May 31, 1996

Colonel Robert H. Reardon, Jr.
U.S. Army Corps of Engineers
Norfolk District
803 Front Street
Norfolk, Virginia 23510-1096

Attn: Adrian Jennings
Regulatory Branch

Re: Olaf Zwicker, Permit Application No. 96-0324-50, Northumberland County, Virginia

Dear Colonel Reardon:

The U.S. Fish and Wildlife Service has reviewed Department of the Army permit application 96-0324-50 for Olaf Zwicker, to construct groins and a spur in Northumberland County, Virginia. Your May 8, 1996 request for formal consultation was received on May 13, 1996. This document represents the Service's biological opinion on the effects of that action on the northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) in accordance with Section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et seq.). A complete administrative record of this consultation is on file in this office.

I. CONSULTATION HISTORY

05-13-96 The Service received the Corps' request to initiate formal consultation and receive a draft of the biological opinion.

5-29-96 The Service issued the draft biological opinion

05-31-96 The Service received the Corps' comments on the draft biological opinion.

II. BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The applicant proposes to construct two 72-foot long, low-profile, timber groins and a 12-foot long spur on his property on the Chesapeake Bay in Northumberland County, Virginia (Figures 1 and 2). The landward end of the groins will be constructed at the toe of the existing bank and extend

channelward. The groins will be 150 feet apart. The groins are expected to accrete sand and reduce the rapid erosion rate. This should decrease the plane of the beach slope and increase the horizontal distance of the intertidal area. The equipment and construction activity will require an approximate width of 10 feet at each proposed groin location. The spur is located at mean low water (MLW), attached and perpendicular to the northern side of the northernmost groin (Figure 2).

RANGEWIDE STATUS OF THE SPECIES

Life History

The northeastern beach tiger beetle is a beach-dwelling insect measuring 0.5 to 0.6 inches in length. It has white to light tan wing covers, often with several fine grayish-green lines, and a bronze-green head and thorax (Knisley 1991, U.S. Fish and Wildlife Service 1993, U.S. Fish and Wildlife Service 1994). Adult tiger beetles are active, diurnal, surface predators. They forage along the water's edge on small amphipods, flies, and other beach arthropods or scavenge on dead amphipods, crabs, and fish (Knisley *et al*. 1987, U.S. Fish and Wildlife Service 1993, U.S. Fish and Wildlife Service 1994). Most foraging occurs in the damp sand of the intertidal zone and scavenging has been observed to occur more often than predation (Knisley *et al*. 1987). Larval northeastern beach tiger beetles are sedentary predators that live in well-formed burrows on the beach from which they extend to capture passing prey. Adult tiger beetles are present on beaches from mid-June through August, where they spend most of the day along the water's edge (Knisley *et al*. 1987). Adults are active on warm, sunny days where they can be seen feeding, mating, or basking (U.S. Fish and Wildlife Service 1994). They are less active on rainy, cool, or cloudy days because they cannot maintain their own body temperature. They must rely on a variety a behaviors, such as foraging and basking, to maintain their high body temperatures (Knisley *et al*. 1987).

Typically, the adults lay eggs on the beach during the summer. In Maryland, some type of "nesting" behavior has been observed at night where females have been commonly found in shallow vertical burrows (5 - 8 cm deep) often with males guarding the mouth of the burrow (U.S. Fish and Wildlife Service 1994). Eggs have been recovered from some of these burrows, indicating that, at least in some instances, egg-laying occurs in these burrows and at night (C.B. Knisley and J. Hill pers. obs.). Larvae pass through three developmental stages and emerge as adults two years following egg-laying (Knisley *et al*. 1987, U.S. Fish and Wildlife Service 1993). However, some larvae that hatch early and catch an abundance of food may develop and emerge after only one year (U.S. Fish and Wildlife Service 1994). Larvae typically occur in an 8 - 12 m width of beach within and above the intertidal zone. However, this area may be wider in areas of washover or where the upper beach is flat and is periodically inundated by high tides (U.S. Fish and Wildlife Service 1994). Larvae have been documented on beaches less than 8 m wide.

Development through three larval stages and pupation takes place in the burrow (Knisley *et al*. 1987). First instars occur from late August through September; second instars from September to late fall; and

third instars from late fall to early spring and through the second year (Knisley *et al*. 1987). Knisley *et al.* (1987) found that the distribution of first and second instars was similar and that highest densities of third instars were in the mid- to upper-tidal zone. Therefore, most burrows were underwater during high tide. Larval burrow depths ranged from 9 - 24 cm and increased with distance from the water's edge, suggesting that burrow depth may be related to subsurface moisture (Knisley *et al*. 1987). Generally, larval burrows are plugged and not visible when the sand is dry and warm. Larvae lack a hard cuticle and are susceptible to desiccation, therefore, they tend to become inactive during hot, dry conditions (U.S. Fish and Wildlife Service 1994). Larvae are active primarily at night and plug their burrows during most of the day. "Burrows are reopened as soil moisture increased with incoming tides, plugged when covered by tidal wash, and then reopened briefly as the tides recede" (Knisley *et al*. 1987). "Larvae nearer to the water's edge tend to develop faster than those farther back where it is drier and prey items are less numerous (C.B. Knisley pers. obs.)" (U.S. Fish and Wildlife Service 1994). Recent studies have shown that larvae can survive flooding from three to six days (U.S. Fish and Wildlife Service 1994). Larvae have been found crawling on the beach, apparently moving to dig a new burrow in a better location (U.S. Fish and Wildlife Service 1994). This behavior is likely a response to variations in tide levels, soil moisture, or sand accretion and erosion patterns.

Larvae overwinter in their burrows and hibernate until mid-March. When sand is damp and cool in the spring, there are low levels of larval activity (C.B. Knisley, Randolph Macon College, pers. comm. 1994). Highest, most predictable periods of larval activity are from late August through early November. Larval activity is highly variable and greatly influenced by temperature, substrate moisture, tide levels, and seasons (U.S. Fish and Wildlife Service 1994). Knisley *et al*. (1987) conducted a study in Virginia and found that first emergence of adults ranged from 5 June to 13 June. Rainfall appears to enhance emergence since numbers of adults usually increase after a rainfall. The number of adults increases rapidly in June, peaks in mid-July, begins to decline through August, and few adults can be found in September.

