BIOLOGICAL ASSESSMENT

ON IMPACTS TO

PEREGRINE FALCONS

MARCH, 1984

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release Distribution unlimited
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION US Army Corps of Engineers Seattle District 6b. OFFICE SYMBOL (If applicable) CENPS-EN-PL	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) PO Box 3755 Seattle, Wa. 98124-2255	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) Biological Assessment on Impacts to Peregrine Falcons	
12. PERSONAL AUTHOR(S) Mr. Ken Brunner	
13a. TYPE OF REPORT Study 13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) March 15, 1994 15. PAGE COUNT 11
16. SUPPLEMENTARY NOTATION	

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

A study was undertaken to identify the impacts to peregrine falcons of a proposed small boat harbor in Lummi Bay. The impacts were classified as falling into three categories: (1) habitat loss and modification, (2) human disturbance, and (3) pollution.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL Mr. Ken Brunner	22b. TELEPHONE (Include Area Code) (206) 764-3479 22c. OFFICE SYMBOL CENPS-EN-PL-ER

DD Form 1473, JUN 86 *Previous editions are obsolete.* SECURITY CLASSIFICATION OF THIS PAGE

Planning Branch

4 JUN 84

Mr. Jim Bottorff
Endangered Species Team Leader
U.S. Fish and Wildlife Service
2625 Parkmont Lane SW., Bldg. B-2
Olympia, Washington 98502

Dear Mr. Bottorff:

Enclosed for your information and review is the biological assessment (BA) evaluating the possible effects of a proposed marina in Lummi Bay, Whatcom County, Washington, on two subspecies of peregrine falcon. The American peregrine falcon (Falco peregrinus anatum) is listed as endangered on the list of endangered and threatened wildlife and plants, while the Peale's peregrine falcon (F. p. pealei) is listed as endangered by virtue of its similarity of appearance to F. p. anatum. Section 7 of the Endangered Species Act of 1973, as amended (Public Law 97-304), requires Federal agencies to prepare a BA for actions that may affect listed species.

The BA concludes that the proposed Lummi Bay Marina would impact the listed subspecies of peregrine falcons. A few mitigation measures are described in the BA which we feel require discussion between your agency, the Lummi Tribe, and the Seattle District before thought is given to implementation. Therefore, I request formal consultation with your office. We are aware of the standard 90-day Fish and Wildlife Service BA review period, but request that you expedite your review and initiate consultation at the earliest possible time to help us achieve our study schedule. Please contact Mr. Andy Maser, study manager, at FTS 399-3651 to discuss the consultation schedule. Questions on the BA may be addressed to Mr. Ken Brunner, wildlife biologist, at FTS 399-3624.

Sincerely,

George W. Ploudre, P.E.
Assistant Chief, Engineering Division

NPSEN-PL-ER 15 March 1984

LUMMI BAY MARINA, WHATCOM COUNTY, WASHINGTON
BIOLOGICAL ASSESSMENT ON IMPACTS TO PEREGRINE FALCONS

1. Introduction. A small boat harbor to provide a navigation access channel and moorage for 438 commercial fishing boats is proposed for the northwestern corner of the sea pond in Lummi Bay on the Lummi Indian Reservation. The Lummi Indian Tribe requested the Seattle District, U.S. Army Corps of Engineers, to conduct a study to identify the feasibility of Federal assistance in the project. The tribe is the local sponsor for the Corps of Engineers study and has agreed to provide the non-Federal legal responsibilities and monetary requirements associated with project development.

Engineering, environmental, and economic studies; survey and foundation investigations; and tidal hydraulic analysis have been conducted to evaluate and design a project at the sea pond site. Plan formulation is essentially completed, with the project features as indicated in figure 1.

Two subspecies of peregrine falcon (Falco peregrinus pealei and F. p. anatum) are known to winter in small numbers in the study area. The American peregrine falcon (F. p. anatum) is an endangered species as listed by the Federal Government on the list of endangered and threatened wildlife and plants. Peale's peregrine is now listed as endangered under similarity of appearance. Section 7 of the Endangered Species Act of 1973, as amended (Public Law 97-304), requires Federal agencies to assess whether a proposed project may result in impacts (including secondary impacts) to listed species that occur in the project area.

2. Project Description. Based upon preliminary estimates, the project will require dredging of 1.47 million cubic yards (c.y.). This includes dredging for the navigation entrance channel (645,000 c.y.), dredging for the marina access channel and turning basin (180,000 c.y.), and dredging for the moorage basin (645,000 c.y.). The proposed channel depth is -12 feet mean lower low water (MLLW). The proposed moorage basin depth varies from -8 to -12 feet MLLW.

The material from project construction dredging would be disposed of within a diked area in the northwest portion of the sea pond, and the uplands formed from this material would be utilized for construction of marina support facilities. Maintenance dredging for the navigation entrance channel, access channel, and turning basin would consist of dredging 40,000 c.y. at 5-year intervals. Advanced maintenance dredging is proposed to be done concurrently with initial project construction. Disposal for maintenance dredging is tentatively planned to occur in a confined disposal site within project diked areas of the sea pond. The plan for maintenance dredging and disposal will be confirmed prior to proposed project maintenance.

The navigation access channel would be dredged a distance of about 7,300 feet through a natural channel in the intertidal area of Lummi Bay. The current channel depth in Lummi Bay where the proposed navigation channel is to be constructed ranges from 1 to 3 feet deeper than the surrounding tideflats. The proposal consists of a channel that would be 100 feet wide at the bottom and 250 feet wide on the shoulders, with side slopes of 4:1 (4 horizontal to 1 vertical). The moorage basin would be approximately 1,450 feet long by 1,000 feet wide, with side slopes of 4:1, and would provide permanent moorage for 438 commercial fishing boats. The moorage basin would contain an interior access channel and a turning basin, as well as berthing area floats and piers. A timber pile breakwater is proposed for the moorage basin entrance to reduce wave action in the marina. Access to the upland facilities from the shore would be by wharves, timber deck, and piers supported on timber piles. Marina support facilities are planned to include a fish buying and processing plant, egg house, cold storage warehouse, web and gear lockers, unloading pier, boat haul out areas, shipyard, restrooms, showers, harbor master building, barge building, fishery supply store, restaurant, small grocery store, and fish market. Sewage is proposed to be pumped out of the area to an existing sewage treatment plant located at existing uplands on the Lummi Indian Reservation. Stormwater runoff will be captured and routed to catch basins.

3. Methods. An intensive 3-month study of peregrine falcon use of Lummi Bay and vicinity was conducted between 2 October and 31 December 1983 by Mr. Clifford Anderson under contract to the Seattle District, Corps of Engineers. His final report is attached as appendix A. Prior to this study, no other study of peregrine falcons had ever been conducted at or near Lummi Bay. Accordingly, Mr. Anderson's report is the primary source of local (i.e., site specific) information utilized in this biological assessment (BA). Because this study was concluded in December, and because no other site specific studies of peregrines have been conducted near Lummi Bay, impacts to peregrines at other times of the year are far more difficult to assess. The author assumes the winter season to be the most critical for peregrines at Lummi Bay since they are known to be most abundant during that season; impacts at other seasons are assumed to be similar but affecting a smaller number of falcons. Individuals knowledgeable about peregrine falcon use of the project area were contacted and interviewed. Available literature on the peregrine falcon was reviewed and pertinent information was used in this assessment. All persons contacted and literature reviewed are listed at the end of this BA.

