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Attn: Dorothy Keough, Ft. Belvoir
George Harrison, Corps

Re: Biological Opinion for Tompkins Basin
Recreation Area, Fort Belvoir, Virginia

Dear Lieutenant Colonel Hirata and Colonel Berwick:

This document transmits the U.S. Fish and Wildlife Service's biological opinion based on our review of the proposed Tompkins Basin Recreation Area (TBRA) located at Fort Belvoir in Fairfax County, Virginia, and its effects on the bald eagle (*Haliaeetus leucocephalus*) in accordance with section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et seq.). The December 7, 1998 request for formal consultation from Fort Belvoir was received on December 15, 1998.

This biological opinion is based on information provided in the November 1998 biological assessment, the July 1997 draft environmental assessment, the August 1998 draft joint permit application to the U.S. Army Corps of Engineers Baltimore District, telephone conversations, field investigations, and other sources of information. A complete administrative record of this consultation is on file in this office. This letter also provides the separate comments of the Service and the Department of the Interior pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), which are included following the biological opinion.

I. CONSULTATION HISTORY

Appendix A contains the consultation history of the project.

II. BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The information in this section has been provided to the Service by Fort Belvoir in the Army's request for initiation of formal consultation and subsequent conversations.

Background - Fort Belvoir proposes to implement the planned development of an outdoor recreation (camping, walking trails, swimming, cabin rentals, recreational vehicle campground) and marina complex at Fort Belvoir (Figure 1). The purpose of the proposed development is to support the U.S. Army's morale, welfare, and recreation mission to provide for and enhance the quality of life of the activity duty, their families, military retirees, and Department of Defense (DoD) civilians. Because of the project size and complexity, development is planned in phases over three to five years; the first phase will be development of marina facilities. The land-based, non-marina facilities will not affect the bald eagle and therefore are not discussed in this opinion.

At present, there is no recreational area comparable to the planned TBRA complex at other installations within the National Capital Region or within the commercial sector that can adequately meet the demand for outdoor recreational activities for this military population. The Virginia Outdoor Plan, a report published by the Commonwealth to ascertain the public's recreational needs, indicated that the Northern Virginia recreational supply is insufficient to meet the regional recreational needs of its residents (Commonwealth of Virginia 1994, 1996).

The Army intends to implement the TBRA project to fulfill its mission to provide recreational services to the military, based on the overall need of the public for quality outdoor leisure facilities. Four other public facilities and one military recreation area within the Washington, D.C. metropolitan area approximate the range and scope of facilities proposed at TBRA (CDM Federal Program 1997). These include the following:

- Burke Lake Park, approximately 7 miles northwest of TBRA.
- Lake Fairfax Park, approximately 25 miles northwest of TBRA.
- Pohick Bay Regional Park, directly across Gunston Cove (approximately 3,200 feet) from TBRA.
- Point Look Out Park in St. Mary's and Calvert Counties, Maryland, approximately 45 miles from Fort Belvoir.
- Solomon's Naval Recreational Center in Calvert County, Maryland, approximately 100 miles from Fort Belvoir.

Each of these facilities is heavily used during relevant outdoors seasons, however, none of the public facilities may be considered a total-destination recreation area. Facilities that have cabins and campsites are generally at 100 percent occupancy. Smaller scaled recreational facilities exist at other military installations in the region. A market demand study and economic feasibility analysis of the

proposed TBRA complex indicated that many of these facilities report a serious problem with overcrowding during peak periods. In addition, the military-operated facilities seem to be more popular than the public parks.

Approximately 39,000 active military personnel live within approximately 15 miles of the Fort. In addition, 41,000 retired military personnel reside within this same area. Combined, these 80,000 military sponsors support a total of more than 125,000 dependents, resulting in a total base-supported population of 205,000 living within 15 miles of the Fort. These individuals, along with DoD civilian employees, represent potential users of the recreational facility. The entire park is expected to accommodate 1,500 visitors per day.

Marina Facility - The proposed marina facility consists of 6.5 acres (Figure 2) and will be a cooperative venture between the Army and a private developer. The private developer will acquire a long-term lease on the property and will fund, construct, and operate all portions of the marina, with government oversight. The rental portion of the facility and the two double launch ramps would be constructed and operated by the Fort. None of the marina facilities will be open to the general public. The fuel dock and boat maintenance facilities would only be available to authorized users of the facility. The hours of operation for the marina will be from 7:00 a.m. to 8:00 p.m. from April 1 through September 30 and from 8:00 a.m. to 6:00 p.m. from October 1 through March 31.

The proposed marina facility includes:

- C A 2,500 square foot marina control building with a retail store, vending machines, shower and locker facilities. A deck with an overlook will be located on the water side of the building. Golf carts will be used to provide visitor transportation from the building to the wet slips.
- C Parking spaces for 57 cars near the marina control building, 90 spaces in an auxiliary lot, and 38 spaces for vehicles with trailers.
- C A 3,200 square foot marina maintenance building with a large drive-through maintenance bay at each end, a manager's office, a wood and fiberglass shop, and a maintenance repair shop.
- C Nine fixed wooden piers with 300 wet slips with a perimeter floating breakwater system to reduce wave action.
- C A dry stack building of three dry stack storage sheds (total floor area approximately 48,000 square feet) to store up to 456 boats, and 115 dry slip spaces for boats on trailers.
- C A forklift pier with 8 floating slips and attached gangways to allow two forklift trucks to work continuously, without having to wait for boaters to clear the slips before loading/unloading the next vessel from dry rack storage.
- C A travel lift pier to launch boats from dry rack storage too large to be handled by the forklift trucks. Because larger vessels generally require a longer period of time to prepare for launching and retrieval, the pier is equipped with two floating docks.
- C A fuel pier with floating docks and floating breakwater. The existing pier will be upgraded with a new deck and handrail system and used as the fuel pier to provide fueling and sanitary pumping services. Fuel will be stored in 3 self-contained, portable, 5,200-gallon above-ground

storage tanks (1 for diesel, 2 for gasoline). The tanks will be UL listed, rectangular steel-enclosed in secondary containment and encased in 6 inches of concrete. The tanks will be fitted with vapor recovery equipment and a leak detector tube for manual monitoring of leaks. Emergency shut-off switches will be provided on the pier, dry stack building, and marina control building. Fuel will be dispensed by units similar to those at gas stations. Boater access to fuel dispensers and sanitary pumpouts will be gained via floating docks moored adjacent to the pier. Supply and distribution fuel lines will be located under the pier. The pier will also have sanitary pumpout facilities, water for wash down, and a portable toilet system. No potable water will be provided at the pier.

- C A repair/maintenance facility, where boat owners will be able to work on their boats.
- C A four-lane boat launch ramp with one fixed pier adjacent to the ramp.
- C 76 rental boats comprised of no more than XX PWC, 20 other motorized watercraft, and XX non-motorized watercraft.

TBRA Marina Boating Capacity	
Wet Slips	300
Dry Storage (on trailers)	115
Rack Storage	456
Rental Boats	76
Forklift Drop Sites	8
Boat Ramp Lanes	4
Parking Spaces - vehicle only	147
Parking Spaces - vehicle/boat trailer	38

The man-made island (already disturbed and poorly maintained) will remain as open, green area (Figure 2, Area 13). An existing pier north of Castle Point (Figure 2, site 11), will be used for fishing.

The site-wide lighting concept for TBRA is to provide limited roadway and parking area lighting. Presently, there are 45 (250 watt) street lights that operate from dusk to dawn. The fixed marina piers will have small light fixtures mounted to the posts of the pier structure. No lighting will be provided for the rental pier area.

Fort Belvoir presently operates a marina at Dogue Creek (Figure 1) (CDM Federal Programs Corporation 1997). This facility includes 375 spaces for trailer storage, rack storage for 12 boats, 105 wet slips, and 76 rental boats (see rental boats described above). Fort Belvoir considered the Dogue Creek site for the marina component of the TBRA project. This alternative was rejected because of

space limitations. Dogue Creek has been affected by sedimentation and the water depth has decreased, which limits the use of some sailboats and motorboats to high tide. The water depth in Dogue Creek is -3.0 to -3.5 feet mean sea level (msl). To provide wet slips for larger boats and to increase the overall capacity of the Dogue Creek marina, the existing channel would need to be dredged from its current depth to -5 feet msl. The land surrounding Dogue Creek is too small to accommodate storage and other facilities of the proposed marina development. Additional space cannot be obtained due to the presence of existing roadways and the residential community (River Village), which borders Dogue Creek marina (CDM Federal Programs Corporation 1997). After construction of TBRA, the Dogue Creek marina will be closed. Floating docks and the rental boats, currently at Dogue Creek will be used at TBRA. Dogue Creek marina will be restored after it is closed, including the removal of structures and reestablishment of natural areas along the water. The TBRA will result in close to 67% more combined storage and slip capacity than Dogue Creek Marina.