There is a period of approximately two weeks after adults emerge when there is little to no dispersal (Hill and Knisley 1994a). Then a small, but significant number of beetles disperse to other sites. There is a regular dispersal phase after peak numbers emerge in early July (Knisley and Hill 1989, U.S. Fish and Wildlife Service 1993). Mark-recapture studies have determined that adults tiger beetles may travel five to twelve miles (Knisley and Hill 1989) from sites where they were marked, and some individuals may disperse tens of miles (U.S. Fish and Wildlife Service 1993). In Northumberland County, Virginia a total of 10,131 adults were marked and released; 91 beetles dispersed to new sites (mainly between two close, large sites 1.5 km apart) (Hill and Knisley 1994a). Large sites seem to serve as recruitment areas, while small sites serve as stop-overs during migration (Hill and Knisley 1994a). "It is probable that feeding or resting occur at these smaller sites and that without them, the larger sites may not experience as much migration" (Hill and Knisley 1994a). Migration serves to disperse genetic material and allow for the colonization of new sites and the ability to leave eroding sites (Hill and Knisley 1994a).

Populations of the northeastern beach tiger beetle are highly variable from year to year because they are subject to local population extinctions and capable of dispersal and recolonization (U.S. Fish and Wildlife Service 1994). Two- to three-fold or greater year-to-year variations in numbers at a given site are common (Knisley and Hill 1989, 1990). Many sites that have adults, especially small sites, are not suitable breeding sites, but may temporarily support adults that have dispersed from other sites (U.S. Fish and Wildlife Service 1994). "Adults tend to be concentrated on wider sections of beach, and occur in smaller numbers or may even be absent from nearby areas of narrow beach" (U.S. Fish and Wildlife Service 1994). Larvae are not found, or may not survive, at many sites where adults are found. Ideal tiger beetle beaches are greater than 5 - 8 m wide (C.B. Knisley, Randolph Macon College pers. comm. 1994). Adult and larval beetles are typically found on highly dynamic beaches with back beach vegetation and prefer long, wide beaches that have low human and vehicular activity, fine sand-particle size, and a high degree of exposure (Knisley *et al*. 1987). Occurrence of this subspecies has been statistically correlated with back beach vegetation, low human and vehicle activity, and wide, long, dynamic beaches (Knisley 1987a).

Status of the Species Within its Range

Historically, the northeastern beach tiger beetle was a common inhabitant of coastal beaches from Cape Cod, Massachusetts to central New Jersey, and along the Chesapeake Bay, from Calvert County, Maryland south through Virginia. The only known extant populations along the Atlantic Coast are in southeastern Massachusetts, one on Martha's Vineyard and one near Westport. The highest number of adult beetles observed at Martha's Vineyard was 1,787 in 1990; in 1995, 1,009 adults were documented. The Westport population was discovered in 1994 (152 adults observed) and in 1995, 10 adults were documented. The species is extirpated from Rhode Island, Connecticut, New York (Long Island), and New Jersey (U.S. Fish and Wildlife Service 1994). However, potential habitat for tiger beetles still exists at some of the historical sites along the Atlantic Coast (U.S. Fish and Wildlife Service 1994). The stronghold of tiger beetle distribution is the Chesapeake Bay. The greater survival of this species in the Bay versus the Atlantic Coast may be due to historically lower levels of human activity in the Bay and less natural mortality from winter storms, erosion, etc. (U.S. Fish and Wildlife Service 1994). Between 1988 and 1993, the northeastern beach tiger beetle was documented at 13 sites in Calvert County, Maryland (U.S. Fish and Wildlife Service 1994). Between 1989 and 1990, a total of 55 tiger beetle sites was documented in Virginia: 32 sites on the western shore of the Bay and 23 sites on the eastern shore of the Bay (Buhlmann and Pague 1992). Surveys in these two states have resulted in documenting 16 occurrences with greater than 500 adults, 10 sites with 100 to 500 adults, and numerous sites with less than 100 adults. Since those surveys, several additional tiger beetle sites have been found in Virginia, resulting in 65 known locations. Because storms and other natural and man-made factors can rapidly alter beach habitat, it is difficult to determine exactly how many sites exist at a given time. Although most Virginia and Maryland sites have been identified, additional tiger beetle sites may exist within the Bay.

Northeastern beach tiger beetles in the Chesapeake Bay and Massachusetts are currently physically

and genetically isolated from each other. Vogler et al. (1993) examined genetic variation in these populations. They found that the isolated Martha's Vineyard population and Chesapeake Bay populations had very low genetic variability which may indicate a history of frequent natural extinctions. "The Martha's Vineyard population can be further distinguished by the presence of an allozyme allele...that has not been observed in the Chesapeake Bay beetles" (U.S. Fish and Wildlife Service 1994). "Thus, although populations from these two areas represent the same subspecies, they should be considered as separate conservation units (Vogler and DeSalle 1994)" (U.S. Fish and Wildlife Service 1994).

Limited northeastern beach tiger beetle reintroduction attempts have been made. An experimental reintroduction of adult tiger beetles was conducted in 1991 in the Chesapeake Bay to determine appropriate reintroduction methods for use in restoring beetles to their historical range along the Atlantic Coast. During the summer of 1992, adult beetles from Martha's Vineyard were transferred to Cape Cod National Seashore, Massachusetts (U.S. Fish and Wildlife Service 1994). The weather became unfavorable during the release and a reintroduction attempt was not successful (U.S. Fish and Wildlife Service 1994). During this attempt, it was observed that the beetles moved only short distances from the release site. It was hypothesized that non-dispersing beetles have very limited ranges and that the release of larvae should be investigated to better aid recolonization. During the fall of 1994, 650 tiger beetle larvae (11 first instars, 313 second instars, 326 third instars) collected from three Virginia sites and 50 (first instar) laboratory-reared larvae were released at two different sites on Sandy Hook, Gateway National Recreation Area, owned by the National Park Service in New Jersey. In the summer of 1995, a total of 55 adults (it has been estimated that only 1/3 of the total number of adults are observed during a count, therefore, the actual number of beetles that emerged from relocated larvae was higher) was documented at both sites, and mating and foraging were observed (A. Scherer, U.S. Fish and Wildlife Service, pers. comm. 1996.). In the fall of 1995, first instar larvae were documented on the beach. These larvae could only be a result of reproduction from the reintroduced beetles. During the fall of 1995, additional larvae (200) were released at the same site. During April 1996, additional larvae will be released (A. Scherer, U.S. Fish and Wildlife Service, pers. comm. 1996.). These are likely to be third instar larvae that should emerge as adults in June. It should be noted that the winter of 1994/1995 was very mild and the reintroduction site had some overwash, but no severe erosion. The winter of 1995/1996 has resulted in severe erosion. Monitoring will be conducted during 1996 to determine beetle survival over the harsh winter (A. Scherer, U.S. Fish and Wildlife Service, pers. comm. 1996.).