4. Impacts of the Proposed Project on Peregrine Falcons.

a. Description of the Environment. Lummi Bay consists of an extensive area of intertidal flats and a small amount of shallow subtidal habitat. The outer bay, which has extensive eelgrass beds, provides habitat for a wide variety of marine animals which support juvenile and, possibly, adult Dungeness crabs. Some of the eelgrass provides spawning habitat for Pacific herring which comprise a fishery and are an important food base for salmon and other fish. Lummi Bay has moderate to high value for all species of waterfowl that utilize the bay, especially in winter and spring (Wahl, et al., 1981). Lummi Bay is considered to be especially important for black brant during

their spring migration, at which time the bay supports 6 percent of the brant population in northern Washington waters (Wahl, et al., 1981). Lummi Bay is also considered to be "very important" to wintering birds, particularly diving and surface feeding ducks, gulls, and shorebirds (Wahl, et al, 1981). The sea pond was created about 10 years ago as an aquaculture facility for raising oysters and pan-sized salmon. It was formed by the construction of a dike on intertidal flats and encompasses about 760 acres. Water exchange between the sea pond and Lummi Bay is relatively restricted despite tide gates that connect the two water bodies at several locations along the dike. The restriction in water exchange and the shallow depth of the sea pond have resulted in high summer water temperatures in the sea pond which limit salmon rearing. Despite this limited use of the sea pond for raising salmon, it appears this diked off area may also have produced unexpected benefits to waterfowl. Rafts of several thousand ducks are now regularly observed in the sea pond during the fall and winter (Anderson, 1984). The dike surrounding the sea pond appears to provide a wind break, thus making the sea pond a calm area of refuge during storms. The dike also serves the same function for the northern portion of Lummi Bay, making it calmer during storms originating from the southwest than it was prior to constructon of the dike. The sea pond is not only important to waterfowl during storms but also at other times as a place to feed and rest (Anderson, 1984). At the present time, any individual can drive or walk along the entire length of the dike. Although no data is kept, possibly 5 to 10 vehicles per day traverse the dike (likely sightseers or hunters in search of waterfowl). The only consistent human activity on the dike occurs at the oyster rearing facility at the southeastern corner of the dike.

b. Peregrine Falcon Use of the Project Area. The Lummi Bay area appears to be a major fall and winter habitat for peregrine falcons. As many as six peregrines were seen in one day during Anderson's study. A minimum of 15 individual peregrines were sighted during the course of his 3-month study. Of these 15 birds, at least three were believed to have established fall residency in the Lummi Bay area based on multiple sightings of these three birds. These are surprisingly large numbers of falcons for an area as small as Lummi Bay and the surrounding lands. In fact, the area is believed to support the highest density of wintering raptors in western Washington (Anderson, 1984).

Probably the primary reason the vicinity of Lummi Bay is so attractive to raptors, and peregrine falcons in particular, is the juxtaposition of varied habitats within a relatively small area isolated from similar favorable habitats. The key features are a sheltered saltwater bay and tideflat attractive to large numbers of waterfowl and shorebirds; flat, treeless agricultural fields; and exposed perches for hunting and feeding. The presence of a consistently large, available prey base (i.e., waterfowl and shorebirds) is probably the strongest factor that attracts the peregrines to Lummi Bay. Wahl, et al. (1981), established that 10,000 to 20,000 ducks use Lummi Bay every winter. In addition, Anderson found approximately 8,000 dunlin inhabiting Lummi Bay in November and December. Waterfowl and shorebirds constitute the primary source of prey for peregrines migrating and wintering in western Washington (Anderson and DeBruyn, 1979). Also, out of 122 hunting flights of peregrines observed

by Anderson (1984), 102 of the prey pursued by the falcons were waterfowl or shorebirds. Anderson (1984) observed 42 peregrine kills, of which 34 were either waterfowl or shorebirds, consisting of green-winged teal (31 percent of all kills), mallard, greater scaup, lesser scaup (unidentified ducks, 29 percent of kills), dunlin (12 percent of all kills), and American golden plover. The other prey items were one each of pied-billed grebe, horned grebe, ring-billed gull, red-winged blackbird, and four unidentified birds. Based on these observations, the peregrine appears to have a preference for small ducks and other small birds in Lummi Bay. This is consistent with the fact that peregrines at this bay carry their kills relatively large distances to find suitable perches on which to feed.

Most hunts by peregrine falcons (115 out of 153) occurred over Lummi Bay (104) or the sea pond (11) (Anderson, 1984). The rest were over the agricultural lands of Lummi Flats (the flat, low lying lands immediately northeast of Lummi Bay). Probably this simply reflects that the prey animals are most commonly in Lummi Bay, though they (i.e., waterfowl) often feed on the uplands as well. An important finding of Anderson relating to the proposed Lummi Bay Marina project was that several thousand ducks were observed to frequently utilize the sea pond between October and December and represent a source of prey for peregrine falcons (Anderson, 1984). The dike surrounding the sea pond apparently provides a barrier to winds and maintains relatively quiet water within the sea pond, thereby attracting waterfowl, particularly during stormy periods. Waterfowl also feed in the sea pond, but it is not certain to what extent. In addition, the sea pond is utilized by waterfowl during low tides when much of Lummi Bay is dewatered but the sea pond still has water. Anderson found that the dike surrounding the sea pond is important to peregrines as a feeding area; i.e., an area to which the falcons bring their fresh kills to eat. The dike is exposed, which is important as it allows the peregrines to keep an eye out for other raptors intent on obtaining an easy meal from the falcons. This is also important since it takes from 25 to 47 minutes to eat a duck, which gives another raptor ample time to attack and take the falcon's prey if it so chooses. This behavior (known as kleptoparasitism) is relatively common in areas with high densities of raptors. Generally, peregrines eat only one meal a day, and the process of capturing the prey can take a significant amount of energy. If the kill is taken from the falcon, then it must try again. Should this be a persistent problem, the peregrine would likely leave the area rather than using excessive energy trying to kill and eat a meal. Use of the western sea pond dike (far out into Lummi Bay) is an advantage to peregrines in that few other raptor species will venture that far out over water in search of prey. The portion of the dike most often used by peregrines is the northwestern corner in the vicinity of the proposed location of the access channel to the marina. Peregrines also use a group of pilings just off the southern tip of Sandy Point for feeding, as well as logs on mudflats, other pilings, the ground, and various other exposed perches with high visibility, though only some of all available perches are utilized. Anderson (1984) found that peregrines carried their prey to preferred perches (rather than eating their prey close to the kill site) far more frequently than had been observed in

studies in other areas. Anderson deduced that this was primarily because the high density of raptors puts extreme pressure on any raptor that has successfully captured prey (e.g., because of kleptoparasitism) and also because suitable feeding perches are apparently scarce in Lummi Bay (only some of the available perch sites are known to be utilized), suggesting that the unutilized perches may not be suitable. Thus, feeding perches take on a special importance in Lummi Bay since only a few perches play a very important role in daily behavior of peregrines.

Perches from which to hunt are also important. It is advantageous for peregrines if such perches are high above the ground, with good visibility of the flocks of waterfowl and shorebirds and minimal disturbance from humans. Such perches are most ideally provided in the Lummi Bay vicinity by Douglas fir (Pseudotsuga menziesii) trees on the ridge at the north end of the bay (Anderson, 1984). These trees are also used for perching. Other perches utilized by peregrines for hunting and perching include logs on mudflats and beaches, pilings, deciduous trees, and plowed or recently harvested agricultural lands (on the ground). Again, not all available perches are utilized.

The final component important to peregrines that spend the fall and winter in an area such as Lummi Bay is the availability of an overnight roost. A roost identified by Anderson (1984) utilized by peregrines feeding at Lummi Bay was on Orcas Island, approximately 11 miles southwest of Lummi Bay. This roost was used repeatedly by at least one peregrine, possibly several others (Anderson, 1984). The roost is important as a sheltered place to rest and sleep at night, and also frequently serves as a convenient place to rest during the day (peregrines often spend several hours of daylight at the night roost).

Spring and summer use of the Lummi Bay vicinity by peregrine falcons has not been investigated. However, one active eyrie (cliff nest) is located within 10 miles of Lummi Bay. This nest has been observed for the past 3 years (1981-1983) and has fledged young 2 of the 3 years. Little is known of the activities of this pair of falcons. It is believed they use Lummi Bay only sparingly for foraging, though they potentially disperse there in late summer during the shorebird migration (Anderson, 1984).

A spring migration of peregrine falcons has recently been documented for the Cape Flattery vicinity (Anderson, 1983). Because northern Puget Sound has high shorebird numbers in spring and because peregrines winter in relatively large numbers in northern Puget Sound, Anderson believes there is likely a spring migration of peregrine falcons through Lummi Bay. This has not been studied however.

c. Impacts of the Proposed Project on Peregrine Falcons. Expected project impacts on peregrine falcons fall into three major categories: (1) habitat loss and modification, (2) human disturbance, and (3) pollution.