Dredging - Gunston Cove channel (Figure 3) will be dredged to achieve a uniform depth of -5.0 msl. Depths in the existing channel range from -1.0 to -6.0 feet msl. Additional areas to be dredged include the travel lift pier, fuel and sewage pier, 300 wet slip area, the breakwater, and forklift pier area (Figure 4). Dredging is not required for the rental pier or the boat ramps. To accommodate boats using the proposed marina, several locations will require dredging to achieve a uniform depth of -5.0 feet msl. The initial dredging activity will remove approximately 12,000 cubic yards of material (36,000 cubic yards of fluid material). The channel areas to be dredged will not include any submerged aquatic vegetation (SAV) beds, mudflats, or wetlands. The material will be dredged using hydraulic equipment. A dredge material disposal facility will be constructed and maintained for the disposal and dewatering of the material dredged from the marina area, approximately 15,000 linear feet from the area to be dredged (Figure 1, T-9 Site). A 20% contingency factor was included in the design of the dredged material containment facility. The dredged material containment facility will include a disposal cell with berms covering an area of approximately 9.5 acres. The basin has been sized to contain the initial dredging and two cycles of maintenance dredging (each at 12,000 cubic yards), which is estimated to occur at 15 year intervals. The containment area is a disturbed training area that is flat and mostly cleared of vegetation. A small stand of young Virginia pine occurs on part of the site. It is estimated that construction of the containment area will take two months. Effluent from the disposal cell will flow by gravity through a 12-inch diameter reinforced concrete pipe from the invert of the concrete box of the outlet structure through the berm, and into a short ditch, which will direct flow into an existing swale that discharges into Pohick Creek. The outlet pipe was sized to restrict outflow to less than the estimated existing stormwater runoff flow through the swale of 10 cubic feet per second. This will prevent damage to existing wetland vegetation in the swale and ensure that flow will not overwhelm the existing culvert. The effluent resulting from the dewatering process will be discharged to Pohick Bay. This is a temporary discharge. Because of the conservative approach used in sizing the basin, the effluent can be detained long enough to allow settling of particulates, including fines, so that the effluent complies with ambient water quality criteria. Fort Belvoir currently has no plans for commercial use of the dredged material. Fort Belvoir does intend to prepare a long-term dredged material basin management plan. The containment facility is not anticipated to affect the bald eagle.

A floating pipeline will be used to convey the material and water slurry to the containment basin. The pipeline from the dredging site to the containment facility will cross Gunston Cove and enter Pohick Bay, coming ashore in the Mason Neck bald eagle concentration area and then following training roads, ending in the southeastern portion of Site T-9 (Figure 1). The maximum size discharge line that will be used is 16 inches in diameter. It is estimated that the hydraulic dredging activity and pipeline transport of the dredge material to the containment facility would take two months if the dredging is performed 24 hours/day or three months if the dredging is done in shifts. The pipeline will be removed upon completion of the dredging operation and will be reinstalled every 15 years for maintenance dredging.

Wetlands/Submerged Aquatic Vegetation - Submerged aquatic vegetation extends approximately 30 to 200 feet from the shoreline of the TBRA (Figure 5). SAV in Accotink and Pohick Bays was found to range from small or dispersed beds in 1990 to more prevalent in 1993 to 1995 (CDM Federal Programs Corporation 1997). The SAV is approximately 5.67 acres and is composed primarily of *Hydrilla verticillata* in the outward 1/3 to 1/2 of the bed. Eurasian watermilfoil (*Myriophyllum spicatum*) is landward of the *Hydrilla*, and wild celery (*Vallisneria americana*) is sporadically scattered through the watermilfoil. Approximately 0.73 acres of SAV will be affected for the marina, primarily in the travel lift pier, fork lift pier, and fuel pier areas. The basin configuration responds to launching, retrieval, and fueling of boats. Eight floating slips are provided to allow two forklift trucks to work continuously, without having to wait for boaters to clear the slips before loading/unloading the next vessel. On busy days, all eight slips are expected to be in continuous use. The travel lift pier is provided to launch boats too large to be handled by the forklift trucks. Because larger vessels generally require a longer period of time to prepare for launching and retrieval, the pier is equipped with two floating courtesy docks. Any additional reduction in the acreage of SAV affected would affect the maneuverability of boats and the loading/unloading operations. For the two walkways over the water connecting the shore with the marina docks, the 60% design includes one foot of vertical clearance from the bottom of -3 feet msl for every foot of horizontal width of walkway over SAV to prevent the shading of the vegetation. Walkways from the shore clear the SAV with sufficient height and have a flexible connection to the floating wet slips (Rhodeside and Harwell et al. 1994). Direct contact with propellers and boats may cut or remove SAV (U.S. EPA 1985).

The draft final EA for this project indicated that although project elements have been designed to avoid wetlands to the maximum extent possible, the construction of TBRA would fill 1.67 acres of tidal freshwater wetlands located along the shoreline and 0.04 acres of palustrine forested wetlands. In compliance with Executive Order 11990, and Fort Belvoir's policy of no net loss of wetland, all wetlands impacted will be replaced. Some loss is proposed for mitigation through restoration and enhancement of existing wetland areas as part of the overall cleanup and restoration of eroded portions of the TBRA shoreline. The remaining wetlands lost will be replaced by creating wetlands at new locations.

Shoreline Stabilization - There are 1,720 linear feet of existing bulkhead. Bulkheads are used only at

the rental pier and the marina, where heavy equipment is used for unloading and loading of boats into the water. Areas with existing bulkheads (to be removed and replaced) in the TBRA will become the fuel pier and travel lift pier. Areas to the west of the rental pier and along the existing island offshore from the TBRA will be sloped and the shoreline stabilized with tidal wetland vegetation and riprap revetments. A total of 0.025 acres of existing bulkhead will become revetments, while a total of 0.158 acres will be sloped and stabilized with a combination of tidal vegetation and riprap.

Action Area - The "action area" is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this project is the Mason Neck bald eagle concentration area and the eastern shoreline of Accotink Bay, including the shoreline along the site of the proposed TBRA marina (Figure 6). The action area includes all waterways and 750 feet inland from those waterways within the area described above.

STATUS OF THE SPECIES RANGEWIDE

Species Description - The bald eagle is a large bird of prey with a wing span of 6.5 feet. It is found primarily near the coasts, rivers, and lakes of North America. The "Southern" bald eagle was federally listed as endangered in 1967. The remaining bald eagle populations in the coterminous United States were listed as endangered or threatened in 1978 and the "Southern" designation was dropped. The Service divided bald eagles in the lower 48 states into five recovery regions based on geographic location. The five regions are the Chesapeake Bay, Pacific, Southeast, Northern, and Southwest. A recovery plan was prepared for each region by separate recovery teams. The Southeast, Northern, and Chesapeake Bay Recovery Regions are pertinent to this opinion. The Southeast bald eagle recovery region includes birds from Florida, Georgia, South Carolina, North Carolina, Kentucky, Tennessee, West Virginia west of the 80th meridian, Alabama, Mississippi, Arkansas, Louisiana, and Texas west to the 100th meridian. Twenty-four states are included in the Northern recovery region. The Chesapeake Bay recovery region encompasses Virginia, Delaware, Maryland, the eastern half of Pennsylvania, the panhandle of West Virginia, and the southern two-thirds of New Jersey.

On August 11, 1995, all bald eagle populations in the lower 48 states (except those already listed as threatened) were reclassified from endangered to threatened due to increasing numbers and range expansion (50 CFR Part 17 36000-36010). In Virginia, the breeding population has steadily increased from an estimated low of approximately 32 pairs in the late 1960s to 229 nesting pairs in 1998. Habitat loss now poses a greater threat to the bald eagle since its preferred habitat is where most of the human population growth is occurring in the United States.

Life History/Populations Dynamics - Unless otherwise noted, the information in this section was taken from Virginia Department of Game and Inland Fisheries (1994) and Watts *et al.* (1994).

Bald eagles breed at four to five years of age, the same time they develop their white head and tail.

Adult birds mate for life, establishing nesting territories that they return to each year. Nesting pairs may remain near their territory year-round, particularly toward the southern range of the species. In addition to the resident breeding population, Virginia has five bald eagle “concentration areas” where sub-adults and non-breeding adults congregate. These areas are used for foraging, perching, and roosting during one or more seasons of the year. There are two concentration areas on the James River--Powell Creek concentration area (between Powell and Wards Creeks) and Presquile concentration area (between the Benjamin Harrison Memorial Bridge and the upstream edge of Jones Neck Cutoff); one on the Rappahannock River--Rappahannock River concentration area (between Port Royal and Tappahannock); and two on the Potomac River--Mason Neck concentration area (between Accotink Bay and the upstream edge of Belmont Bay) and Caledon concentration area (between Chotank Creek and just west of Somerset Beach). Immature and non-mated eagles range widely. Northern pairs also migrate south during the winter when rivers and lakes freeze. These birds tend to congregate in both summer and winter concentration areas, where feeding opportunities are good and human disturbance is minimal. Although eagles from Virginia account for a portion of the birds found in these concentration areas, many come from outside the state. Evidence suggests that birds from both southeastern and northern states converge on these Virginia sites. Protection and management of these concentration areas may be more important to the continued recovery of the bald eagle in Virginia and throughout the East Coast than any other habitat.

During the day, eagles spend approximately 94% of their time perching (Gerrard *et al.* 1980, Watson *et al.* 1991). During the breeding season, 54% of that time is spent loafing, 23% scanning for food or eating, and 16% nesting (Watson *et al.* 1991). Eagles prefer high perches in trees that rise above the surrounding vegetation to provide a wide view that faces into the wind (Gerrard *et al.* 1980). In Maryland, eagles used shoreline that had more suitable perch trees, more forest cover, and fewer buildings than unused areas at all times of the year (Chandler *et al.* 1995). Chandler *et al.* (1995) found that distance from the water to the nearest suitable perch tree was shorter for areas used by bald eagles than areas that did not receive eagle use. In their study, eagles tended to perch within 164 feet of the shore. They recommended that shoreline trees greater than 7.87 inches in diameter at breast height and dead trees not be removed. Eagles often locate prey from a shoreline perch, and hunting forays from perches appear to be more successful than those initiated from flight (Jaffee 1980). Gerrard *et al.* (1980) found that after a successful fishing trip, eagles flew to a low perch to feed; these perches were less than 33 feet above the water and were well below the level of neighboring tree tops. Clark (1992) observed that, within the Powell Creek concentration area, eagles perched in shoreline trees, flew out to pick up fish, and then returned to the perch to eat.