Few northeastern beach tiger beetle sites have some form of protection and many are threatened by human impacts (U.S. Fish and Wildlife Service 1994). Protected sites in Virginia include Bethel Beach Natural Area Preserve (Mathews County), Kiptopeke State Park (Northampton County), Hughlett Point Natural Area Preserve (Northumberland County), W.B. Trower Bayshore Natural Area Preserve (Northampton County), Smith Point North (Northumberland County), and Parker's Marsh Natural Area (Accomack County). Protected sites in Maryland include Cove Point (Calvert County), Flag Pond (Calvert County), Janes Island (Somerset County), and Cedar Island (Somerset County).

The only protected site on the Atlantic Coast is in Westport, Massachusetts.

Since its listing, several biological opinions have been completed for this subspecies:

- On June 3, 1994, a non-jeopardy opinion was issued to the Corps for the Peaceful Beach Estates Property Owners Association to construct groins (to attach to a bulkhead) along the Chesapeake Bay in Northampton County, Virginia. This project was expected to result in the loss of adult and larval beetles from 28,000 square feet, along with permanent habitat loss within the footprint of the groins and potential adverse affects to adjacent populations due to alterations in sand transport (the effects of this project on the tiger beetle are described below).

- On September 30, 1994, a non-jeopardy opinion was issued to the Corps for Dorothy Justis *et al*. to construct a bulkhead and groins in the Silver Beach subdivision, along the Chesapeake Bay, in Northampton County, Virginia. This project was expected to result in the loss of adult beetles from 600 square feet, along with permanent habitat loss and potential adverse affects to adjacent populations due to alterations in sand transport.

- On May 11, 1995, a non-jeopardy opinion was issued to the Corps for the Bavon Beach Property Owners Association to construct a small outflow pipe to the Chesapeake Bay in Mathews County, Virginia. This project was expected to result in the loss of adult and larval tiger beetles from 680 square feet of beach, with no permanent habitat loss.

- On August 3, 1995, a non-jeopardy opinion was issued to the Corps for Habitats, L.L.C. to construct riprap, groins and spurs, along the Chesapeake Bay, in Northampton County, Virginia. This project was expected to result in the loss of adult and larval beetles from 2,150 linear feet of beach along with permanent habitat loss within the footprint of the structures and potential adverse affects to adjacent populations due to alterations in sand transport.

- On August 22, 1995, a non-jeopardy opinion was issued to the Corps for Lloyd Chappell to construct a pier and a groin, along the Chesapeake Bay, in Mathews County, Virginia. This project was expected to result in the loss of adult and larval beetles from 470 square feet along with permanent habitat loss within the footprint of the pier pilings and the groin.
- On November 22, 1995, a non-jeopardy opinion was to the Corps for Ralph Zwicker to construct three timber groins, along the Chesapeake Bay, in Northumberland County, Virginia. This project was expected to result in the loss of adult and larval beetles from 410 linear feet of beach along with permanent habitat loss within the footprint of the groins.

Threats to the Species

In 1990, the Service determined threatened status for this beetle because of its greatly reduced range and high susceptibility to natural and human threats (Federal Register, Vol. 55, No. 152, August 7,

1990). Natural limiting factors include winter storms, beach erosion, flood tides, hurricanes (Stamatov 1972), and natural enemies. Primary natural enemies of adult tiger beetles are wolf spiders (*Arctosa littoralis*), asilid flies (C.B. Knisley, pers. comm. 1994), and birds (U.S. Fish and Wildlife Service 1994). Similar to other tiger beetles species, larval survivorship is low due to natural enemies and other limiting factors. Larvae are probably more vulnerable to habitat disruption than adults (Knisley *et al.* 1987) and are probably more limited by natural enemies (U.S. Fish and Wildlife Service 1994). The main larval enemy is a small, parasitic wasp (*Methocha* species) that enters the larval burrow, paralyzes the larvae with a sting, and lays an egg on it. The egg hatches, and as it develops the larval wasp consumes the larval tiger beetle. Mites have also been found on larvae at Martha's Vineyard, but their effect, if any, is unknown (U.S. Fish and Wildlife Service 1994).

Anthropogenic threats to the northeastern beach tiger beetle include pollution, pesticides, high levels of recreational activity, off-road vehicular traffic, and shoreline development with its associated beach and shoreline stabilization (Knisley *et al.* 1987, Knisley and Hill 1989, Knisley and Hill 1990, U.S. Fish and Wildlife Service 1993). The extirpation of the northeastern beach tiger beetle from most of its range has been attributed primarily to destruction and disturbance of natural beach habitat from shoreline development, beach stabilization, and high levels of recreational use (Hill and Knisley 1994b). Oil slicks and use of pesticides for mosquito control may have contributed to the decline of this species (Stamatov 1972). Most of the large northeastern beach tiger beetle populations in Maryland and many of those in Virginia are threatened by activities associated with the increasing human population and all are subject to oil spills and beach erosion (U.S. Fish and Wildlife Service 1994). Adult foraging, mating, and ovipositioning can be disrupted by human activity (Knisley *et al.* 1987). However, larvae are probably more affected because they spend most of their time at the tops of their burrows waiting for prey, and are disturbed by even the slightest activities such as vibrations, movement, and shadows (Knisley *et al.* 1987). For many species of tiger beetles, larval densities are limited by food, and survival under natural conditions is very low (Knisley *et al.* 1987). "For example, only about 5% of the first instar larvae of several Arizona species reached adulthood" (Knisley 1987b). "Habitat disturbances could further reduce survivorship" (Knisley *et al.* 1987) and "... can eliminate suitable habitat, and when combined with natural mortality factors, could reduce populations to the point of extinction" (Knisley 1987b).