Waterfowl and shorebird habitat would be lost or modified from dredging of the entrance channel (35 acres) and the marina moorage basin, access channel, and turning basin (31 acres) and from a 65-acre area of the sea pond adjacent to

the marina where dredged material would be disposed to form uplands upon which would be built the marina support facilities. Thus, about 131 acres of intertidal and shallow subtidal habitat, as well as portions of the existing sea pond dike, would be lost or modified by project construction. The loss or modification of intertidal and shallow subtidal habitat is expected to be partially offset by initially reintroducing 90 acres of the sea pond to tidal action. Twenty-five acres of this 90 is tentatively planned to be filled with dredged material from maintenance dredging of the channel and harbor over a 50-year period. The remaining 65 acres of sea pond reintroduced to tidal action would probably mean less waterfowl use than currently exists due to the alternately inundated/dewatered condition resulting from tidal action. On the other hand, at low tides the area would be more attactive to shorebirds than it is currently. In summary, the impacts include 65 acres lost through initial fill (plus about 6 more fill acres from dike construction surrounding the marina, mitigation, and maintenance dredging disposal areas), 66 acres modified by dredging and construction of the marina, and 90 acres of protected sea pond changed to tidal and fill areas. This reduction in habitat may mean a reduction in waterfowl numbers in Lummi Bay and perhaps a small increase in shorebird numbers. However, it is impossible to predict the magnitude of such changes. A significant reduction in prey base would mean less food for the peregrine falcons and other raptors that compete for this food source and, therefore, fewer raptors (including peregrines) utilizing Lummi Bay, particularly during the fall and winter. Lummi Bay's extremely high density of raptors is considered to be a result of high quality habitats and readily accessible prey base, as well as the fact that other similar raptor habitats in the region are assumed to be filled to carrying capacity. Thus, should waterfowl numbers be reduced, peregrine falcons and other raptors from Lummi Bay may also be reduced in numbers. An increase in shorebird numbers in Lummi Bay may offset a reduction in waterfowl numbers, depending on the size of the decrease in waterfowl and the increase in shorebirds. On the other hand, for reasons discussed in detail below, peregrines may not utilize shorebirds in this area of the sea pond.

Anderson found that the natural channel that would be deepened for the navigation access channel (i.e. through Lummi Bay) is used by waterfowl during low tides when much of Lummi Bay is dewatered. This use would likely be lessened because of the boat traffic. Some or all of the waterfowl that currently use the channel would be displaced to an alternate area. Such an area may not exist close by, thus an additional reduction in waterfowl numbers could result from channel dredging (worst case).

Also included in habitat losses is that of a known perch used frequently for feeding by peregrine falcons. Loss of this perch may impact peregrine feeding behavior since quality feeding perches are quite scarce. An important feeding perch on the sea pond dike would be lost to construction of the marina. Another portion of the dike, if isolated from humans, may provide a substitute perch. However, this cannot be predicted with certainty. Peregrine falcons are highly selective for feeding perches, as shown by the fact that many apparently suitable perches are available but not used (such as the pilings extending southwest from the sea pond). Pilings off the tip of Sandy Point

constitute a primary feeding perch, with the sea pond dike serving as a secondary feeding perch when the falcons are disturbed from the Sandy Point perch. It may be that the northwestern corner of the sea pond dike was chosen by the peregrine as an alternate perch site because this is the closest portion of the dike to Sandy Point. Energy budgets of wintering birds are generally such that if the bird is disrupted from routine behavior, causing it to use additional energy, then it could weaken the bird to a critical condition. Should the northwestern corner of the dike become unavailable as a perch due to marina construction, the next nearest portion of the dike isolated from human disturbance would be one and one-third times farther than the northwestern corner of the dike is from Sandy Point. This additional distance would demand additional energy from the falcon, which, over the course of winter, could prove critical. No other known alternate feeding perches are nearby to the sea pond dike perch. Additional discussion relating to the primary perch at Sandy Point is placed in paragraph 4.d. The possibility of mitigating for lost feeding perches is discussed in paragraph 4.e.

Human disturbance is expected to increase if the marina is constructed. Many more people would be utilizing the northern portion of the sea pond and dike than currently use it. Boat traffic in Lummi Bay would increase, particularly during the early fall fishing season. The potential fishery may consist of salmon, crabs, herring, and bottomfish. Most fishing activity should occur during the fall, with boat activity expected to be substantially less during winter. Fishermen are expected to devote time at the marina facilities to other activities during winter, such as mending of nets and boats, etc. Barge construction and fish processing activities (primarily on the filled uplands) would occur throughout the year. Thus, activity at the marina support facilities does not drop off significantly during the winter. Secondary and tertiary effects may occur over time since the marina could spur increased human use in the vicinity of the marina or on the uplands adjacent to the shoreline of Lummi Bay, thus potentially resulting in the loss of more habitat; however, the likelihood of such development is considered slight. Human disturbance can be direct, such as waterfowl hunters shooting at the falcons or human disturbance can be indirect in the sense that the mere presence of man can be enough to disrupt feeding by peregrines. Anderson (1984) found the closest he could approach a peregrine was 150 yards. Thus, a subtle but important factor is that the peregrines would be expected to avoid areas of activity, such as the marina and immediately developed areas (including the proposed tidal habitat mitigation on the sea pond), as well as boats, by some (unknown) distance, thus reducing their foraging area by more than just the acreage taken up by the marina and facilities. If boats are using Lummi Bay (not considered likely since the bay is shallow; boats are expected to be confined to the navigation channel), their presence may result in additional stress on peregrines. As mentioned earlier, boat use of the channel at low tides would disrupt waterfowl use of the channel and reduce prey availability to peregrines.

A few pilings not far from the dike and near the shoreline of Lummi Bay are used by peregrines for perching. Anderson found that the presence of man-made structures (such as houses, pilings, roads, buildings, etc.) did not in themselves disturb peregrines. But whenever humans appeared, the peregrines took

flight from their perches. Even approaching vehicles do not always disturb peregrines, but, if the vehicle stops, and people emerge, most of the time the peregrine will take flight (author's personal experience). Some pilings are close enough to the dike that marina construction activities would likely prevent use of the perches by peregrines. Use of the perches would likely not continue when the marina is built because of the significant increase in human activity associated with the marina.

Pollution in Lummi Bay resulting from major boat fuel and oil spills could result in localized secondary impacts such as fouling of bird's plumage and food source reduction and/or contamination. The substrate of Lummi Bay consists of mud and eelgrass, considered to be one of the most vulnerable substrates to long-term damage from oil spills (Simemstad, et al., 1979). Wahl, et al. (1981), feels Lummi Bay is one of the most critical areas in north Puget Sound in winter and spring for many species of waterfowl. They further analyze that a high percentage of the birds that utilize Lummi Bay are also those that are most susceptible to oil spills. Though this is of concern, past experience with marinas of similar size to the proposed Lummi Bay Marina suggests that oil pollution should not be a significant problem. Lummi Bay waters are presently considered to be "AA", extraordinary, by the Washington State Department of Ecology. Thus, pollution of such a pristine body of water is difficult to predict. Chronic inputs of fuel and oil to the substrate could result in long-term accumulation of hydrocarbons and heavy metals in fine-grained sediments. Since most of the sedimentary material in the proposed marina basin is sand, most of the hydrocarbons and metals will be dispersed into the open water. The concentrations of these elements will not be toxic to aquatic organisms although they may be bioaccumulated through the food chain. The bioaccumulation is not expected to be significant. Therefore, pollution, though undesirable, is not expected to result in significant impacts to peregrine falcons.

There are no known night roosts in the near vicinity of Lummi Bay and Lummi Flats. In fact, trees that may provide for such roosts would not be affected by the marina; thus, it is predicted that the marina would not impact any night roosts of peregrine falcons.