Bald eagles are opportunistic foragers, preying on fish, birds, and small mammals, as well as scavenging carrion. In the summer, fish are the primary component of the diet. Eagles in Virginia feed on shad, catfish, carp, menhaden, perch, and eels depending on their seasonal availability. In the fall and winter, eagles shift their foraging to waterfowl and supplement their diet to a greater extent with carrion. Because the main diet of bald eagles inhabiting the Chesapeake Bay and its tributaries during the summer is fish, the majority of birds are likely to be present along the shoreline at any given time (Wallin

and Byrd 1984). Foraging is a key behavior that influences daily and seasonal activity budgets (Watson *et al.* 1991). Foraging patterns may be strongly influenced by tidal fluctuations. Several studies have found that birds foraged much more than expected during low tides and less than expected at high tides (McGarigal *et al.* 1991, Watson *et al.* 1991). In King George County, Virginia, overall bald eagle foraging frequency was highest from 4:35 to 6:00 a.m., with a small decline from 6:00 to 10:00 a.m. At 10:00 a.m. foraging decreased further and then remained the same until 6:00 p.m. when it decreased rapidly (Jaffee 1980). Watts and Whalen (1997) conducted boat and eagle observations from three pier locations within the Powell Creek eagle concentration area on the James River during the summer of 1997. Peak eagle foraging began at dawn and continued until 8:30 a.m. After 8:30 a.m., eagle foraging activity declined and remained fairly stable until 11:00 a.m., when the amount of foraging decreased rapidly and remained low for the rest of the day. Between 6:00 and 8:30 a.m., 55% of morning foraging was documented. By 9:30 a.m., 70% of foraging had occurred. By 10:00 a.m., 79% of foraging had occurred, and 95% of all morning foraging activities had occurred by 11:00 a.m.

During the late afternoon/early evening, bald eagles fly inland to roost for the night. Most summer eagle roosts in the Chesapeake Bay region were found in greater than 100-acre forest blocks and were further from human development than random sites (Buehler *et al.* 1991b). Ninety-five percent of the roosts were within 2,362 feet of water and 50% were at least 2,231 feet from the nearest building (Buehler *et al.* 1991b). Trees used for roosting were larger in diameter, taller, and more accessible than other available trees (Keister and Anthony 1983, Buehler *et al.* 1991b). Another important attribute of communal roosts is proximity to food sources (Keister and Anthony 1983). Because food for eagles occurs in the water, suitable habitat along rivers is important. Clark (1992) found that, within the Powell Creek concentration area, distance to the roost was the most important habitat factor that influenced eagle distribution along the shoreline. Buehler *et al.* (1991b) determined that on the Northern Chesapeake Bay “. . . fewer than 2% of the random trees met the minimum habitat values of roost trees, indicating that suitable roost trees are scarce relative to other trees. This relative scarcity suggests that if shoreline forest is removed indiscriminantly, roost habitat could become limiting to the bald eagle population in the future.”

Status and Distribution - Historically, bald eagles were plentiful along major river systems and coastal areas in the United States and Canada. However, habitat loss associated with human settlement, and later, the use of persistent pesticides (such as DDT) for crop management, resulted in a dramatic decline in eagle populations. By the late 1960s, most breeding populations had been decimated by eggshell thinning and associated low productivity. Since the nationwide ban on most persistent pesticides, bald eagle populations have experienced gradual recovery in both productivity and total numbers.

Although the bald eagle has rebounded over the past 15 to 20 years, current patterns of habitat loss in the Chesapeake Bay region threaten to halt or even reverse this recovery. Shoreline development throughout the Chesapeake Bay is reducing available habitat and poses the single greatest threat to the

eagle population. Nesting, roosting, and foraging habitat is being lost to shoreline development for housing, business, industry, recreational facilities, public utilities, and transportation. Conversion of woodlands to agricultural fields and timber harvesting is also resulting in the loss of eagle habitat. As the human population along these shoreline areas continues to grow, more undisturbed wooded habitat used by bald eagles will be permanently altered. Between 1978 and 2020, the developed area of the Chesapeake Bay watershed is predicted to increase by 74% and 80% in Maryland and Virginia, respectively (Gray *et al.* 1988). In addition, water-based recreation in the Chesapeake Bay region has increased dramatically since the 1970s, resulting in disturbance to eagles in breeding, roosting, and foraging areas. Between 1992 and 1995, the population in Virginia increased 1.5% each year and boat registration increased 7% during that time (J.R. Davy, Virginia Department of Conservation and Recreation, pers. comm. 1996).

Buehler *et al.* (1991b) stated, “We assume there is an upper limit to the number of eagles that can be supported by any stretch of undeveloped shoreline. Thus, as shoreline continues to be modified, we believe that the length of remaining undeveloped shoreline may become the limiting factor for some eagle populations, including the Chesapeake population.” Bald eagles in Virginia will survive and maintain sustainable numbers only if there is adequate habitat for nesting, roosting, and foraging free from human disturbance. Management to preserve and protect these shoreline areas is essential to the continued growth and recovery of the Chesapeake Bay’s nesting, summering, and wintering bald eagle population.

Chronic human activity may result in disuse of areas by eagles (U.S. Fish and Wildlife Service 1989). Buehler *et al.* (1991b) found that bald eagle use of shoreline was inversely related to building density (magnitude of effect was greatest in summer) and directly related the development setback distance. Clark (1992) concluded that “increased numbers of waterfront buildings and decreased amounts of shoreline woodland . . . negatively affect eagle shoreline use.” Clark (1992) found that eagle numbers decreased with increased numbers of buildings and amount of medium duty roads. Buehler *et al.* (1991a) found that in the northern Chesapeake Bay, 76% of shoreline areas may now be unsuitable for eagle use because of the presence of development within 1,640 feet of the shoreline. Up to an additional 10% of the shoreline was found to be unsuitable at times because of boat and pedestrian traffic. When shoreline is developed, it is irretrievably lost as eagle habitat (Buehler *et al.* 1991b). Human activity resulting in even temporary disruption of the bird's environment represents a major source of potential disturbance in many eagle populations (McGarigal *et al.* 1991, Stalmaster and Kaiser 1998). Human activity in perching areas can interrupt feeding and cause birds to relocate (Fraser 1988, Stalmaster and Kaiser 1998). Watts and Whalen (1997) examined eagle density as a function of human presence and their results suggest that the presence of people had a negative effect on shoreline use by eagles. Watts and Whalen (1997) stated that “. . . it is clear that eagles avoid shoreline segments that regularly have people within 100 m [328 feet] of the water.” Buehler *et al.* (1991b) seldom observed eagles on the northern Chesapeake Bay within 1,640 feet of human activity and found that the birds rarely used developed areas or areas frequented by people on foot. During the summer, birds on the northern Chesapeake Bay flush, on average, when humans get within 577 feet

(Buehler *et al.* 1991b). Once birds are disturbed, they do not return to the area until several hours after the disturbance has occurred and only when the disturbance no longer persists (Stalmaster and Newman 1978, Stalmaster and Kaiser 1998).

In addition to human activity, removal of shoreline vegetation results in disturbance to eagles and loss of habitat. Clark (1992) found that within the Powell Creek concentration area, eagle abundance increased with increases in woodland width (defined as maximum width of woodland in each sampling plot measured in meters inland from the shore), snags (defined as number of standing dead trees over five meters in height on the shore of each sampling plot), and woodland length (defined as maximum length of woodland in each sampling plot measured in meters along the shoreline), which are indicative of the amount of forest habitat available. These three variables indicated lack of development, presence of a vegetation screen from human activities, and the presence of perching habitat. Removal of tall, large diameter trees will decrease the amount of perching and roosting habitat available (Buehler *et al.* 1991b). Luukkonen *et al.* (1989) recommended maintaining shorelines with forested buffers at least 328 feet wide. In addition, the buffer should have a minimum of one tree per 820 feet of shoreline that is at least 15.7 inches in diameter at breast height, is accessible to eagles, and contains suitable perching limbs. They also recommended conserving trees greater than or equal to 23.6 inches in diameter at breast height.

It has been documented that eagles are more tolerant of sounds when the sources were partially or totally concealed from their view (*e.g.*, Stalmaster and Newman 1978, Wallin and Byrd 1984). Strips of vegetation that reduce line-of-sight will allow closer presence of humans and provide perching and roosting trees (Stalmaster and Newman 1978). Stalmaster (1980) recommended restricting land activities 820 feet from eagles perched in shoreline trees to protect 99% of the birds. He suggested that boundaries could be shortened to 246 to 328 feet in width if at least 164 feet of this zone contains dense, shielding vegetation.