A study at Flag Ponds, a county park in Maryland, suggested that human impact was the most important factor influencing tiger beetle numbers (Knisley and Hill 1989). As visitor use of the park continued to drastically increase, no reduction in the population of adult tiger beetles was found (Knisley and Hill 1990). However, human impact appeared to result in the lack of newly emerged adults on the public beach, although later adults were quite common on this beach (Knisley and Hill 1990). Larval survivorship was significantly lower on the beach area with the greatest amount of human use (Knisley and Hill 1990). Areas that were firmly stomped, to simulate increased foot traffic, resulted in a 50 - 100% reduction in numbers of active larvae (Knisley and Hill 1989). In addition, 25% of the burrows did not reopen within 10 days of stomping, suggesting that larvae may have been dead (Knisley and Hill 1989). Negative effects of foot traffic apparently involve compaction or disruption of

burrows or direct injury to larvae. Because larvae occur in the intertidal zone, burrows can be easily compacted or dislodged by vehicles or high levels of human activity (Knisley *et al.* 1987). Beach vehicle activity impacts to *C. d. media* were studied on Assateague Island in Maryland and Virginia where beetles were absent from areas with high levels of off-road vehicle traffic (Knisley *et al.* 1987).

Beach erosion, resulting from natural events or anthropogenic beach modifications, may also have serious effects on tiger beetles and their habitat. Tiger beetle larvae are not usually found at sites that have only narrow, eroded beaches. At sites with large adult populations, few or no larvae are found in areas with narrow beaches (1 - 3 m wide) (U.S. Fish and Wildlife Service 1994). Larvae seem to be limited to areas where beaches are at least 5 m wide, with some sand above the high tide zone (U.S. Fish and Wildlife Service 1994). Although larvae are more sensitive to erosion and beach impacts than adults, adults are also less abundant in these narrow sections. Erosion within the Chesapeake Bay is a natural phenomenon resulting from rising sea levels and prevailing currents. However, this process has been exacerbated by beach development activities which interfere with the natural beach dynamics. Beach stabilization structures such as groins, jetties, riprap, and bulkheads, which are designed to reduce erosion, may interrupt and capture sand from longshore movement and build up the beach around the structure, but rob sand from the down-drift shoreline. There are many examples of erosion resulting from shoreline stabilization in the Chesapeake Bay. One example is the north section of Flag Ponds, Maryland, where the beach has become severely eroded since construction of a jetty at Long Beach just to the north (U.S. Fish and Wildlife Service 1994). The eroding beach south of the ferry dock at Kiptopeke Beach in Northampton County, Virginia may be another example of this phenomenon (U.S. Fish and Wildlife Service 1994). Natural points and spits may have the same effect as man-made features.

Bulkheads and riprap typically result in the reflection of wave energy, which ultimately removes the beach and steepens the profile. Such changes in the beach profile can take from 1 to 30 years. These structures also prevent the back beach from supplying sand to the forebeach, and concentrate wave energy at the ends of the bulkhead, resulting in erosion at these points (Knisley and Hill 1994). Knisley (1990) noted that "surveys in various sites in the Chesapeake Bay indicate very few larvae at sites or within sites where groins or other beach stabilization structures are located."

Knisley and Hill (1994) conducted a northeastern beach tiger beetle study on the western (Smith Point, Duck Pond, Gwynn Island, Jarvis Point) and eastern (Peaceful Beach, Silver Beach, Cape Charles, Picketts Harbor, and Elliotts Creek) shore of the Chesapeake Bay. Numbers of adults were lowest at modified sites (i.e., sites with bulkheads, groins, riprap, and/or dredged material deposition). “In general, the longest and widest beaches with natural shoreline had many more adults and larvae than modified long or short, narrow beaches...” (Knisley and Hill 1994). The mean number of larvae per transect on natural beaches was 15.3; 12.1 on beaches with dredge material deposition; 6.5 at sites with bulkheads or riprap; 3.7 at sites with groins; 3.3 for narrow beaches (less than 2 m wide); and 1.5 for sites with bulkheads and groins. The unexpectedly high number of larvae for bulkhead beaches in

this study was the result of high larval numbers at one bulkheaded section of one beach. Most other beaches with bulkheads or riprap had few or no larvae (Knisley and Hill 1994). "Distribution and abundance of larvae provide a better indication of habitat quality and utilization for *C. d. dorsalis* since the presence of high numbers of larvae indicates the habitat is likely suitable for (long-term) larval recruitment and development. Adult presence, however, indicates only adult utilization which may perhaps be transitory during dispersal" (Knisley and Hill 1994). Modified sites generally had lower numbers and densities of larvae, but they did support recruitment and larval development (at least into the fall season) (Knisley and Hill 1994). From this type of study it is difficult to determine definitive results because, for example, shoreline modifications typically occur in areas that are experiencing high erosion rates and thus may have fewer larvae because they have narrow beaches (Knisley and Hill 1994). This study and others show that narrow beaches of less than 2 - 3 m support significantly fewer larvae than wider beaches (Knisley and Hill 1994). It is still not known if larvae can successfully complete development through one or two winters on beaches with modified shorelines (Knisley and Hill 1994). Knisley and Hill (1994) concluded that, "preliminarily, it seems that bulkhead or revetment along the shoreline has a negative impact on the habitat of this species while groins probably have a lesser effect on the habitat" and "...the impacts of...structural modifications can only be determined with certainty by systematic pre- and post-construction studies to assess cause and effect."