Discussion of impacts to this point has focused on fall and winter peregrine use of Lummi Bay. Peregrines that utilize the bay in spring and summer can be expected to suffer similar impacts, though perhaps to a lesser extent, since it is believed that fewer peregrines use Lummi Bay in these seasons. Of course the impacts are still great if one peregrine is forced to abandon Lummi Bay. The peregrines known to nest within 10 miles of Lummi Bay are not known to utilize Lummi Bay and may not be affected by the marina.

d. Cumulative Impacts. Another project is currently proposed for construction in the vicinity of Lummi Bay harbor entrance improvement for recreational boats at Sandy Point. This project would improve the existing access for boats into and out of the residential development at Sandy Point. Currently about 400 recreational boats use the Sandy Point system of canals. The number of boats could increase following channel improvements, especially

since a public boat launch will be provided for the first time. This project would not directly impact the primary feeding perch of the dominant peregrine in Lummi Bay in fall 1983 (Anderson, 1984). The perch consists of pilings located just off the southern tip of Sandy Point. Presently there are no structures located near the pilings and little human use exists in this portion of Sandy Point. Anderson found that he could approach the pilings in a vehicle only to within about 150 yards, at which point the peregrine, if perching there, would leave. Whenever other humans approached the perch near Sandy Point, the peregrine (if present) took flight (Anderson, 1984). Thus, a concern was that the Sandy Point project might spur development of the area near the perch and perhaps preclude use of the perch by the peregrine. However, Seattle District, Corps of Engineers, has conducted an economic analysis and has concluded that the project would not create additional demand for development than currently exists at Sandy Point. Therefore, the perch at Sandy Point would not be affected, either directly or indirectly, by the Sandy Point project.

e. Potential Mitigation Measures. It would be very difficult to modify the plan of the Lummi Bay Marina due to physical constraints of the site. As a result, mitigation measures must be devised to alleviate impacts resulting from marina construction. Effective mitigation measures should ideally focus on replacement of feeding and hunting perches, minimizing human disturbance, and maximizing of waterfowl and shorebird habitat and population levels. In addition, mitigation measures, once established, should be monitored. It appears that the most critical impacts to peregrine falcons resulting from construction of the proposed Lummi Bay Marina would be the loss of an important feeding perch, coupled with increased human disturbance in the vicinity of potential alternate perches. When potential impacts to the primary feeding perch from the Sandy Point project are added in, the potential loss of feeding perches could be severe. Thus, suitable alternative feeding perches must be provided. These should be highly visible and approachable by peregrines yet far away from potential human activity and disturbance by raptors. This is no easy task since, as mentioned earlier, peregrines are highly selective of feeding perches and currently use only a handful of available perches in the Lummi Bay area for feeding, making placement of artificial perches somewhat untenable. Nonetheless, if the marina is constructed, alternative perches must be provided. These could be pilings driven in the middle of Lummi Bay or perhaps artificial islands with logs and grasses, or even spare tires on mudflats. To provide better assurance of success, several perches should be provided; the more perches provided, the better the chances that one or more will be used. Such perches could be used by peregrines for either feeding or hunting/perching, or both.

Another measure that would benefit peregrine falcons would be the restriction of human use of the sea pond dikes, particularly the interior dikes and the outer dike surrounding the southern half of the sea pond (except for emergency repairs, etc.). Such a restriction would encourage continued peregrine use of the dike for feeding.

A few measures have been discussed that would be aimed at holding waterfowl in the area despite the habitat losses that would occur from marina construction. These measures are all characterized by high expense and complex planning and design efforts, thus making them infeasible as currently envisioned. Nonetheless, should other, less costly and simpler mitigation measures prove unworkable, these expensive measures could merit consideration. Briefly, the measures include such ideas as subimpoundments in Lummi Bay, impoundment of the Lummi River, and raising of crops to support wintering waterfowl.

Another possible measure to hold more waterfowl in the area would be to reduce hunting harvests in Lummi Bay. This could be done by reducing bag limits and with stronger enforcement of current hunting regulations.

Following marina construction, waterfowl and shorebird populations should be monitored to determine whether their numbers are stable and that they continue to provide a consistent food source for the peregrines. Any significant disturbance of intertidal and subtidal habitat (such as oil spills) should be cleaned up immediately.

It should be noted that it is not implied that the mitigation measures described herein would be successful if established. Rather, the measures are suggested as possible means of alleviating impacts to peregrines. These and other measures would need to be discussed among the Lummi Tribe and Federal and state agencies prior to construction of the marina.

5. Conclusions. The proposed Lummi Bay Marina would impact peregrine falcons. It is impossible to assess with certainity the severity of impacts. It seems clear that some reduction in the prey base would occur and a loss of perches would occur. These, combined with increased human activity, seem certain to result in a reduction of the peregrine falcon population utilizing Lummi Bay. Planned mitigation to introduce 90 acres to tidal action would probably reduce waterfowl use in that mitigation area. Replacement of perches, provision of measures to hold waterfowl in the area, and restriction of human activity on the sea pond dikes are of utmost importance. Seattle District, Corps of Engineers, concludes that the proposed Lummi Bay Marina, if constructed, would result in impacts to peregrine falcons.

6. References.

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Beebe, F. L. 1960. The marine peregrines of the northwest Pacific coast. Condor 62 (3):145-189.

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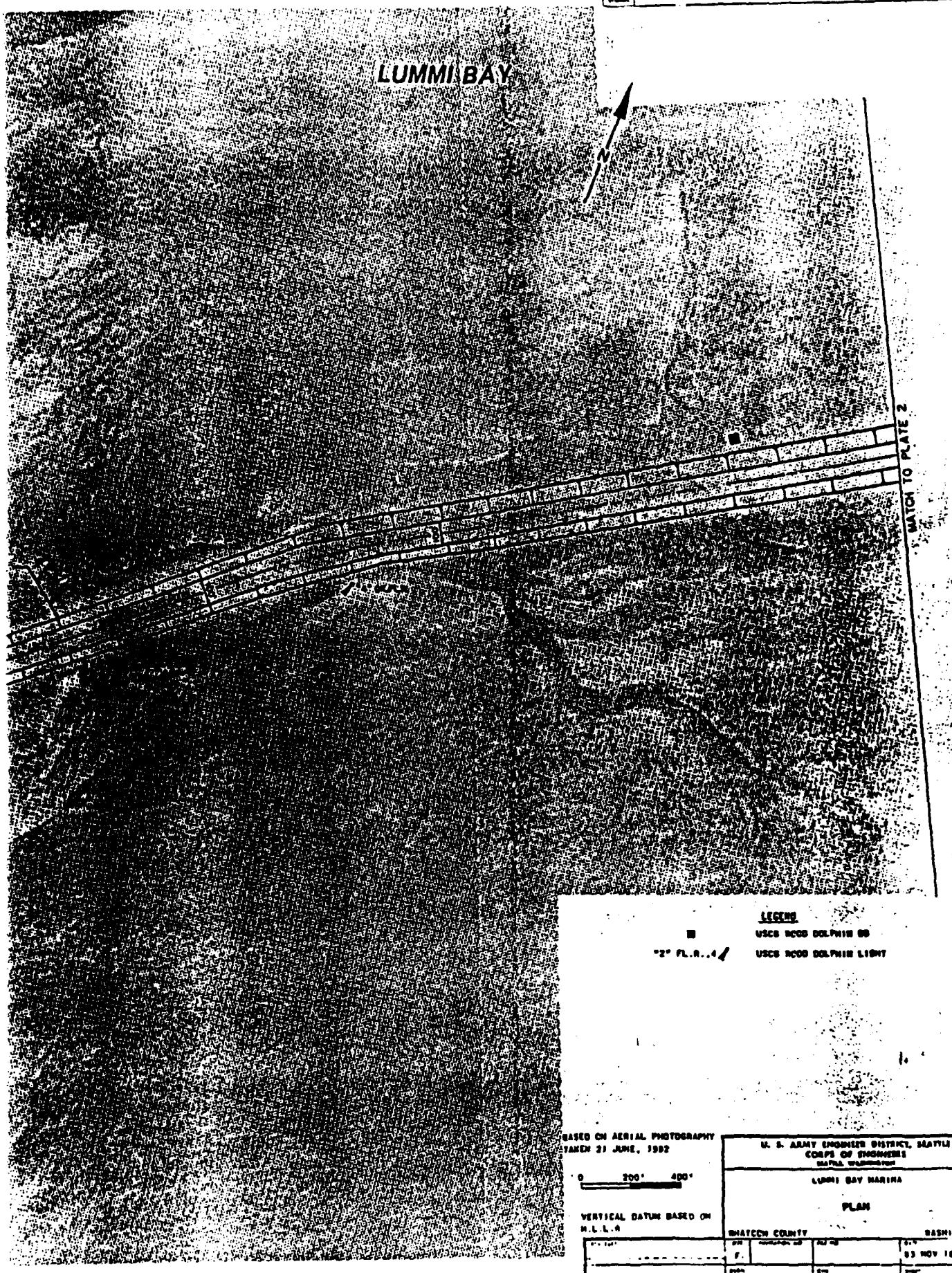
Wahl, T., S. Speich, D. A. Manuwal, K. V. Hirsch, and C. Miller. 1981. Marine bird populations of the Strait of Juan de Fuca, Strait of Georgia, and adjacent waters in 1978 and 1979. U.S. Environmental Protection Agency, Washington, D.C. 125 pp.