Feeding behavior of bald eagles can be disrupted by the mere presence of humans (Stalmaster and Newman 1978, Stalmaster and Kaiser 1998). Early morning human activities are potentially the most disruptive to eagle foraging activity (McGarigal *et al.* 1991, Stalmaster and Kaiser 1998). Disturbance may result in increased energy expenditures due to avoidance flights and decreased energy intake due to interference with feeding activity (Knight and Knight 1984, McGarigal *et al.* 1991, Stalmaster and Kaiser 1998). “The difference between the presence of a species when food is available versus the ability of that species to utilize the food is important. Whereas scavengers might be present in an area and appear to be unaffected by human activity, closer inspection would be required to determine whether the individuals are actually able to feed on that food” (Knight *et al.* 1991). Camp *et al.* (1997) found that wildlife responds to disturbance physiologically before responding behaviorally. They stated that heart rate increases and attention is diverted to human activities at a distance greater than that which actually causes the wildlife to flush. Knight *et al.* (1991) examined winter bald eagle concentration areas in Washington and found that when anglers (not in boats) were present, fewer bald eagles were feeding and the eagles shifted their foraging from early morning to late afternoon. “. . . The

presence of anglers disrupted feeding, which reduced energy intake and increased energy expenditure through avoidance flights. The ultimate effect of such disturbances on energy budgets and individual fitness is unknown” (Knight *et al.* 1991).

Clark (1992) found that within the Powell Creek eagle concentration area, eagle abundance decreased with increased numbers of “boat landings.” Boat landings were defined as “. . . piers, boat ramps, and sites where boats are regularly landed or anchored on the shore . . .” Wallin and Byrd (1984) had similar findings within the Caledon concentration area on the Potomac River. Clark (1992) recommended that additional boat landings within or adjacent to the Powell Creek concentration area be discouraged, including those on tributary creeks of the James River.

Boating activity is likely to adversely impact eagles because it disrupts feeding activity and affects large areas in short periods of time (Knight and Knight 1984). Activities of recreational boaters are not predictable and thus are especially disruptive to birds (Wallin and Byrd 1984). McGarigal *et al.* (1991) found that eagles usually avoided an area within 656 to 2,952 feet of a single stationary experimental boat, with an average avoidance distance of 1,300 feet. During this time, eagles spent less time foraging and made fewer foraging attempts. McGarigal *et al.* (1991) recommend a 1,312 to 2,624 foot wide buffer around high-use foraging areas. Knight and Knight (1984) studied wintering eagles in Washington and found that a 1,148 foot wide buffer would protect 99% of birds perched in shoreline trees from a single canoe. However, eagles feeding on the ground were more sensitive to disturbance and required larger buffers. A buffer of at least 1,476 feet would be required to protect 99% of eagles feeding on the ground from a single canoe.

Moving boats, as well as stationary boats, disrupt eagles. Buehler *et al.* (1991b) found that on the northern Chesapeake Bay, eagles were flushed by an approaching boat at an average distance of 575 feet. M.A. Byrd (College of William and Mary, pers. comm. 1989) has observed that when eagles are flushed by recreational boats from perch sites along the James River, they usually fly inland and cease foraging for at least several hours. Watts and Whalen (1997) studied boats and eagles on the James River. They found that nearly 25% of eagles perched on the shoreline flushed when their survey boat was within 656 feet of the shoreline. When the boat was within 328 feet of the shoreline, nearly 80% of the birds flushed. During shoreline surveys, they found that nearly 50% of all boats observed were within 656 feet of the shoreline and more than 35% were within 328 feet. Jon boats, jet skis, and bass boats tended to be closer to the shoreline than sport boats (defined as v-hull type boats). “The general distribution of boats relative to the shoreline . . . in combination with the observed flushing probabilities . . . suggest that a large number of boats may directly influence shoreline use by eagles” (Watts and Whalen 1997). Their data analysis suggested that the presence of boats within 656 feet of the shoreline has a significant negative effect on shoreline use by bald eagles.

Stalmaster and Kaiser (1998) studied wintering eagles on the Skagit River in Washington and found that eagles foraging on the ground were intolerant of humans within 300 m, especially in the morning and that the “. . . manner in which eagles responded to motorboats demonstrated that this activity was

extremely disruptive to the population, even though only a small number of human were involved.” Luukkonen *et al.* (1989) studied non-breeding eagles in North Carolina and found “eagles and people tended to concentrate their activities on different portions of both lakes.” They estimated that boat densities of more than 0.5 boats/km² altered eagle distribution patterns. “Disturbance by boaters or others may negatively affect eagle energy budgets by causing unnecessary eagle movements and by displacing eagles from foraging areas” (Luukkonen *et al.* 1989). Wood and Collopy (1995) studied breeding and non-breeding eagles on three lakes in Florida. They found a significant negative relationship between boat numbers and eagle numbers on one of the lakes. The other two lakes did not show this relationship, but did not receive as much boat traffic. Boat use was highest on weekends and eagle use was highest on weekdays. Moving boats seemed to be more disruptive than stationary boats. Boating activity reduced the number of eagles using the shoreline, increased the perching distance from the shoreline, and increased the flushing distance (mean flush distance was 174 feet).

Chemical poisoning and shooting are now less of a threat than in past years, but continue to cause loss of eagles. The Service, U.S. Environmental Protection Agency, and the states monitor pesticide-related eagle mortalities; restrictions on some types of pesticides have resulted from eagle mortalities. With increased petrochemical transport activities in the Chesapeake Bay region, the potential exists for eagles to come into contact with oil resulting from spills. Eagle deaths occasionally occur throughout the species’ range due to collisions with power lines or electrocutions at power poles. In Virginia, power companies have voluntarily agreed to place “perch guards” on power poles that have a high risk of eagle electrocution.

The following provides information on current recovery goals and accomplishments toward delisting the species in the three recovery regions pertinent to this opinion.

Southeast Recovery Region - Delisting may be considered if the recovery trend continues for five years after reclassification (U.S. Fish and Wildlife Service 1984). However, criteria for delisting have not been prepared. As of 1998, there were 1,485 occupied territories with an average productivity of 1.15 young produced per occupied territory.

Northern Recovery Region - The recovery plan indicates that when the goal of 1,200 occupied breeding areas has been obtained, the threats identified for listing the species will have to be reassessed, but may be assumed to have been alleviated (U.S. Fish and Wildlife Service 1983). As of 1998, there were 2,204 occupied territories with an average productivity of 1.19 young produced per occupied territory (note that all states did not provide data).

Chesapeake Bay Recovery Region - Delisting requirements are (1) a nesting population of 300 to 400 pairs with an average productivity of 1.1 eaglets per active nest, sustained over 5 years and (2) permanent protection of sufficient nesting habitat to support 300 to 400 bald eagle pairs, and enough roosting habitat to accommodate population levels commensurate with increases throughout the Atlantic region resulting from increased productivity (U.S. Fish and Wildlife Service 1990). Since 1992, there

have been at least 300 occupied territories every year and the productivity goal has been met for 5 consecutive years. However, in 1991 productivity was only 1.08. As of 1998, there were 539 occupied territories with an average productivity of 1.21 young produced per occupied territory. There has been very little permanent protection of nesting or roosting habitat within the Chesapeake Bay region. Over 83% of the bald eagle nests in Virginia are located on private and corporate lands.

Currently, the Service is assessing the status of the eagle rangewide to determine the appropriateness of delisting.

ENVIRONMENTAL BASELINE

Status of the Species Within the Action Area - Bald eagles are found in the action area year-round. Breeding/nesting bald eagles occur on and adjacent to the Fort. In addition, most of the shoreline within the action area is part of the Mason Neck bald eagle concentration area. "The Fort Belvoir shoreline along Pohick Bay and Accotink Bay is regularly used by bald eagles for perching and foraging, primarily in the winter but increasingly in the summer as well. As many as 14 eagles have been counted in the winter in one location on Accotink Bay . . ." (Keith Cline, Virginia Department of Game and Inland Fisheries, *in litt.* 1996). The concentration area is utilized by bald eagles from the Northern, Southeast, and Chesapeake Bay recovery regions. Eagles using this area feed and perch along the shoreline during the day and roost in adjacent large, wooded tracts at night. The only known eagle roost on the Mason Neck peninsula is located off Kaners Creek. Midwinter surveys of the roost found 57 eagles in 1992, 58 in 1995, 38 in 1996, and 45 in 1997.

Table 1 presents the numbers of eagles observed in the Mason Neck area between 1992 and 1997. The actual numbers of eagles that occur along the shoreline segments shown in Figure 7 throughout the year may be higher than reported because the surveys were conducted between 10:00 a.m. and 2:00 p.m., and most bald eagles forage early in the morning. Table 1 indicates that the greatest number of bald eagles were observed in fall and winter (September through January). The smaller number of eagles in late spring and summer may be due to the current level of boat traffic in the action area.

In general, the areas with the greatest amount of eagle habitat are located in segments 9 through 18 (Kaners Creek to the westernmost edge of Hallowing Point Estates), segment 22 (the shoreline approximately 0.5 miles north of Hallowing Point Estates to just south of Pohick Bay Regional Park), and segments 24 through 27 (Accotink and Pohick Bays). Portions of the shoreline least suitable for eagles are segments 19 through 21, along the highly developed Hallowing Point Estates, and segment 23, Pohick Bay Regional Park marina.

Factors Affecting Species Habitat Within the Action Area - The proposed TBRA site is a former military training area, now classified as a recreation area and in recreational use. Much of the shoreline is bulkheaded. Existing recreation facilities include the Castle Point picnic area, a fishing pier, archery range, and Outdoor Recreation office buildings. The shoreline has been disturbed by previous training

activities and is mostly clear of vegetation. Similarly, the upper terrace areas of the site have been cleared during previous use. The Army Reserve Marine Training Facility is located south of the proposed TBRA location. This training facility is used for boat testing and operations and temporary construction of floating bridges. However, all training activity takes place outside of the eagle concentration area.