The above study examining effects of shoreline stabilization structures was continued in 1995 (Hill and Knisley 1995). A total of 53 sites or subsites were analyzed for both years combined (Figure 6). This included 13 natural beach sites, 4 dredged material deposition/beach nourishment sites, 14 narrow beach sites, 11 groin sites, 11 groin and bulkhead sites, and 5 riprap sites. Adults beetles were most abundant at sites with totally or mostly natural shoreline (1994 = 116.8/100 m, 1995 = 89.3/100 m) or sites with dredged material deposition (= 95.5/100 m, = 98.4/100 m). Adults were less abundant at sites with narrow shorelines (= 31/100 m, = 9.5/100 m), of sites stabilized with groins (= 59.3/100 m, = 71.6/100 m), groins and bulkheads (= 12.4/100 m, = 19.6/100 m), or riprap (1994 and 1995 = 0/100 m), only sites with groins had moderate numbers of adults. Numbers and densities of larvae exhibited a similar pattern, but larvae occurred more selectively (Hill and Knisley 1995). Mean numbers of larvae counted within 2 m wide transects included natural beach (14 in 1994, 6.9 in 1995), nourishment sites (13.9, 5.3), narrow beach (3.1, 1.9), groins (2.7, 0.8), groin/bulkhead (2.1, 0.34), and riprap (0, 0). Larval numbers were lower in 1995, this may be due to normal year-to-year fluctuations in recruitment or survival. Beach width is an important habitat factor for larvae. Mean beach widths for combined sites included natural beach, 8.7 m, beach nourishment, 7 m, groins, 3.1 m, narrow beach, 2.2 m, groins/bulkhead, 1.4 m, and riprap, 0 m. During both years, a similar trend was found in larval numbers relative to shoreline type. Since larval recruitment and survival is more important than habitat choice by adults, this suggests that groins, narrow beaches, riprap, and groins/bulkheads provide poorer quality habitat than natural beaches and nourished beaches (Hill and Knisley 1995). Hill and Knisley (1995) concluded that natural and nourished beaches provide more favorable habitat than narrow or modified shorelines. "Since many...larvae on narrow and modified beaches occurred in the back 0.5 m portion of narrow beaches, often adjacent to bulkheads or riprap, they might be destroyed by severe late fall through spring erosion or beach loss.... Larvae on natural

beaches may have a better chance of survival because as erosion occurs larvae could move farther back on the newly eroded beach" (Hill and Knisley 1995).

Additional work has been done on some of the areas in the above study. Roble (1994) found that in Northampton County, "Silver Beach continues to support a large population of beetles despite the fact that much of the shoreline is within a residential development and several groins have been constructed to stabilize the beach. Further research on the impacts of beach stabilization structures on larval and adult tiger beetles, and correspondingly appropriate regulatory activities, are perhaps the two most important steps that can be taken to protect these sites." Hill and Knisley (1995), stated that "Before and after studies are the most powerful in obtaining better data...preferably with monitoring data several years before and after construction."

At the northern end of Silver Beach is an area known as Peaceful Beach Estates that supports tiger beetles. It was surveyed in November, 1993 and the results indicated that the entire length of shoreline provided suitable habitat for recruitment and development of tiger beetle larvae (Knisley 1993). Knisley (1993) indicated that "this site probably supports a good, stable population." A bulkhead was constructed at the site in 1994. Approximately 50% fewer larvae were found between 1993 and 1994 (after the bulkhead was constructed); however, this section of beach was severely eroding before the bulkhead was constructed and larval counts can be extremely variable (Knisley 1994a). The areas with bulkheads had smaller beach widths (1 m or less between current high tide and bulkhead), supplying little or no suitable larval habitat (Knisley 1994a). Some larvae were found near the bulkhead, but Knisley (1994a) indicated that they were not likely to survive to maturity because they would not be able to migrate landward to avoid severe storms and erosion during the winter months. He stated that "...the beach along this groin-less bulkhead will continue to erode and probably negatively impact larvae there in the immediate future. Construction of the groins will perhaps reduce these erosional effects by trapping sand or otherwise provide some protection for these larvae" (Knisley 1994b). After the 1994 surveys, groins were constructed. Numbers of adult beetles were considerably lower in 1995 (750) compared to 1994 (1,335) (Knisley 1995). The distribution of adults along the shoreline was similar in both 1994 and 1995, with few adults present on the bulkhead/groin section and most adults in the 550 m stretch of natural beach south of the bulkhead. The number of larvae were very reduced throughout the site in 1995 (Knisley 1995). In the bulkhead section, there were 20 larvae per 12 transects (each transect 2 m wide). In the 200 m of shoreline south of the bulkhead, there were 5 larvae per 5 transects. In the remaining 350 m southern section (200 m to 550 m south of the bulkhead) there were 213 larvae per 14 transects. The cause of the reduction in larval numbers in not certain. The lower numbers of adults would result in fewer larvae, but the difference is too large to be caused solely by this. Knisley (1995) believed that "the most important factor accounting for the reduced 1995 larval numbers is the significant erosion and deterioration of habitat in the beach south of the bulkhead/groins." The 200 m south of the bulkhead had little to no beach above high tide and had been recessed approximately 6-8 feet behind the bulkhead due to erosion. This section was approximately 3 m wide in 1994. The southern section of shoreline had fewer larvae as in 1994, and the beach was only slightly narrower than in 1994. Larval numbers in the bulkhead/groin section were reduced in 1995, but the

beach was slightly wider, possibly indicating that some accretion of sand may have occurred from groin construction (Knisley 1995).

Beach nourishment is likely destructive to larvae and may render beach habitat unsuitable for subsequent larval recruitment and development (Knisley 1991). However, deposition of dredged material may create habitat. Dredged sand was placed south of Cape Charles in Northampton County, Virginia in 1987, and in 1989 there was a good population of both adult and larval tiger beetles (Knisley undated proposal). Although the addition of sand may actually maintain the habitat in the long-term, it is likely that its immediate effects would result in larval mortality through crushing, smothering, or inability to dig out and resume normal activities (U.S. Fish and Wildlife Service 1994). Sand deposition could also have indirect negative effects on food (amphipod) availability (U.S. Fish and Wildlife Service 1994). The short- and long-term effects of beach nourishment on larvae need to be investigated. Since larvae seem to be very specific in their microhabitat distribution, sand particle size or other physical aspects of the microhabitat (e.g., slope, profile), may be critical (U.S. Fish and Wildlife Service 1994).