STRAIT OF GEORGIA
ENTRANCE CHANNEL



REVISIONS

Month	Description	Date	By

LEGEND

■ USCG ROSS DOLPHIN 88

"2" FL.R.,4 USCG ROSS DOLPHIN LIGHT

BASED ON AERIAL PHOTOGRAPHY TAKEN 21 JUNE, 1982

0 200' 400'

VERTICAL DATUM BASED ON M.L.L.W.

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

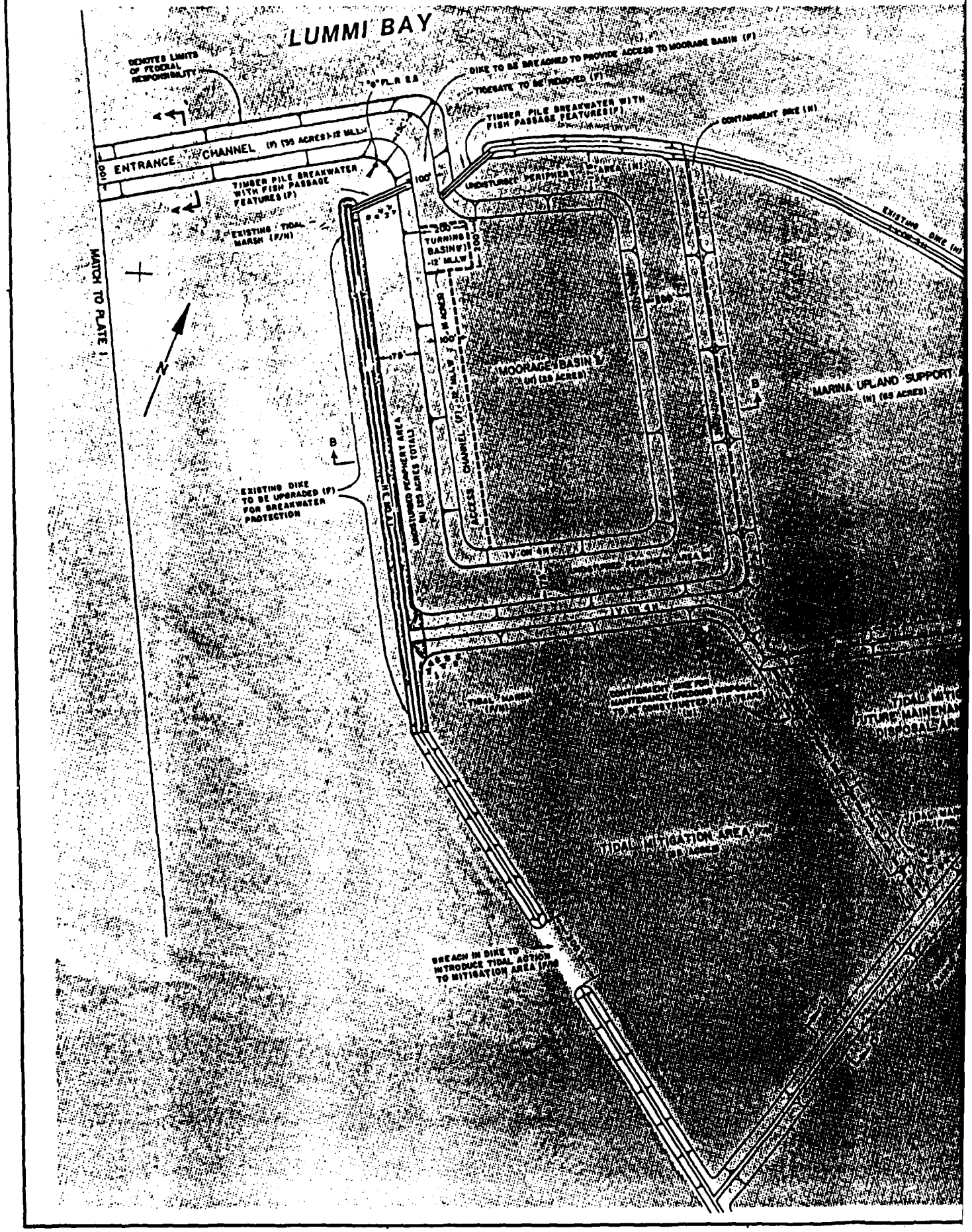
LUMMI BAY MARINA

PLAN

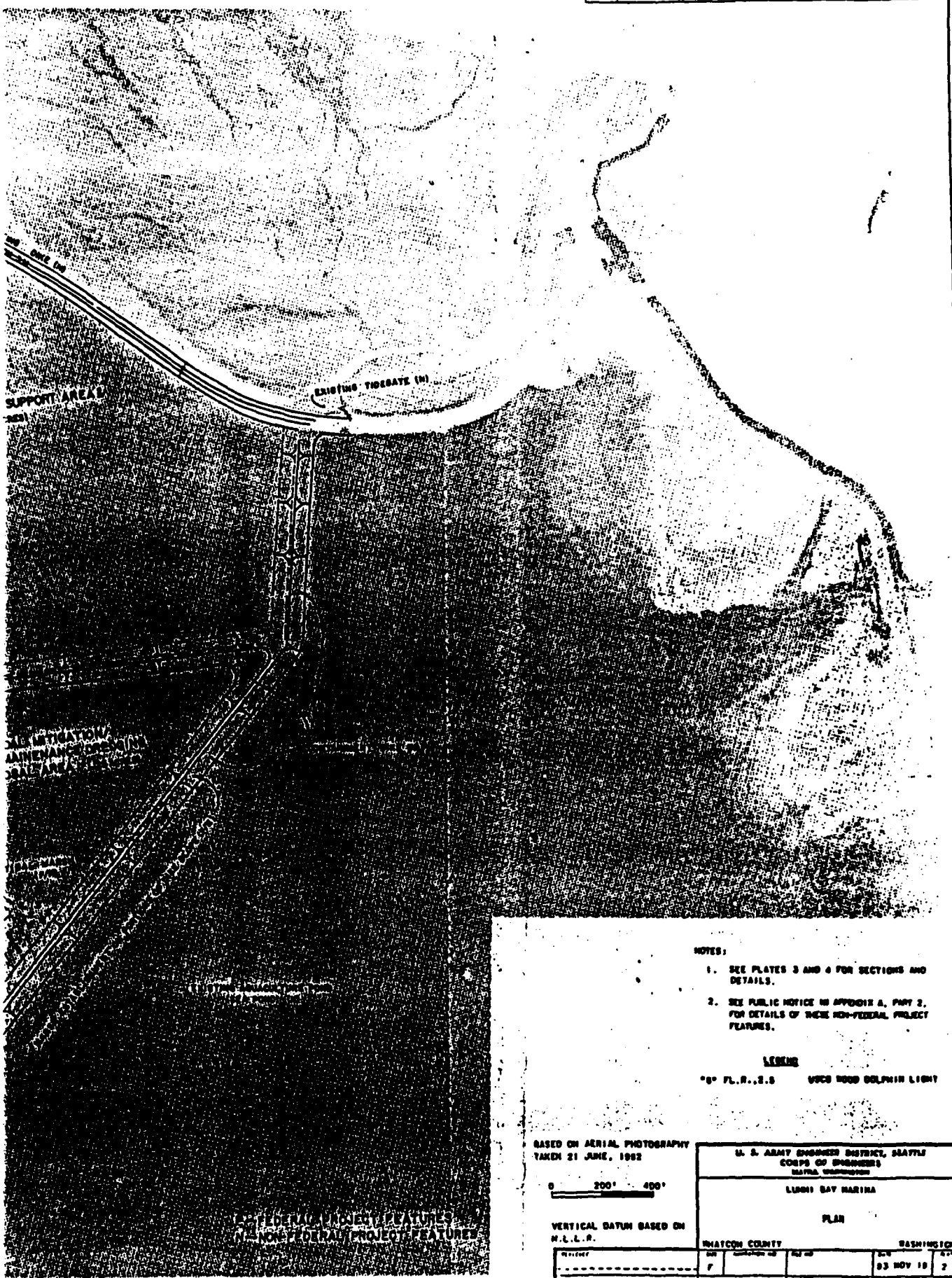
WHATCOM COUNTY WASHINGTON

Designed	Drawn	Traced	Date	Sheet
	F.		83 NOV 18	1

8


LUMMI BAY
DENOTES LIMITS OF FEDERAL RESPONSIBILITY
DIKE TO BE BREACHED TO PROVIDE ACCESS TO MOORAGE BASIN (F)
TIDEGATE TO BE REMOVED (F)
TIMBER PILE BREAKWATER WITH FISH PASSAGE FEATURES (F)
CONTAINMENT DIKE (N)
ENTRANCE CHANNEL (F) 135 ACRES -12' MLLW
TIMBER PILE BREAKWATER WITH FISH PASSAGE FEATURES (F)
EXISTING TIDAL MARSH (F/N)
UNDISTURBED PERIPHERAL BUFFER AREA (N)
EXISTING DIKE (N)
TURNING BASIN (F) -12' MLLW
MOORAGE BASIN 'B'
MARINA UPLAND SUPPORT (N) (69 ACRES)
MATCH TO PLATE 1
EXISTING DIKE TO BE UPGRADED (F) FOR BREAKWATER PROTECTION
CHANNEL (F)
TIDAL MARSH (F/N)
TIDAL MITIGATION AREA
BREACH IN DIKE TO INTRODUCE TIDAL ACTION TO MITIGATION AREA (F/N)

REVISIONS			
SYMBOL	DESCRIPTION	DATE	BY



NOTES:

1. SEE PLATES 3 AND 4 FOR SECTIONS AND DETAILS.
2. SEE PUBLIC NOTICE IN APPENDIX A, PART 2, FOR DETAILS OF THESE NON-FEDERAL PROJECT FEATURES.

LEGEND

"G" FL.R.,2.5 USCG ROSD DOLPHIN LIGHT

BASED ON AERIAL PHOTOGRAPHY TAKEN 21 JUNE, 1982

0 200' 400'

VERTICAL DATUM BASED ON M.L.L.W.

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

LUMMI BAY MARINA

PLAN

WHATCOM COUNTY WASHINGTON

PROJECT	DES	CONSTRUCTION NO.	REF NO.	DATE	SHEET
	F			83 NOV 10	2
	DRAWN	CHK		SHEET	

8

United States
Department of the Interior

Fish and Wildlife Service
Lloyd 500 Building, Suite 1692
500 N.E. Multnomah Street
Portland, Oregon 97232

In Reply Refer To: AFA-SE

Your Reference: 1-3-84-F-41

SEP 27 1984

Colonel Roger F. Yankoupe
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Yankoupe:

This is in response to the June 4, 1984 (received June 7, 1984) request of Mr. George Ploudre of your staff for formal consultation pursuant to Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA). This consultation is to address the project impacts of the proposed Lummi Bay Marina project, Whatcom County, Washington on the Federally endangered peregrine falcon (Falco peregrinus). Additional project information necessary to complete this consultation was requested from your agency. We received that information on July 10, 1984. This opinion is based on the biological assessment supplied with your consultation request, the biological data collected by Mr. Clifford Anderson (Anderson, et al. 1984) under contract to your agency for this project, and information in our files. Furthermore, Mr. Fred Dobler, raptor biologist with the Washington Department of Game, reviewed your data and supplied valuable input into this opinion.

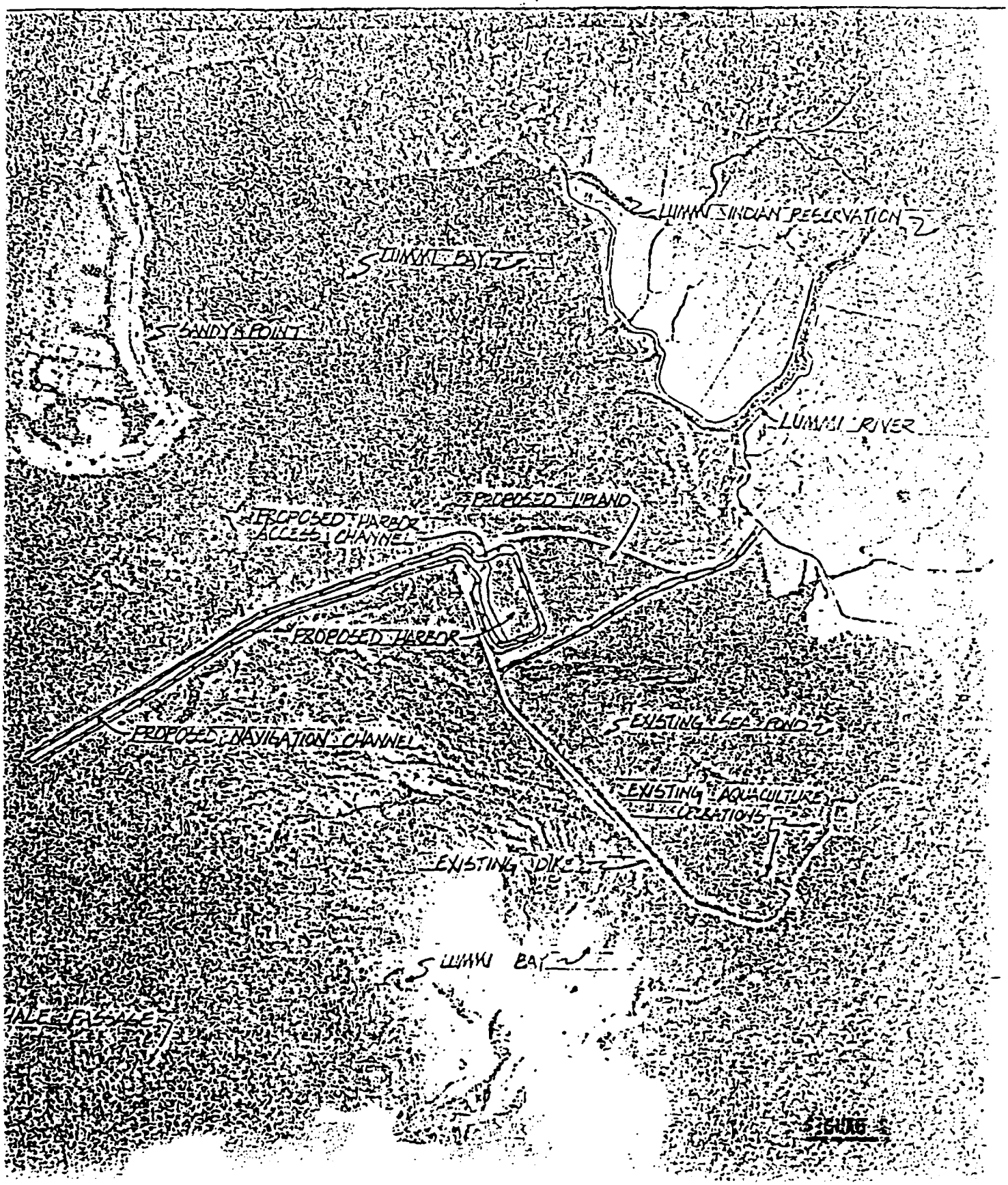
Biological Opinion

It is our biological opinion that construction of the Lummi Bay Marina will not jeopardize the continued existence of the peregrine falcon. It will unquestionably result in habitat and prey base loss and disruption of normal peregrine falcon activities. Conservation measures are presented that, if implemented, would reduce the deleterious effects of this project.

Project Description

The project would be located within Lummi Bay, a shallow estuary (about 5700 acres) connected to Puget Sound. The project consists of the dredging of material for a navigation channel, harbor access channel, and turning basin in addition to filling and construction of upland marina and fish processing facilities. The marina would be located within the existing 750-acre sea pond. This structure was constructed as an aquaculture facility approximately 10 years ago. It is surrounded by a dike which contains tidegates to allow for some water exchange. A view of the proposed development is contained in Figure 1, which was supplied by your agency, as was the following description of the project features.