The shorelines of Accotink and Pohick Bays consist mainly of gentle slopes, relatively flat areas or areas of extensive wetland vegetation, with individual large, mature eagle perch trees along the perimeter. The width of the mouth of Gunston Cove is approximately one mile, narrowing to approximately 0.5 miles at the mouths of Pohick and Accotink Bays. The shoreline of the Mason Neck peninsula has steep slopes ranging from 35 to 60 feet high. The majority of the peninsula has a designated conservation land use (e.g., park, wildlife refuge). With the exception of those areas on the peninsula with a considerable amount of residential development, near Gunston Manor and Hallowing Point Estates, the shoreline is heavily wooded with many tall perch trees.

During the bald eagle shoreline surveys conducted by Mason Neck National Wildlife Refuge, the following observations were noted by the Refuge Manager from 1988 to 1997: (1) There appears to be a consistent negative relationship between the number of eagles foraging and the volume of boat traffic. When eagles were not observed in a given shoreline segment, four to five fishing boats were using the area. Few or no eagles were observed if there were six or more fishing boats in the survey area. (2) The majority of boats staying close to the shoreline around the Mason Neck peninsula were fishing boats. Paddle boats and small sailboats also appear to be a source of disturbance to eagles because these boats tend to concentrate in shallower water where the eagles forage. (3) The effect of fishing boats on eagles appears to be the greatest source of disturbance because these boats repeatedly enter and exit the small coves, sometimes as often as twice an hour.

Only one public boat ramp, located at Pohick Bay Regional Park, currently provides boat access directly to Gunston Cove and Accotink and Pohick Bays. Pohick Bay Regional Park reported approximately 250 boat launches per weekend day for the six-week period of June 1 through mid-July, 1994 (CDM Federal Program 1997).

During the summer of 1996 a boat use study was conducted for the proposed TBRA project (Dunk *et al.* 1997). The results of that study are provided below.

Ramp Interviews/Questionnaires - Users of each of six public boat ramps between Quantico Marine Corps Base and Washington, D.C. were interviewed during a single six-hour period on a summer weekend day, 120 usable interviews were completed. One-hundred fifty questionnaires were sent to boaters who access the Potomac River from Leesylvania State Park boat ramp, 54 responses were received (36% response rate). Boaters who used Dogue Creek marina were sent questionnaires, 64 were returned (response rate of 43%). Questionnaires were provided to three local marinas, 24 individual responses were returned.

The traditional “runabout” (typically 16 to 18 feet long and 100 to 200 hp) was used by 40% of survey respondents. Fishing boats were used by 23%, and together with runabouts, comprised nearly 2/3 of all boat types used. Cabin cruisers and sailboats were used by 13% and 12%, respectively. Personal watercraft (PWC) were used by 5% of respondents. Many boaters reported that they used PWC in addition to a runabout or other type of boat. PWC are also a popular choice for rentals and may be used by several different renters on the same day. A small number of larger and more powerful boats, referred to as “speedboats” (20 to 25 feet long and several had power ratings over 250 hp) were used by 5% of respondents. Few respondents used boats in the “kayak/canoe” category (<1%) or houseboats (<1%).

A majority of boaters reported that they used their boats from April through October. Greater than 85% reported boating from May through September. Very few respondents reported boating between November and March. The top months for boating were reported as June, July, and August by >2/3 of respondents. However, both May and September were indicated as top months by ~25% of respondents. No more than 8% checked any month between October and April. Regarding amount of boat use in the action area, 15% listed Pohick Bay, 10% Gunston Cove, 6% Belmont Bay, and 2% Accotink Bay as one of their most common destinations. Taken together, approximately 1/3 of boaters surveyed stated that they use some portion of the action area most often. The largest percentage of boaters (51%) reported that they hardly ever or never used Pohick or Accotink Bays. The other half of the respondents indicated use of these Bays sometimes (25%), frequently (12%), and very frequently (11%). 51% of boaters stated that they went into one of the Bays within the last year; 7% within the past 1-3 months, and 39% within the last week to 1 month.

Boat Ramp Exit Interviews - Pleasure boating (53%) and fishing (32%) were the two most pursued activities by ramp users; water-skiing was 17% and PWC was 12%. Of the ramp users, 67% were on the water for a half day, 30% for a full day, and 3% for more than 1 day. The most common destination for ramp users on the day of the interview was the mainstem Potomac River (28%), Gunston Cove (13%), Pohick Bay (11%), Belmont Bay (2%), and Accotink Bay (2%). Although the three Bays were the primary destination for only a small percentage of boaters, the proportion of boaters who were in those Bays for at least part of their trip is somewhat higher. This is particularly true for Pohick Bay, which 27% of respondents used. Accotink and Belmont Bays were each used by 6% of boaters. Overall, 31% of boaters used one or more of the three Bays.

While most boaters who used the three Bays did spend some time there rather than just passing through, most spent the majority of their trip in other areas; 23% said they passed through, 51% said they spent about an hour, and 26% said they spent most of the trip in one of the three Bays. Seventy-one percent of boaters estimated that they had been within 100 yards of the shoreline and 26% said they had been within 0.5 miles from shore while in one or more of the Bays. As was the case regarding the boaters’ primary activities for the trip, the primary activity within the Bays was most often pleasure boating (30%). Fishing (24%) and water-skiing (22%) by Bay users, were relatively close to those recorded for overall primary activities. However, a large difference was apparent in regards to PWC

use in that only 12% of the respondents mentioned PWC use as a primary activity on the day of the interview, while 27% of those who used the Bays indicated PWC use was their primary activity while there. This suggests that PWC use in this area is concentrated in the three Bays. Non-powered boating activities were minor in the Bays.

Boat Counts - The authors concluded “that the methods used for conducting boat counts during the 1996 study had severe limitations and as a consequence the data lack sufficient reliability to make strong inferences about the results.” The overall average number of boats counted on weekends in Gunston Cove was more than 5 times the average number counted on weekdays and was more than 10 times greater than the weekday average in Belmont Bay. The data indicated that the amount of use increases throughout the day on weekends and peaks in mid- or late afternoon. The early afternoon peak on Belmont Bay represents a more than nine-fold increase over morning traffic. This increase over the course of the day is much less dramatic on Gunston Cove on weekends and on weekdays with perhaps a tripling or quadrupling of use between the morning and the afternoon peak. Gunston Cove and Pohick Bay receive the most use on any day. Accotink Bay had the lowest average number of boats per half hour for all days.

The most common type of boats in Gunston Cove and Belmont Bay on weekends were pleasure boats less than 20 feet long. These boats were also most common on weekdays in Belmont Bay. However, on weekdays in Gunston Cove, PWC were the most common followed by pleasure boats less than 20 feet long. PWC were also a close second behind small pleasure boats on weekends in Gunston Cove. In Belmont Bay, PWC were not observed at all in the morning period and very rarely seen before 2:00 p.m. PWC were also scarce during the morning period in any region of Gunston Cove. However, they were far more prevalent starting with the 10:00 a.m. counts, especially on weekends. Ski boats were most often observed in Pohick Bay at any time and in Gunston Cove in the late afternoon. In Belmont Bay, ski boats were found to be rarely used before 12:00 p.m.; however, in the afternoon this type of boat became a significant part of the boat traffic in that Bay. At most times, averages for fishing boats in Gunston Cove were consistently lower than the previously mentioned boat types. The highest averages occurred during the morning and pre-noon periods in Pohick Bay. In Belmont Bay, fishing boats were observed most in the pre-noon time period. Sailboats, sailboards/wind surfers, and canoes, kayaks, or rowboats were typically minor components of the boat traffic observed. These boat types were very rarely observed, if at all, on weekdays.

Authors’ Conclusions - “Characterizing boat traffic patterns with TBRA in operation based on the information gathered for the study is extremely difficult . . . it can be projected that the use of Gunston Cove and its bays would change significantly [once TBRA is operational]. The percentage of boaters who use the Gunston Cove, Pohick or Accotink Bays most often with TBRA in operation would likely be similar to the current percentage. However, with double the amount of boats with direct access to the area it can be expected that the amount of boats using these areas most often would sharply increase. Changes in their use patterns could also be expected as a result of higher densities of boat traffic in the area. Albeit, because boaters would be originating from an access within the Gunston

Cove, the amount of traffic going in and out of the area would also add to the amount of boat traffic in the main stem of the cove.”

With TBRA in operation, the large amount of boat storage capacity may result in an increase in boat traffic on weekdays equivalent to the levels currently found on weekends for the Gunston Cove area in particular. Pleasure boats and PWC were the boats observed most often in Gunston Cove. It can be expected that these types of boats would increase proportionately and remain the dominant type with TBRA in operation. However, PWC that are rented are generally not allowed to be taken far from their place of rental. This would increase the presence of PWC in Gunston Cove and its Bays. “Restrictions regarding rental of PWC would be a prudent course of action given their uncertain effect on bald eagles.”

The effects TBRA would have on Belmont Bay can be expected to be less than in the Gunston Cove area. The proposed TBRA is approximately 9 miles by boat from Belmont Bay. The added amount of use Belmont Bay would receive as a result of TBRA can be expected to increase but not as much as in the Gunston Cove area. Use patterns in Belmont Bay can be expected to be very similar to the current patterns.

The additional types of facilities and activities that will be available at TBRA, compared to Dogue Creek, may draw non-slip renters and boaters accessing the river far from the study area.

“Given the limitations of the data gathered for the purpose of describing and projecting use, it is recommended that decision-makers institute a monitoring program to measure actual boat numbers by type, location, and time in relation to bald eagles’ response It would be prudent to budget for annual boating use studies in concert with bald eagle studies as development occurs and to recommend adjustments according to study findings.”