The Corps (Baltimore District) deposited sand in the Smith Point area, north of the Little Wicomico River, in Northumberland County, Virginia during the winter of 1994-1995. This resulted in a large quantity of sand pumped from the inlet channel of the Little Wicomico River to the north end of the beach, resulting in a sandbar jutting out in the Chesapeake Bay. In 1995, the mean number of tiger beetle larvae in the deposition area was 2.5, and the beach was 2 - 3 m wide and 1,400 m long (Hill and Knisley 1995). Hill and Knisley (1995) found that the sand deposited at the north end created a jetty or groin effect. This blocked sand flow to the south and increased erosion rates during 1995, resulting in decreased larval numbers during fall 1995. However, there was a 150 m section of deposition that was not occupied by larvae until after the deposition occurred (Hill and Knisley 1995). A natural beach with coarse sand occurred north of the channel inlet and had an average of 2.3 larvae/transect in 1994 and no larvae in 1995. High adult densities occurred along most of the beach both years except for approximately 150 m at the northern end and 400 m at the southern end (near the channel inlet). The middle portion of this site had greatly eroded by fall 1995 and had far fewer larvae than in 1994. This site had a very wide beach over most of its length and the back beach remained natural and relatively undisturbed by human activity.

“Along a given length of shoreline, the first structure installed often has an adverse impact on the neighbor’s shoreline (usually down-stream of a longshore current), thus forcing a sequence of other shoreline modifications. Eventually, as shoreline modifications increase in number and amount of shoreline modified, the sand ‘bank’ is further depleted as erosion is halted and sand moves offshore into deeper channels. The long-term (50+ years) impacts of this scenario are unknown, but may eventually lead to a collapse of the natural beach habitat...” (Hill and Knisley 1995).

Recovery Goals and Accomplishments

Recovery for the tiger beetle will depend to a large extent on re-establishing the subspecies across its

former range along the Atlantic Coast and protecting it within the Chesapeake Bay (U.S. Fish and Wildlife Service 1994). The best approach for achieving this is through landscape-scale conservation. The Service's recovery plan for this species defines several Geographic Recovery Areas (GRA) for conserving the northeastern beach tiger beetle and its ecosystem, providing a framework within which protection and population establishment efforts can be ranked and implemented (U.S. Fish and Wildlife Service, 1994). Recovery will hinge on maintaining the ecological integrity of essential tiger beetle habitat within each GRA, in order to achieve the population levels and structure needed for this species. Nine GRAs have been identified, four along the Atlantic Coast (Coastal Massachusetts and Islands; Rhode Island, Block Island, Long Island Sound; Long Island; Sandy Hook to Little Egg Inlet, New Jersey), two in Maryland (Calvert County, Tangier Sound), and three in Virginia (eastern shore of Chesapeake Bay, western shore of Chesapeake Bay north of the Rappahannock River, western shore of Chesapeake Bay south of the Rappahannock River). Full recovery will require the establishment of populations in each of the four Atlantic Coast GRAs as well as protection of existing populations in each of the five Bay GRAs (U.S. Fish and Wildlife Service 1994). Delisting will be considered when:

1. At least three populations within each of the four Atlantic Coast GRAs have been established (defined at self-maintaining for at least five years, with no foreseeable threats) and permanently protected (defined as long-range protection from present and foreseeable anthropogenic and natural events that may interfere with their survival; adequate protection measures include land acquisition, conservation agreements and/or easements, and management measures to protect the species' habitat; this includes accounting for off-site impacts such as littoral sand drift).

2. Within the Chesapeake Bay, at least 26 populations are permanently protected at extant sites distributed among the five Bay GRAs as follows:

    - Calvert County, Maryland -- four largest populations
    - Tangier Sound, Maryland -- two large ($\geq$ 500 adults) populations
    - Eastern Shore of Chesapeake Bay, Virginia -- four large populations, four others
    - Western shore of Chesapeake Bay north of the Rappahannock River, Virginia -- three large populations, three others
    - Western shore of Bay south of the Rappahannock River, Virginia -- three large populations, three others

3. Life history parameter, human impacts, and factors causing decline are understood well enough to provide needed protection and management; and

4. There exists an established, long-term management program in all states where the species occurs or is reintroduced (U.S. Fish and Wildlife Service 1994).

For the most part, the four recovery goals have not been met. There is one protected population (Westport) in one of the Atlantic Coast GRAs, however recreational and foot traffic occurs at this site

(Susi Von Oettingen, U.S. Fish and Wildlife Service, pers. comm. 1996.). In addition, this site does not meet the definition of "established" in the recovery plan since it has not been documented as self-maintaining for five years and there are foreseeable threats from recreational activities. Similarly, in the Bay 10 sites have some form of protection, but most do not meet the definitions of "established" or "permanently protected" as defined in the recovery plan. Goals three and four have not been met. While work is underway to meet goal three, no management programs have been initiated as required for goal four.

The recovery plan (U.S. Fish and Wildlife Service 1994) identifies "significant Chesapeake Bay sites, based on a consistent population size of >200 *C. d. dorsalis* and/or conservation potential" that include:

- Accomack County, Virginia -- Scarborough Neck, Hyslop Marsh, Parkers Marsh
- City of Hampton, Virginia -- Grandview Beach
- Mathews County, Virginia -- Bavon, Bethel Beach, Gwynn Island, New Point Comfort, Rigby Island, Sandy Point Island, Winter Harbor
- Northampton County, Virginia -- Cape Charles South, Kiptopeke State Park, Picketts Harbor, Silver Beach, Savage Neck Dunes
- Northumberland County, Virginia -- Dameron Marsh, Haynie Point, Hughlett Point, Jarvis Point, Smith Point, Vir-Mar Beach, Taskmakers Creek
- Calvert County, Maryland -- Cove Point, Flag Ponds, Scientists Cliffs, Western Shores Estates
- Somerset County, Maryland -- Cedar Island, Janes Island

"Because the species seems very susceptible to frequent local extirpation of populations, either from human or natural causes, preservation measures will require protection of a series of adjacent or nearby sites in a given area" (Knisley 1991). A northeastern beach tiger beetle conservation strategy was prepared for Virginia (Donoff *et al.* 1994). Initially, 15 priority conservation sites were identified (Kiptopeke State Park, Picketts Harbor, Cape Charles, and Savage Neck in Northampton County; Scarborough Neck and Hyslops Marsh in Accomack County; Sandy Point Island, Rigby Island, Bethel Beach, Bethel Beach North, Winter Harbor, and New Point Comfort/Bavon Beach in Mathews County; Smith Point and Hughlett Point in Northumberland County; Grandview Beach in the City of Hampton). However, due to the large number of tiger beetle sites in Virginia, the conservation strategy focused on 12 priority conservation sites in Mathews (Sandy Point Island, Rigby Island, Bethel Beach, Bethel Beach North, Winter Harbor, and New Point Comfort/Bavon Beach), Northampton (Kiptopeke State Park, Picketts Harbor, Cape Charles, and Savage Neck), and Accomack