POND SMALL BOAT HARBOR AND NAVIGATION CHANNEL
LUMMI RESERVATION, WHATCOM COUNTY, WASHINGTON
CONCEPTUAL PROJECT LAYOUT - AUG 82



Based upon preliminary estimates, the project will require dredging of 1.47 million cubic yards (c.y.). This includes dredging for the navigation entrance channel (645,000 c.y.), dredging for the marina access channel and turning basin (180,000 c.y.), and dredging for the moorage basin (645,000 c.y.). The proposed channel depth is -12 feet mean lower low water (MLLW). The proposed moorage basin depth varies from -8 to -12 feet MLLW.

The material from project construction dredging would be disposed of within a diked area in the northwest portion of the sea pond, and the uplands formed from this material would be utilized for construction of marina support facilities. Maintenance dredging for the navigation entrance channel, access channel, and turning basin would consist of dredging 40,000 c.y. at 5-year intervals. Advanced maintenance dredging is proposed to be done concurrently with initial project construction. Disposal for maintenance dredging is tentatively planned to occur in a confined disposal site within project-diked areas of the sea pond. The plan for maintenance dredging and disposal will be confirmed prior to proposed project maintenance.

The navigation access channel would be dredged a distance of about 7,300 feet through a natural channel in the intertidal area of Lummi Bay. The current channel depth in Lummi Bay where the proposed navigation channel is to be constructed ranges from 1 to 3 feet deeper than the surrounding tideflats. The proposal consists of a channel that would be 100 feet wide at the bottom and 250 feet wide on the shoulders, with side slopes of 4:1 (4 horizontal to 1 vertical). The moorage basin would be approximately 1,450 feet long by 1,000 feet wide, with side slopes of 4:1, and would provide permanent moorage for 438 commercial fishing boats. The moorage basin would contain an interior access channel and a turning basin, as well as berthing area floats and piers. A timber pile breakwater is proposed for the moorage basin entrance to reduce wave action in the marina. Access to the upland facilities from the shore would be by wharves, timber deck, and piers supported on timber piles. Marina support facilities are planned to include a fish buying and processing plant, egg house, cold storage warehouse, web and gear lockers, unloading pier, boat haul out areas, shipyard, restrooms, showers, harbor master building, barge building, fishery supply store, restaurant, small grocery store, and fish market. Sewage is proposed to be pumped out of the area to an existing sewage treatment plant located at existing uplands on the Lummi Indian Reservation. Stormwater runoff will be captured and routed to catch basins.

As part of the project, six pilings and four tires will be placed on the tideflats north of the sea pond. Furthermore, hunting from the dike as well as non-maintenance access to the dike would be restricted. These measures were included to partially offset impacts to favored falcon perching sites.

Species Account

Previous accounts of the requirements for this species have been presented in documents referenced in your biological assessment and your contracted study. Furthermore, new information presented in the assessment contributed

to a species account on a local and site specific level. Salient points in those documents that have a direct influence on the analysis of project impacts are as follows:

1. Lummi Bay has one of the highest known concentrations of migrating and wintering peregrine falcons on the West Coast.

2. Large numbers of waterfowl occur on Lummi Bay in general and within the sea pond in particular.

3. The sea pond afforded protection to waterfowl during stormy periods as well as a loafing area when the remainder of Lummi Bay was dewatered at low tide.

4. Sixty-seven percent of the prey items taken by falcons during project environmental studies were waterfowl. Sixteen percent of the prey items were shorebirds.

5. Kleptoparasitism frequently occurs, and carrying of kills to preferred feeding perches was frequently recorded.

6. A high degree of philopatry to feeding perches and roost sites occurs.

7. Lummi Bay offers a complete complement of required habitats and food base within a relatively confined area for migrating and wintering peregrine falcons.

8. Although data are limited, the contract study revealed that perched falcons would flush from and depart the perch when a human approached closer than 150 yards.

Site specific analysis of Lummi Bay was conducted from late October through December. As no data are available from the site for the late winter through spring period, assumption is made that the recorded level of use during the study period will continue throughout the winter and through the spring migration.

Only recently have migration and wintering patterns of peregrine falcons in the northwestern United States been studied. The importance of some preferred migration and wintering habitats is beginning to be documented and understood. Winter is a stressful period for falcons. Energy demands are quite high because of the requirements associated with body maintenance during extensive periods of inclement weather as well as energy requirements during migration. Reduction of available prey species and habitat or the availability of prey and habitat may result in birds returning to eyries in less than optimal condition, thus causing or contributing to lowered productivity and survival. The species is already severely depressed. From 50 to 175 nesting pairs remain north of Washington in western Canada and Alaska. Population declines are primarily due to the presence of certain pesticides, habitat loss and persecution.

Analysis of Impacts

An excellent description of most impacts associated with the project proposal was presented in your biological assessment. We concur with your basic findings of project impacts and repeat them below. They have been divided into three categories: (1) habitat loss and modification, (2) human disturbance, and (3) pollution.

About 131 acres of intertidal and shallow subtidal habitat would be lost or modified. A subsequent loss of waterfowl (primary prey base in Lummi Bay) is indicated. A possible increase in shorebirds was hypothesized. If this does occur, it is doubtful (albeit unknown) if falcons would successfully hunt for shorebirds within the remaining sea pond area and if shorebirds could sustain the same population of falcons that have subsisted primarily on waterfowl. A favored perch site will also be lost to project construction.

Human activity associated with construction, commercial fishing, and operation of shoreside and dockside facilities is expected to increase. A subsequent avoidance by falcons of those areas experiencing increased activity can be expected. Although not specifically addressed, future secondary developments associated with marina construction may occur, leading to even more avoidance of the area. Almost all recorded falcon use was contained in an area to the north of the sea pond. This area north of the sea pond comprises much less than one-half of Lummi Bay and is most subject to human disturbance.

Oil and fuel spills and bilge flushing may impact the food chain and subsequently falcons through reduction of prey species. Although difficult to predict or quantify, this will further reduce the ability of Lummi Bay to support a population of migrating and wintering peregrine falcons.

The result of these impacts will be a loss of habitat for both the falcons and their prey species. Disruption of their normal activities and possibly displacement from remaining preferred habitats near the developed areas will occur due to disturbance. The potential for a further reduction of prey species from pollution is also a realistic threat. Mitigation measures were incorporated into the project to reduce the habitat loss and disturbance, but those measures will not eliminate the adversities. Although impossible to quantify from the data presented with the consultation request, increased stress and subsequently lowered productivity and survival may result. Preferred perches and the best remaining habitat may continue to be dominated by a few falcons. Other falcons will suffer the deleterious chain of effects associated with the marina development.

Biological Opinion

It is our biological opinion that construction of the Lummi Bay Marina is not likely to jeopardize the continued existence of the peregrine falcon. Adverse impacts will occur, however, though not of the magnitude leading to loss of the species.

Conservation Measures

Sections 2(c) and 7(a)(1) of the ESA require Federal agencies to utilize their authorities to further the purposes of this Act and to carry out programs for the conservation of listed species. Your agency has the opportunity to fulfill those mandates by implementing the following measures. If implemented, these measures would further reduce the adverse impacts associated with development. However, they would not eliminate all impacts nor would they improve habitat within Lummi Bay with the exception of recommendation number 8.

1. Dredging of the proposed harbor access channel, associated filling within the sea pond, and initial marina construction activities should not occur during the fall and winter period (October-March).

2. As stated in your project description, access to the sea pond should be restricted to only official construction and maintenance travel and use during the fall and winter period.

