory since observations began. Of 50 hr of monitoring this nest, a Bald Eagle pair was observed perched in this territory 46.5 hr. In April, a subadult Bald Eagle performed the circling display for approximately fifteen minutes. A territorial chase ensued, the adult Bald Eagle extending talons to harass the subadult. This was observed on three occasions in spring 1990. On the basis of these observations and the large size of new Nest A, it appears that this territory has been historically active. During the aerial survey flown May 24, one egg was seen in new Nest A, thus the nest was thought to be active. However, observations from boat before and after the survey were not consistent; the female was not seen incubating the egg, but was perched with the male 90% of time observed. On July 26, nest reconstruction was observed. Then, on August 24 the female was observed for two hr on the nest in incubating posture.

Three nests on Betton Island, located about one mile west of the western shoreline of Back Island, were used for the control group. Betton Island received approximately 30 hr of monitoring time. Due to close proximity to Back Island, nest #66 was also observed while observing nest #67 and #76 on Back Island. No construction activity occurred on the island and the habitat is comparable. Though it is in close proximity to Back Island, noise levels were insignificant and human activity, other than research observations, was absent. All nests observed on Betton Island were active and produced young: #66 produced two fledglings, #65 and #64 each produced one. No unoccupied nests were identified in the observed portion of Betton Island.

## **Discussion**

As evidenced by the historical breeding data (Table 1) and the 1990 nesting abandonment (Table 2), nesting was adversely affected by disturbance. On the basis of approximately 150 observation hours at Back Island from February 21 to August 24, 1990, it appears that nesting success was influenced by human activities. Human activity near nest sites has been suggested to result in reproductive failure by Bald Eagles (Stalmaster 1987). Of importance at Back Island was the eagle's breeding chronology and the timing of construction activities. Increased levels of disturbance were taking place during the most critical times of Bald Eagle nesting, egg laying and incubation. Noise levels were higher than ever experienced. Human activity, insignificant in past years, was increasing. This may have been reason for the early abandonment of nest #67 and development of the

frustration nest. Eagles vary widely in their response to human activity. Some pairs of eagles will tolerate activity near the nest, others are not as permissive, as evidenced by the 1990 nesting success rate of Back Island. Raptors in frequent contact with human activities tend to be less sensitive to additional disturbances than raptors nesting in remote areas (Newton 1979). Similarly, whether or not there will be detrimental effect may depend on several factors, including the stage of nesting cycle and the duration of the disturbance (Gerrard and Bartolotti 1988).

Gerrard and Bartolotti (1988) state, "Studies of the effects of human activities near eagle nests have yielded variable results, although most suggest that people have a negative effect on nesting success. It is easy to be misled or get false impressions of the influence that humans have on the productivity of nesting eagles because of examples of a few tame individuals. Some eagles are fairly tame, but others are extremely upset by the presence of humans even hundreds of yards away from their nest. Much of the variability in behavior may perhaps be attributed to learning. Experience with a specific kind of disturbance generally has one of two effects on the eagle's subsequent behavior toward that disturbance. The bird may habituate to it, that is, show no adverse reaction, for it has learned that there is nothing to fear. Alternatively, eagles may become so sensitized that they react with ever-increasing intensity." This was observed in July near nest #68.

A correlation can be made between the absence of the production of young and a change in the level of disturbance on Back Island. There were five nests on Back Island in 1990. The nest closest to the facility, #67, receiving the highest ranking of disturbance, advanced the least in 1990. No eagles on Back Island produced young in 1990, yet there is a record of strong historical use (Table 1). Of the three nests observed on Betton Island, where disturbance was low to nonexistent, nesting advancement extended to the nestling stage in all nests (Table 2).

## **Conclusion and Recommendations**

Much of the landscape in Southeast Alaska has not experienced activity at the levels of the Back Island project. Although Back Island is within the Clover Pass Scenic Area, past activity has been limited to recreational boat traffic and an occasional picnic on the island. Hunting pressure has not been significant (Bob Wood, ADFG biologist, pers. comm.).

Evidence suggests a strong negative relationship between the amount of disturbance as a ranking and the nesting advancement of Bald Eagles on Back Island. Construction activity produced increased noise and levels of human activity. Future long-term management recommendations, though, will require the collection of additional data.

The recommendation is to continue the monitoring program to determine what happens to the birds when construction disturbances decrease and the facility begins operation, which will be in 1991. Nesting raptors may or may not reuse the same nesting territory the year following the disturbance.

The monitoring program format should be similar to that which existed this year for



consistency, though with increased intensity. All nests on the island should be given equal weight as disturbance has occurred in some form near all five nests and will likely continue, but at various levels. Field observations would be made two times per week from March 1 through August 31, 1991. I recommend routine use of a noise meter, perhaps placing one at each nest site. Time lapse cameras could be used to monitor nests and could be placed with the noise meter at each nest site or at selected sites. This could be a cooperative study with the USFWS who have the equipment. A project such as this would require additional funding, but could produce significant research and management implications.

The general SEAFAC operations plan should concentrate on minimizing SEAFAC disturbance to the nests during the critical stages of egg laying and incubation, establishing a 330-foot buffer for all active nests. It is known that falcons nesting in remote areas may be more sensitive to human activities (Newton 1979) and more restrictive management involving disturbance to the birds may be necessary. Operating guidelines might include the use of a propeller boat instead of a jet boat and general land noise kept to a minimum at recommended times.

### **Acknowledgements**

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*Editors' Note: Back Island was resurveyed by the U.S. Fish and Wildlife Service during June 1998. None of the original nests observed during this study were found. Two new nests were found on the south shore at Back Island; both were inactive.*

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