(Scarborough Neck and Hyslops Marsh) Counties (Donoff *et al*. 1994). The primary factors considered in developing the conservation plans were: (1) extent of occupied and potential habitat, (2) maintenance of dynamic beach strand habitat, (3) provision of buffer lands, and (4) provision for species movement corridors. "Several of the priority conservation sites are best treated as components of larger macrosites [several significant populations linked together]" (Donoff *et al*. 1994). The Bethel Beach macrosite would include Sandy Point Island, Rigby Island, Bethel Beach, Bethel Beach North, and Winter Harbor. Another macrosite includes Cape Charles, Picketts Harbor, and Kiptopeke State Park; three small sites, Elliotts Creek, Cape Charles-Old Plantation Creek, and Arlington-Old Plantation Creek, would also be included (Donoff *et al*. 1994).

Roble (1996) placed values on known tiger beetle sites in Virginia relative to each site's importance to future conservation efforts. Sites with a high site value included: Silver Beach, Savage Neck Dunes, Cape Charles, Cape Charles-Old Plantation Creek, Picketts Harbor, Grandview Beach, Bethel Beach, Winter Harbor Creek Beach, Smith Point North, Smith Point South, Taskmakers Creek, Dameron Marsh, and Hughlett Point. Except for the Cape Charles-Old Plantation Creek site, these high value sites were also noted as significant Chesapeake Bay sites in the species recovery plan (U.S. Fish and Wildlife Service 1994). As previously discussed, four of these sites have some form of protection. The remainder are privately owned (Grandview Beach is owned by the City of Hampton) and are in need of additional protection (Roble 1996).

ENVIRONMENTAL BASELINE

As defined in 50 CFR 402.02 "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. 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 direct and indirect effects of the actions and activities resulting from the Federal actions must be considered in conjunction with the effects of other past and present Federal, State, or private activities, as well as the cumulative effects of reasonably certain future State or private activities within the action area. The Service has determined that the action area for this project is the shoreline from MLW to the toe of the bank from the southern-most edge of the applicant's property to 144 feet north of the northern-most groin.

Status of the Species - This property is south of the confluence of the Little Wicomico River and the Chesapeake Bay. The area has been subdivided into lots approximately 1.5 acres in size for single-family, residential-type development. No structure has been placed on this lot. Other undeveloped lots exist along this stretch of beach and are currently being marketed. The applicant's shoreline has a sandy beach that is undulating and averages 10 feet in width from the base of the eroding bank to mean high water (MHW) and is 310 feet long. The site has a high-energy, dynamic beach that has an easterly fetch to the Chesapeake Bay with an estimated erosion rate of 6.1 feet per year. The applicant cites a shoreline loss of 65 feet in the past five years. South (145 feet) of the proposed southern-most groin are three existing groins (see Ralph Zwicker biological opinion described above). Further south is

approximately 275 feet of undeveloped shoreline, and south of that is approximately 120 feet of riprap. To the north of the proposed project site is one lot with an undeveloped shoreline. North of that lot are two adjacent lots with bulkheads and groins. North of those two lots, permit applications (T.N. Enterprises, O'Connor, and Renzi) for additional shoreline stabilization have been submitted to the Corps.

The jetty at the entrance to the Little Wicomico River is a nodal point for sand transport, resulting in accretion on both sides of the jetty; areas above and below this nodal point are eroding. South of the channel, the accretion rate is 1-2 feet/year. North of the channel, accretion is occurring, but is not measurable. Sand movement north of the jetty is north to south; south of the jetty, sand movement is south to north. The Corps (Baltimore District) deposits dredge material at the northern portion of Smith Point. In the fall of 1994, the Corps began a sand pumping project from the mouth of the Little Wicomico River inlet to the north end of the beach.

The proposed project is located within the Smith Point South (SPS) tiger beetle population; north of the Little Wicomico River is the Smith Point North (SPN) tiger beetle population (Figure 3). During the summer of 1994, Hill and Knisley (1994a) conducted a metapopulation study of the tiger beetle. They captured 3,470 adults at SPN and recaptured 42.2%. At SPS, they captured 1,981 adults and recaptured 47.0%. Overall, 35 beetles moved from SPN to SPS (distance between SPN and SPS is 1.5 km). They concluded that SPS and SPN are large, reproductively-viable sites and stated that large sites such as these seem to serve as recruitment areas as evidenced in this and other studies where large numbers of larvae have been observed. Roble (1994) conducted beetle surveys at SPS for both adult (1,820) and larval (100 total; 7 first instar; 74 second instar; 19 third instar) beetles. He concluded that protection of areas with adult beetle counts greater than 1,000 will be important to the long-term conservation of *C. d. dorsalis* in the Chesapeake Bay. He stated that "Further research on the impacts of beach stabilization structures on larval and adult tiger beetles, and correspondingly appropriate regulatory activities, are perhaps the two most important steps that can be taken to protect these sites."