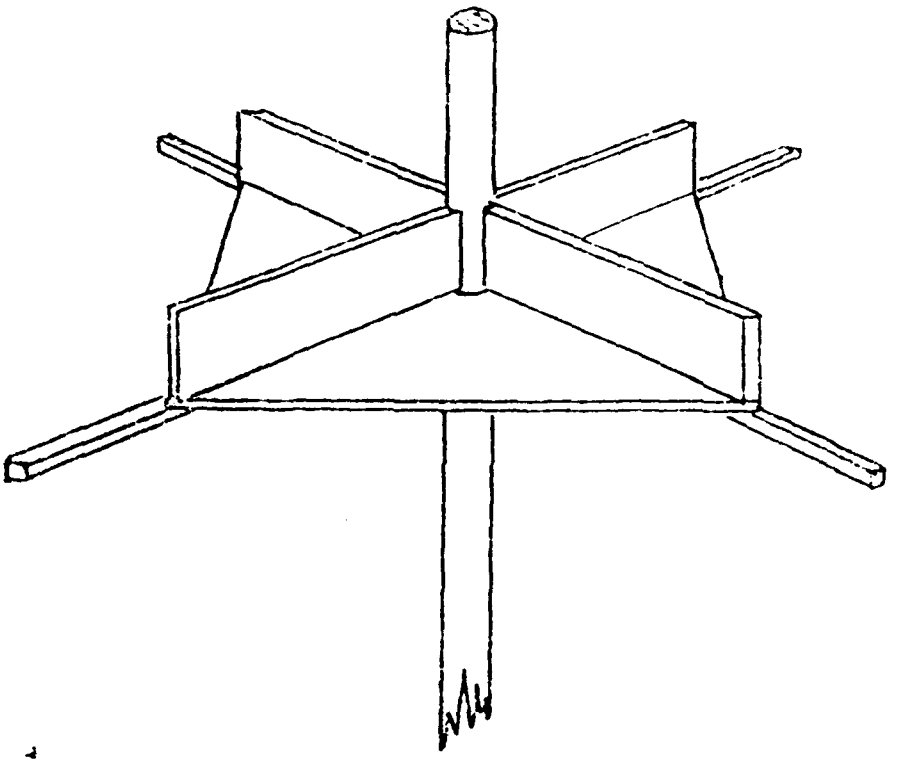
3. The grove of coniferous trees used as perches located at the north end of Lummi Bay as identified in the biological assessment should be secured. In addition, a 300-foot secured buffer strip should be established around that stand of trees.

4. At least ten artificial perches should be placed within Lummi Bay as identified in your revised project description. All perches should be constructed of pilings in lieu of the four that were to be made out of tires. Tires are more ephemeral than pilings and they do not offer as commanding a view as pilings.

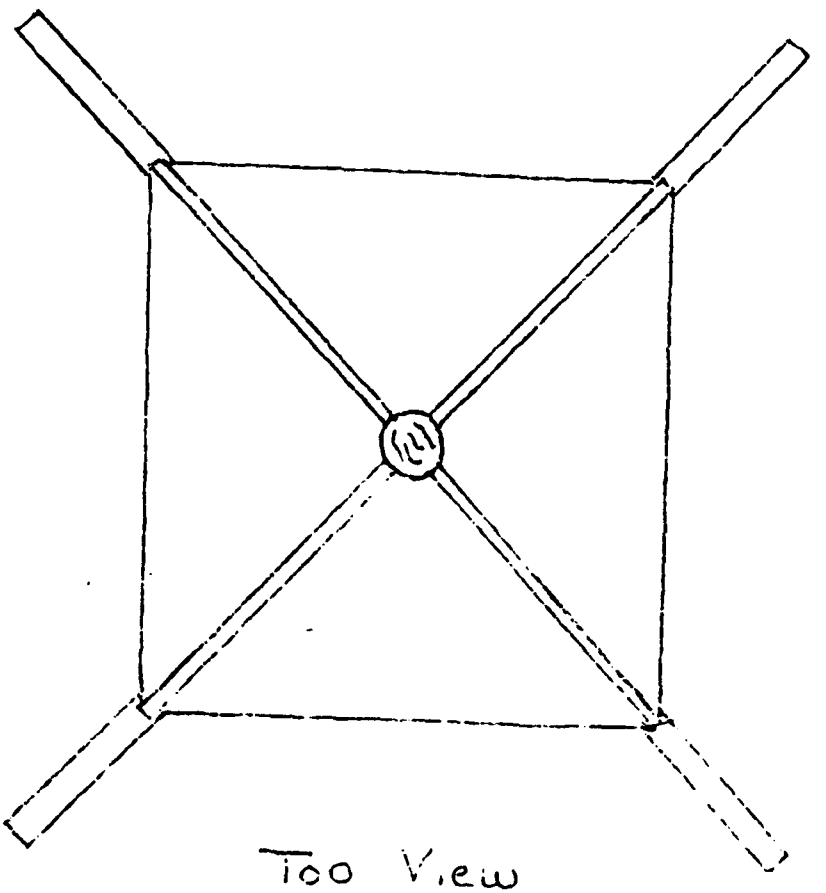
5. The actual placement of the pilings should correspond with the location of prey kills identified in the assessment. This would require more perches being placed to the north and west of locations identified in your mitigation measures in your letter of July 5, 1984. Perches should be at least 150 yards from roadways and dwellings.

6. Every other piling should be fitted with protective platforms and sides. The sides should be at least 18 inches high. Alternate quarters may be covered. These perches may afford more shelter from inclement weather than exposed pilings. Figure 2 contains a schematic of a suggested configuration.

7. Monitoring as proposed and discussed in your assessment should be conducted. Monitoring should include not only population assessments of shorebirds and waterfowl, as indicated in your assessment, but of distribution of those species and of peregrine falcon use/distribution and effectiveness of conservation measures. This should be done during construction and for at least two winters post-construction with a report prepared at that time detailing results. Modifications or additions to conservation measures can then be made if necessary.



Schematic View



Top View

FIGURE 2

8. Enhancement measures were mentioned in the biological assessment. These measures, such as planting of specific crops to hold waterfowl, were summarily determined to be too costly. This specific measure should be reconsidered and analyzed. If properly done, it may result in maintaining an increased food supply and subsequently falcons throughout the wintering period in Lummi Bay.

Incidental Take

Section 9 of the ESA prohibits any taking (harm, harassment, mortality, etc.) of listed species without special exemption. Under the terms of Sections 7(b) 4(iii) and 7(2), taking that is incidental to and not intended as a part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with terms and conditions of this biological opinion.

1. If one individual of a peregrine falcon dies or is injured as a result of the construction and operation of this project or failure to implement recommended safeguards, the Seattle District of the Corps of Engineers should require that the causative action of such taking cease immediately, and shall reinitiate formal consultation and/or seek authorization under Section 10(a)(1)(B) prior to proceeding with the action.

2. No additional requirements need be implemented by the Corps to minimize incidental take.

3. All dead or injured individuals shall be retrieved and turned over to the Washington Department of Game.

4. The Corps of Engineers shall immediately telephone the Olympia Endangered Species Office in Olympia, Washington if incidental take occurs, and prepare a written report that includes the following information: (a) the number of individuals taken; (b) the date on which they were taken; (c) the location from which they were taken; and (d) the disposition of the individuals that were taken. Written and telephone reports should be directed to Jim Bottorff, USFWS, Olympia Endangered Species Office, 2625 Parkmont Lane SW, B-2, Olympia, Washington 98502 (telephone 206/ 753-9444; FTS 434-9444).

Summary

Lummi Bay provides excellent habitat to a large number of peregrine falcons throughout the wintering period. Food supplies are abundant as is shelter and relatively undisturbed hunting areas. Construction and operation of the proposed marina will result in the loss and/or displacement of part of their prey base, loss of hunting, perching, and feeding habitat, and increased human disturbance resulting in some avoidance and displacement of

remaining habitat. This level of loss should not cause reductions in the peregrine population resulting in jeopardizing the continued existence of the species. Several conservation measures were offered that would further reduce the adverse impacts. Incidental take has been established at zero before additional formal consultation is required.

This concludes formal consultation on this project. If the actions described are significantly modified in a manner that would change the impacts discussed in the opinion; if new information becomes available on this species that could change the conclusion of the opinion; or if a species occurring in the area is added to the list of endangered species, formal consultation should be reinitiated. Your decision regarding the inclusion of the recommendations presented in this opinion should be sent to the Olympia Endangered Species Office. In addition, the Olympia office would appreciate any reports on the monitoring activities that you conduct for the actions presented in this Plan.

Sincerely,

William F. Shake
Assistant Regional Director
Federal Assistance

Literature Cited

Anderson, Clifford M., Randall K. Knapp, and Janner K. Fackler. 1984. The behavior and ecology of fall peregrine falcons at Lummi Bay and vicinity, Whatcom County, Washington. U.S. Army Corps of Engineers, Seattle District. 65 pp. Contract #DACW67-83-M-0996.