EFFECTS OF THE ACTION

Direct Effects - The marina facility is not located near any bald eagle nests. The TBRA is located approximately 3,200 feet from the Mason Neck bald eagle concentration area. Therefore, no direct effects to the bald eagle from marina construction are anticipated. The dredging vessel is not likely to disturb bald eagles because it is not located in the concentration area and will be relatively stationary. The dredge spoil containment center is not anticipated to adversely affect eagles. However, a floating pipeline will transport the dredge material. The pipeline will be partially located in the water within the eagle concentration area and will leave the water and cross the shoreline within the concentration area. The presence of this pipeline near shoreline segments 24, 25, 26, and 28 may result in eagle avoidance of Pohick Bay, a high use eagle area, for up to three months. As a result, bald eagles will only be able to utilize 20% of the available quality eagle habitat within the action area. However, eagles may adapt to this structure since it will not vary in location or be associated with much human activity.

Interrelated and Interdependent Actions - An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. The Service is not aware of any such actions.

Indirect Effects - Indirect effects are defined as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02). Three indirect effects adversely impacting the bald eagle will occur from the proposed project: maintenance dredging, water quality degradation, and increased boat traffic.

Maintenance Dredging - Maintenance dredging is planned at 15-year intervals. Impacts similar to those described in the “Direct Effects” section are anticipated.

Water Quality Degradation - Small oil and gas spills, leaks or exhaust resulting from boating and fueling operations, and pumping/draining of bilge water are expected to occur on a regular basis and degrade the water quality of Gunston Cove, including Pohick and Accotink Bays. These impacts are anticipated to adversely impact eagles through contamination of the prey base; such impacts on eagles have not been well studied and cannot be quantified at this time. Large oil spills may occur resulting in injury or death to eagles from contact with the oil or consuming oiled prey. However, because the occurrence of such an oil spill is expected to rarely occur, and it is difficult to anticipate the number of eagles that could be affected. Other pollutants discharged into waters from boat maintenance operations include copper from sanding and painting of boats with anti-fouling paint. These operations are likely to contaminate the prey base of the eagle with a currently unquantifiable outcome. Fort Belvoir will implement a Spill Prevention, Control, and Counter-measure Plan.

Boat Traffic - The boating season at TBRA is anticipated to be May through October. In late spring and summer (May through August), when boat traffic is expected to be at its highest levels, the number of bald eagles in the action area will be at their lowest densities (Table 1). It is expected that TBRA will have the greatest effect on eagles utilizing shoreline segments 21 through 28 (Figure 7), which is the shoreline in Gunston Cove and Accotink and Pohick Bays. Most boats leaving and entering the marina would transit some or all of these segments within at least 1,000 feet of the shoreline. Also, boat traffic will increase along these shoreline segments from boats remaining in Gunston Cove and Accotink and Pohick Bays. If those 8 segments (21 through 28) are divided by the total action area, consisting of 22 segments, the functional habitat loss anticipated from increased boat traffic is equal to approximately 36% of the action area. However, it should be noted that two (segments 23 and 28) of the eight segments currently receive little eagle use. Because eagles have been documented in the action area year-round, it is likely that the majority, if not all, of the bald eagles foraging and perching in segments 21 through 28 on any given day of the year will be disturbed by boating activity. Even a small increase in boat frequency on weekdays may represent a larger relative effect on the eagles, as it may leave no time for eagles to recuperate from the increased disturbance during the weekends.

Pohick Bay Regional Park Marina reported 250 launches per day on a summer weekend/holiday. Operation of TBRA is anticipated to greatly increase the number of boats in the action area. It is estimated that 380 launches per day will occur from TBRA on a summer weekend/holiday. The estimated number of launches from TBRA is based on current use patterns of Dogue Creek marina (which will be closed after construction of TBRA) which differs substantially in the amount and type of amenities offered. Twenty of the 380 boats launched from TBRA would have already been in Gunston Cove/Accotink and Pohick Bays after launching from Dogue Creek Marina. Therefore, TBRA will launch 360 boats not currently known to utilize Gunston Cove/Accotink and Pohick Bays. This is a 144% increase in boat traffic. However, boaters launch from other ramps/marinas, and subsequently utilize Gunston Cove/Accotink and Pohick Bays; this boat traffic has not been quantified. This additional boat traffic would result in the actual increase in boat traffic in the action area from TBRA being less than a 144% increase.

An approximate 144% increase in recreational boating activity in the Mason Neck eagle concentration area on a summer weekend/holiday day resulting from TBRA will increase disturbance to eagles utilizing this concentration area. This facility will result in launching of recreational boats immediately adjacent to the eagle concentration area, and as a result, boats traveling or remaining within the vicinity of TBRA will disturb eagles. Boat traffic resulting from TBRA will be disruptive to perching and foraging eagles. As boats leave TBRA and near the shorelines of Gunston Cove and Accotink and Pohick Bays, eagles will be flushed and will likely fly inland. Data analysis by Watts and Whalen (1997) suggested that the presence of boats on the James River within 656 feet of the shoreline had a significant negative effect on shoreline use by bald eagles. Once a boat is stationary, eagles will avoid the area around the boat, resulting in additional disturbance. When boats leave from and return to TBRA and travel in and out of Gunston Cove and its two Bays, there is a high probability that individual eagles will be flushed multiple times, forcing them to fly inland for prolonged periods. This results in increased time eagles will spend scanning for boats while trying to forage, yielding a decrease in food intake and/or inability to forage after being forced inland from numerous disruptions. Reduced foraging by the nesting eagles within the action area could seriously impact the survival of their young. In addition, Fraser (1983) stated that subadult bald eagles make up the future breeding populations and food shortages and major habitat disturbances are likely to affect them before breeding birds are affected. Stalmaster and Kaiser (1998) found that “although the effects of activity are cumulative, events early in the daily sequence cause most disturbance . . . recreational use should be restricted in the morning to increase feeding activity . . .” They further stated that “. . . many recreationists were either unaware of eagles responding to their presence or based their beliefs on their observations of unusually tolerant birds. Many intolerant eagles had already left the river or altered their behavior during the earliest events of the day, before most visitors were on the river. . . .” Stalmaster and Kaiser (1998) recommended that “. . . recreational use should be prohibited during the first five hours of daylight . . .” to allow bald eagles to forage without disturbance from humans.

With respect to the TBRA, Nielsen *et al.* (1998) stated, “It is likely that this increase in traffic within the bald eagle’s high use foraging area will lead to repeated disturbance of the foraging eagles and

increased flushing. This may result in eagles being forced to move to another area to find suitable foraging habitat. Resident pairs may suffer decreased productivity as a result of the increase in energy expenditure due to repeated flushing. The impact to nonresident bald eagles is more difficult to assess. Continued disturbance of foraging eagles with the action area may result in some of the eagles, both resident and migrant, abandoning the area permanently.” Insufficient data on density threshold capacities for bald eagle foraging areas makes it difficult to predict how many bald eagles displaced from one stretch of shoreline could be accommodated in another shoreline stretch. This disturbance is anticipated to be severe enough to disrupt the normal daily activity patterns of the bald eagle, including, but not limited to, activities such as foraging and perching along shoreline segments 21 through 28 in the Gunston Cove area.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Nielsen *et al.* (1998) provided the following information. The 1993 Fort Belvoir Real Property Master Plan does not designate any areas along Accotink, Pohick, or Dogue Creeks for future development and most areas along the creeks on the Fort are designated “environmentally sensitive.” Increased shoreline development along the Mason Neck eagle concentration area is limited by the large tracts of protected land on the Mason Neck peninsula, including Mason Neck State Park, Mason Neck NWR, and Pohick Bay Regional Park. New residential development outside these areas is limited by the availability of sewage treatment in the area. Recent Fairfax County zoning plans indicate that the closest sewer lines in the vicinity of the Mason Neck peninsula are generally northwest of the intersection of Gunston Road and Route 1. There are no plans to bring sewer lines into the peninsula due to poor soil conditions and low elevations that would require costly sewage pumping stations. The current sewer system for Hallowing Point River Estates is failing, and it is unlikely that the county will install public sewer lines to reach this development of any future development. Construction of a large number of additional private piers within the action area is unlikely as this construction is often associated with new development. Therefore, no cumulative effects from development in the action area are anticipated.

There are 76 rental boats that will be available at the rental pier. As consumer demand changes, the total number of boats and the type and number of each boat may change. Change in number or type of rental boats will be a federal action on the part of the Army and therefore, will require informal consultation with the Service and may require reinitiation of formal consultation.

CONCLUSION

After reviewing the status of the bald eagle, the environmental baseline for the action area, the effects of

the proposed action and the cumulative effects, it is the Service's biological opinion that the TBRA, as proposed, is not likely to jeopardize the continued existence of the Chesapeake Bay, Northern, or Southeast bald eagle recovery populations. No critical habitat has been designated for this species, therefore, none will be affected.

III. INCIDENTAL TAKE STATEMENT

Sections 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by the Army so that they become binding conditions of any construction project, lease, contract, or permit, as appropriate, for the exemption in action 7(o)(2) to apply. The Army has a continuing duty to regulate the activity covered by this incidental take statement. If the Army (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to any permit, lease, or contact document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Army must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

AMOUNT OR EXTENT OF TAKE

Determining the exact amount of take of the bald eagle is difficult because: (1) there are insufficient data on the specific thresholds for disturbance that eventually causes eagles to abandon an area, (2) there is great variability in the numbers of eagles and the individual eagles present in the action area throughout the year, and (3) there are insufficient data on the current and projected destinations and numbers of boaters within the action area to predict the precise location and exact increase in disturbances which will occur.

The Service anticipates that incidental take of the bald eagle will be difficult to detect because direct killing/immediate death of birds is not likely. Instead, loss of vigor, depressed reproductive rates, and

relocation to marginal habitat are expected. While these types of activities are likely to result in injury and may, in some cases, lead to death, they are not easily observed and finding a dead or impaired specimen is unlikely. Eagle habitat used for foraging, perching, and roosting throughout the concentration area along the shoreline of the Potomac River and its tributaries and 750 feet landward will be affected by human activities, including the floating dredge pipeline. Boats within 656 feet of the shoreline in the concentration area will flush foraging or perched eagles. Each boat will flush eagles as it travels within the concentration area. Every time a boat stops, the area up to 2,952 feet around it will be avoided by eagles. When the boat moves again, more eagles will be flushed. Because the use of boats is unpredictable and eagle numbers may vary on a given shoreline segment, a total acreage of disturbance cannot be quantified. A few boats moving along the shoreline could functionally eliminate a significant portion of the shoreline and riverine habitat from eagle use for an entire day.

Incidental take is expected to be in the form of harm and harassment. The Service anticipates that on an average weekend day during May through October, all eagles will be adversely affected within shoreline segments 21, 22, 23, and 28. Based on current conditions, this could result in as many as 38 eagles being harmed/harassed on a given day. It is estimated that a smaller percentage of eagles within segments 24 through 27 will be adversely affected because these segments are within Pohick and Accotink Bays and will not be traversed by or be the destination for every boat launched from TBRA. Although an exact number cannot be calculated, it is anticipated that 25% to 75% of the eagles within segments 24 through 27 could be affected. Based on current conditions, as many as 20 eagles could be harmed/harassed within segments 24 through 27 on a given day.

The Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein. This incidental take statement does not include impacts to bald eagles from oil/chemical spills and/or releases. Take of eagles from such spills/releases shall continue to be subject to the provisions of ESA, MBTA, and BEPA.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the bald eagle:

- C Implement time-of-day restrictions on watercraft leaving the TBRA marina facility. Jaffee (1980) observed that in the Caledon bald eagle concentration area on the Potomac River, most bald eagle foraging occurred prior to 10:00 a.m. Avoiding disturbance of eagle foraging during critical time periods will minimize impacts to the eagle.
- C Reduce and enforce (for Fort Belvoir boaters) boating access and “no wake” zones in or near Accotink and Pohick Bays to minimize impacts to perching and foraging bald eagles from

nearshore boat traffic.

- C Minimize number and user days of PWC launches from TBRA marina facility to minimize impacts to bald eagles from this type of watercraft that typically remains near its point of launch and will therefore likely remain in the bald eagle concentration area and result in a significant amount of disturbance to eagles utilizing the shoreline.
- C Implement time-of-year restrictions on dredging to minimize impacts to bald eagles utilizing Accotink and Pohick Bays.
- C To minimize the extent of harassment to eagles, measures must be taken to inform boaters of the potential for their activities in Gunston Cove and Accotink and Pohick Bays to disturb foraging and perching eagles.
- C Minimize shoreline lighting to avoid harassment/harm of bald eagles utilizing the area near TBRA.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the ESA, the Army must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

1. The Army shall prohibit boaters from the TBRA marina facility from accessing Accotink Bay and a portion of the Pohick Bay shoreline (Figure 8). This shall be done via buoys and signs on the buoys stating no entry, contingent upon Fort Belvoir receiving approval/authorization from the appropriate regulatory agencies to install buoys. This shall be enforced by use of surveillance cameras. The buoys, signs, and surveillance cameras shall be in place before any boats are allowed to use the TBRA marina facility.
2. No privately-owned personal watercraft shall be launched from the TBRA marina facility at any time.
3. No more than XX personal watercraft shall be for rent from the TBRA marina facility at any time. These rental personal watercraft shall not be available for use during non-holiday weekdays.
4. No watercraft shall leave the TBRA marina facility before 10:00 a.m. on non-holiday weekdays year-round.
5. No watercraft shall leave the TBRA marina facility before 8:00 a.m. on weekends or holidays

from September 1 through January 31 of any year.

6. No watercraft shall leave the TBRA marina facility before 7:00 a.m. on weekends or holidays from February 1 through August 31 of any year.
7. No organized, water-based recreational activities (*e.g.*, fishing tournaments, guided canoe trips) sponsored or authorized by the Army shall occur within 1,000 feet of the Gunston Cove, Accotink Bay, or Pohick Bay shorelines from September 1 through January 31 of any year.
8. No dredging shall occur from September 1 through January 31 of any year.
9. All individuals who utilize the TBRA marina and rental facility shall be subject to marina rules and regulations. The Army shall suspend or revoke these privileges upon violation of any marina rule or regulation pertaining to these Terms and Conditions.
10. REWRITE The Army shall initiate informal consultation with the Service if the Army proposes to change the number or type of rental boats at the TBRA.
11. The Army shall request from the appropriate regulatory agencies, establishment of a “no wake” zone within 1000 feet of the Pohick Bay shoreline prior to operation of the TBRA marina or rental facility.
12. Mandatory educational programs shall be conducted by the Army to encourage users of TBRA to avoid sensitive areas in Accotink and Pohick Bays and to avoid engaging in boating behavior that could be detrimental to bald eagles. The Army shall provide its proposed bald eagle protection policy to the Service for review prior to authorizing boat use of the TBRA marina or rental facility. Upon Service review of the policy, the Army shall transmit the policy to Pohick Bay Regional Park.
13. All exterior lighting at the TBRA marina and rental facility shall be covered to ensure that all lighting is directed downward.
14. Large weatherproof signs shall be placed and maintained adjacent to the marina and the rental pier at all times, informing users of the large numbers of bald eagles utilizing the shoreline adjacent to the TBRA. The signs shall describe the use of the area by eagles, identify the dates and times of boat ramp closure, state any prohibitions, and explain why boaters should avoid nearshore activities. The signs shall also provide educational information on the natural history of the bald eagle and the significance of the Mason Neck bald eagle concentration area. The proposed size, language, and layout of the signs shall be submitted to and approved by the Service. The signs shall be installed prior to operation of TBRA and photographic evidence thereof must be submitted to the Service.

15. Pursuant to 50 CFR 402.14(i)(3), to monitor the impacts of incidental take, the federal agency or applicant must report the impact of the action on the species to the Service. To meet this requirement, the Army shall conduct year-round monitoring of boat/eagle use along shoreline segments 21 through 28 (Figure 7), one year prior to use of the TBRA marina and rental facility, and for two consecutive years following the first day of operation. The methodology should be patterned after the pier observations in “Watts, B.D. and D.M. Whalen. 1997. Interactions between eagles and humans in the James River bald eagle concentration area. Prepared by the Center for Conservation Biology, College of William and Mary, for the Virginia Department of Game and Inland Fisheries, Richmond, VA.” A draft monitoring plan shall be submitted to the Service for approval at least 45 days prior to initiation of monitoring. The monitoring shall be conducted by individuals proficient in the identification, research, and biology of the bald eagle. Every six months after initiation of monitoring, the Army shall submit to the Service an interim report documenting the researchers, dates, methods, and results of the study to date. Within 120 days of completion of the third year of monitoring, the Army shall submit to the Service, VDGIF, and Corps a final report documenting the researchers, dates, methods, and results. Upon request, the Service and VDGIF shall be given copies of any and all raw data within 60 days of the request. Within 60 days of submittal of the final report to the Service, the Army shall contact the Service to determine if reinitiation of formal consultation and/or other terms and conditions are necessary. Capture and/or collection of bald eagles is not authorized, except as permitted by appropriate federal and state regulatory agencies.
16. Care must be taken in handling any dead specimens of proposed or listed species that are found in the project area to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead specimen, notify the Service at the address provided.
17. The Army shall notify the Service before initiation of construction and upon completion of the project at the address given below. All additional information to be sent to the Service shall be sent to the following address:

Virginia Field Office
U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, VA 23061
Phone (804) 693-6694

Fax (804) 693-9032

IV. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to further minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Mason Neck bald eagle concentration area is utilized year round by eagles from three recovery regions. A dramatic increase in boat traffic is likely to cause significant declines in eagle use of the concentration area by adversely modifying and appreciably reducing eagle habitat. The 1994 “Memorandum of Understanding on Implementation of the Endangered Species Act,” to which the Service and Corps are cooperators, states that cooperators will protect and manage populations of listed species and the ecosystems upon which those populations depend using existing federal authorities and programs. The cooperators shall also work together to improve the effectiveness of interagency consultations. In light of the serious negative environmental consequences that will result from the proposed action, combined with the Corps’ ability and requirement to pro-actively manage and protect listed species, the Service recommends that the Corps work with the Army to implement the following:

1. Preserve the existing riparian forest on Fort Belvoir property 750 feet landward of the shoreline on shoreline segments 24 through 27 (Figure 7) to protect foraging/ perching habitat for the bald eagle.
2. Build the marina in a less environmentally sensitive location. If this cannot be accomplished, the currently proposed TBRA should be appreciably reduced in size.
3. Limit the number of rental boats to no more than 76.

For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

V. REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect

listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

FISH AND WILDLIFE COORDINATION ACT COMMENTS

Because a Corps' permit application has not been submitted, the following comments constitute the preliminary report of the Service and the Department of the Interior on this project and are submitted under provisions of the FWCA. Once a Corps' Public Notice is issued for the proposed project, the Service will provide further, more detailed comments. The description of the resources of the project site and the impacts associated with the construction and use of the proposed facility included in the Service's biological opinion are pertinent to our comments under the FWCA. It is the Service's position that the Mason Neck bald eagle concentration area is vitally important to the species' continued recovery in the eastern United States. The increased boating pressure within the concentration area continues to degrade the area and decrease the amount of habitat available to eagles. At present, it is unknown at what point human disturbance will cause eagles to abandon the concentration area. The proposed TBRA would constitute one of the largest marina facilities in Virginia. From a biological standpoint, the Service believes that this area cannot support such a large facility. The Service recommends that Fort Belvoir and the Corps:

1. Build the marina in a less environmentally sensitive location. If this cannot be accomplished, the currently proposed TBRA should be appreciably reduced in size.
2. To avoid impacts to SAV beds:
 - C Change the configuration or reduce the size of the marina.
 - C Ensure a minimum 3:1 no-dredge buffer around existing SAV beds. That is, allow a three-foot lateral buffer for every one foot of vertical dredged material removal in the dredged channel.
 - C Do not conduct new dredging in areas around piers unless there was historical deepwater access.
 - C Minimize width and depths of dredged channels.
 - C Dredging near SAV will occur between February 1 and March 31.
 - C Stake SAV beds prior to dredging.
 - C Require a post-dredging survey to ensure channels were dredged to depths allowed in any Corps permit.
3. All maintenance of temporary and permanent sedimentation and erosion control facilities shall be carried out in accordance with Section 1.7 of the Virginia Erosion and Sediment Control Handbook regulations (VR 625-02-00).

4. Ensure that habitat for the northern Virginia well amphipod (*Stygobromus phreaticus*) adjacent to TBRA be permanently protected. This amphipod is globally rare and is a species of concern for the Service.

The Service appreciates this opportunity to work with Fort Belvoir and the Corps in fulfilling our mutual responsibilities under the ESA and FWCA. Please contact Cindy Schulz at (804) 693-6694, extension 127, if you have any questions.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

Enclosures

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APPENDIX A - CONSULTATION HISTORY

Prior to the specific information provided below, the Service and the Army had conducted meetings and site visits to discuss the proposed TBRA.

- 09-14-94 The Service received a letter from Fort Belvoir requesting resumption of informal consultation on the proposed project.
- 11-14-94 The Service received a letter from the Corps requesting Service attendance at a pre-application meeting to discuss the proposed TBRA.
- 11-16-94 The Service met with Fort Belvoir to discuss section 7 ESA issues prior to preparation of the Environmental Assessment.
- 11-29-94 The Service participated in a pre-application meeting with Fort Belvoir and their consultants, Baltimore District Corps, Virginia Department of Environmental Quality, Virginia Department of Health, Virginia Institute of Marine Science, Virginia Marine Resources Commission, and U.S. Environmental Protection Agency.
- 06-18-96 The Service met with Fort Belvoir and the VDGIF to discuss the proposed project and its impact on the bald eagle.
- 05-13-97 The Service met with Fort Belvoir, their consultant, VDGIF, and the Corps to discuss the proposed project.
- 06-24-97 The Service received a letter from Fort Belvoir providing bald eagle information and a copy of the draft "Recreational Use Study" for the TBRA.
- 09-04-97 The Service met with Fort Belvoir, their consultant, and the VDGIF to discuss the draft "Recreational Use Study."
- 09-15-97 The Service received a facsimile from Fort Belvoir providing a summary of the 9-4-97 meeting and requesting comments on same.
- 09-19-97 The Service provided comments to Fort Belvoir on their 9-15-97 facsimile.
- 10-15-97 The Service was contacted by the Corps' Waterways Experiment Station (WES) to discuss the "Recreational Use Study."
- 12-01-97 The Service received a draft report entitled "Boating Use Patterns on the Potomac River" from WES for review and comment.
- 12-30-97 The Service received the final draft "Boating Use Patterns on the Potomac River"

report.

- 12-15-98 The Service received Fort Belvoir's request to initiate formal consultation.
- 01-13-99 The Service sent a letter to Fort Belvoir indicating that their request for formal consultation had been received and was complete.
- 01-13-99 Fort Belvoir indicated that they want to review a draft opinion.
- 01-15-99 The Service sent a letter to the Corps informing them that formal consultation on the proposed project had been initiated.
- 05-14-99 The Service submitted the draft biological opinion to Fort Belvoir and the Corps.
- 07-28-99 The Service met with Fort Belvoir to discuss the draft biological opinion.

Table 1. Mason Neck/Potomac River Bald Eagle Shoreline Use Area Shoreline Count Summary, April 23, 1992 - August 12, 1997 (Conducted by Mason Neck National Wildlife Refuge).

Shoreline ¹ Segment	Average Number of Bald Eagles ² Observed (Total # Eagles/Total # Surveys)												
	Jan (3) ³	Feb (1)	Mar (4)	Apr (6)	May (7)	Jun (9)	Jul (10)	Aug (9)	Sep (8)	Oct (8)	Nov (6)	Dec (4)	Total ⁴
1	0.67	0	0	0.33	0	0.22	0.20	0.11	0.88	0.25	0.17	0.75	0.293
2	1.00	0	0	0	0.14	0.40	0	0.33	0.50	0.50	0.33	0.75	0.316
3	0.67	0	0	0	0.14	0.22	0.10	0	0.13	0	0.17	0.50	0.133
4	0	0	0.25	0	0	0	0	0.11	0.13	0.38	0.33	0.25	0.120
5	0.33	0	0	0	0	0.11	0.20	0.22	0.25	0.38	0.33	0	0.173
6	0	1.00	0.50	0	0	0.22	0.20	0	0.25	0.13	0.83	1.50	0.280
7	0	0	0.50	0	0	0.22	0.30	0.11	0.25	0	0	0	0.133
8	0	0	1.00	0	0.43	1.11	0.60	0.11	0.38	0.25	0.33	0.75	0.453
9	0.67	1.00	1.25	0.67	1.14	1.11	1.40	0.44	1.38	0.75	0.33	1.00	0.947
10	1.33	0	0.75	2.00	2.29	3.00	1.90	0.56	2.50	2.25	0.50	1.50	1.77
11	1.33	1.00	1.00	1.33	1.14	1.33	0.90	0.33	1.63	1.50	1.33	0.75	1.13
12	1.00	0	0.75	0	0.43	0.77	0.90	1.11	0.50	0.88	0.50	1.25	0.72
13	2.33	0	1.50	0.17	0.14	0.56	1.20	0.67	2.00	1.38	1.33	1.00	1.03
14	1.33	4.00	0	1.17	0.86	0.67	1.70	2.33	1.88	0.88	1.67	0.75	1.33
15	3.33	0	2.5	0.50	1.14	1.67	1.40	2.56	3.63	2.00	1.83	3.75	2.05
16	1.33	0	2.5	1.50	3.00	3.67	2.70	5.89	3.00	3.88	3.17	2.25	3.20
17	1.00	0	0.75	0.50	1.43	1.00	0.40	0.56	1.13	1.38	1.33	1.00	0.92
18	1.00	2.00	0.25	0.67	0.29	0.44	0	0.56	0.75	0.25	0.50	0.25	0.44
19	0.33	0	0	0	0	0	0	0	0.13	0	0.33	0.25	0.067
20	0.67	0	0.50	0.83	0.29	0	0.10	0	0.13	0.63	1.33	2.25	0.467
21	2.33	0	1.00	0.17	0	0.22	0.90	0.78	0.75	1.75	3.50	1.50	1.027
22	2.33	1.00	1.00	0.50	0.57	0.67	0.30	0.89	1.63	1.00	1.67	0.50	0.920
23	0	1.00	0	0	0	0.44	0.10	0.56	0.13	1.25	1.33	2.00	0.507
24	1.33	4.00	1.25	1.00	1.14	0.44	0.20	1.00	1.75	0.38	1.67	3.75	1.120
25	1.67	1.00	0.50	0.33	0.29	0.78	0.70	0.56	1.13	0.75	0.67	2.25	0.787

Lieutenant Colonel Hirata and Colonel Berwick

Shoreline ¹ Segment	Average Number of Bald Eagles ² Observed (Total # Eagles/Total # Surveys)												
	Jan (3) ³	Feb (1)	Mar (4)	Apr (6)	May (7)	Jun (9)	Jul (10)	Aug (9)	Sep (8)	Oct (8)	Nov (6)	Dec (4)	Total ⁴
26	3.00	0	0.50	0.50	1.00	0.67	0.50	0.78	0.63	0.38	1.00	2.00	0.813
27	0	0	0	0.50	0	0.33	0	0.11	0.25	0.63	0.83	1.50	0.333
28	0	0	0	0	0	0	0	0.22	0.13	0	0.67	0.25	0.107
Total ⁵	1.12	0.57	0.65	0.45	0.57	0.73	0.60	0.75	0.99	0.85	1.00	1.22	

¹See Figure 7 for location of shoreline segment.

²Adult and juvenile bald eagles combined.

³Number in parentheses is number of surveys conducted during that month.

⁴Total number of eagles/total number of surveys for that particular shoreline segment.

⁵Total number of eagles/total number of surveys for that particular month.

(CSchulz:7/29/99)

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bcc:

ARD-ES, Region 5

Program Supervisor, ES-South, Region 5

ARD-South, Region 5

Supervisor, CBFO

Endangered Species Coordinator, Region 5

Law Enforcement, Richmond

(Attn: Senior Resident Agent)

Al Hundley, LE, Fredericksburg

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