Knisley and Hill (1994) also conducted research at Smith Point. They found that fall beach widths were narrower than those recorded during the summer, but provided a better indication of the site's ability to support larvae during the fall and through the winter. At SPN, 3,300 adult beetles were documented along 1,200 m of natural, unmodified shoreline. High adult densities occurred along most of SPN, except for approximately 200 m at the northern (very coarse sand and a narrow beach with the tide cutting into the bank) and southern (coarse sand) ends. At SPN, the mean larval density was 9.1 larvae per transect (total number of larvae = 164), including eight transects with no larvae, but most transects had more than 15 larvae. During night work in September, many transects had over 25 larvae and a total of over 1,000 active larvae were observed in the middle portion of this site. This site had a very wide beach over most of its length and the back beach was natural and undisturbed by human activity. The northern half of SPS supported a very large adult population (2,130), but larval numbers and densities were low (58 larvae total; of 3.6 larvae/transect). The northern section approaching the channel was a very steep, narrow beach and apparently unsuitable for larvae. The southern half of

SPS had fewer larvae (42 total; of 3.0 larvae/transect). The natural beach had a total of 29 larvae (of 3.2/transect). Some of this lower section had groins and bulkheads and larval densities were higher (of 6.2/transect) in this portion. This area was not surveyed for adults. During 1995, at SPS, there were no larvae in the narrow, far northern and southern portions (Hill and Knisley 1995). The northern several hundred meter section near the channel had a very steep, narrow beach and apparently unsuitable for larvae (Hill and Knisley 1995). The proposed project is located in the southern portion of SPS where larvae numbers are probably low due to poor habitat quality.

Effects of the Action - In evaluating the effects of the Federal actions under consideration in this consultation, 50 CFR 402.2 and 402.14(g)(3) require the Service to evaluate the direct and indirect effects of the actions on the species. Direct impacts to the tiger beetle will result in the crushing of adult beetles and subsequent injury or death during construction by use/placement/ stockpiling of equipment and materials on the beach and associated foot traffic. Construction will also result in a temporary loss of habitat for adults through disruption of their daily activity patterns (i.e., foraging, mating, basking, egg-laying). Larval tiger beetles will be directly affected through crushing, dislodging, and entombment, resulting in death or injury, during construction by use/placement/stockpiling of equipment and material on the beach and heavy foot traffic. Existing habitat, for both larval and adult beetles, will be permanently lost within the footprint of the groins (approximately 80 square feet landward of MLW).

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). The proposed groins and spur are designed to capture sand from longshore movement. Each groin will trap sand on its south side, while starving sand on its north side, alternately building/eroding beach. There will be seasonal and yearly differences in amounts and distribution of sand between the groins and spur. Thus, the small area (applicant's property and the undeveloped lot to the north) of natural beach will be altered in its width, profile, and distribution and amount of sand. The northeastern beach tiger beetle is not likely to survive at the current population level at the project site. However, the exact extent of impacts to the tiger beetle population following completion of the project cannot be quantified. Seasonal and yearly variation in amounts and distribution of sand between the groins will continually alter (and occasionally totally remove) the habitat and expose and displace larval tiger beetles. Knisley (1990) noted "my observation on the distribution of *C. dorsalis* larvae indicate they are most abundant in slowly accreting areas of beach, suggesting that the pattern of particle size distribution and layering of sand on beach is important. Consequently, significant disruptions of the beach could have a negative impact." While the groins are likely to result in increased erosion on the undeveloped property to the north, the proposed spur should minimize this effect.

Future maintenance of the shoreline stabilization structures may result in additional indirect affects. Maintenance may result in injury or death to adult and larval tiger beetles through heavy foot traffic on beach areas, use/stockpiling of heavy equipment, and stockpiling/placement of materials. Maintenance activities may also result in temporary habitat loss.

Cumulative Effects - Cumulative effects include the effects of future State, 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. The construction of shoreline stabilization structures (e.g., riprap, bulkhead) landward of MHW may occur within the action area in the future and such activities would not require Corps' authorization. This type of activity would adversely affect tiger beetles directly through death or injury during pre-construction and construction activities and temporary and permanent habitat loss. Any surviving larvae would likely die during winter storms and erosion because their ability to migrate landward would be restricted. Additional future activities that may affect the northeastern beach tiger beetle include construction of shoreline stabilization structures (channelward of MHW) and use of dredge material for beach nourishment. These activities will require a permit from the Corps and will be reviewed when a Federal permit is applied for.

CONCLUSION

After reviewing the current status of northeastern beach tiger beetle throughout its range and in the action area, the environmental baseline for the action area, the effects of the proposed groin and spur construction, and the cumulative effects, it is the Service's biological opinion that the issuance of a DOA permit for this project, as proposed, is not likely to jeopardize the continued existence of the northeastern beach tiger beetle. No critical habitat has been designated for this species, therefore, none will be affected.

III. INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined 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 as 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 any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant. 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 a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

AMOUNT OR EXTENT OF TAKE

The Service anticipates that incidental take of the northeastern beach tiger beetle will be difficult to detect because the population density of the beetle within the project area has not been determined and

any beetles (adult or larvae) that are killed during project construction and associated activities will be difficult to observe or locate due to their coloring, small body size, and tendency for larvae to remain beneath the surface. However, the level of take of this species can be anticipated by the areal extent of the potential habitat affected. This incidental take statement anticipates the taking of northeastern beach tiger beetles from the beach between the toe of the bank and MLW from the southernmost groin, north to approximately 144 feet north of the northernmost groin resulting from construction activities, stockpiling of materials and equipment, habitat alteration (modifications to the beach profile, width, and distribution and amount of sand), and temporary and permanent (80 square feet) habitat loss.

REASONABLE AND PRUDENT MEASURES

The measures described below are nondiscretionary, and must be implemented by the Corps so that they become binding conditions of any permit issued to the applicant in order for the exemption in Section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse. The Service considers the following reasonable and prudent measures to be necessary and appropriate to minimize take of the northeastern beach tiger beetle.

- Construction activities must be conducted before numbers of adult beetles become abundant.

- Human activity, materials, and equipment on the beach must be minimized to reduce the impact to adult and larval tiger beetles.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. No construction, earth-moving, placement of materials or equipment, or maintenance of structures will occur on the beach between June 11 and September 15, 1996 or between June 1 and September 15 of any subsequent year.

2. Materials will be transported to the beach only on an as-needed basis.

3. No ground disturbance or use of vehicles or heavy equipment will occur on the beach outside of the applicant's property boundaries.

4. No refueling of equipment or vehicles will occur on the beach.

5. No use of pesticides on the beach.

6. The applicant is required to 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 should be sent to the following address:

Virginia Field Office
U.S. Fish and Wildlife Service
P.O. Box 480
Rt. 17, Mid-County Centre
White Marsh, VA 23183
Phone (804) 693-6694
Fax (804) 693-9032

7. Care must be taken in handling any dead specimens of northeastern beach tiger beetle 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, initial notification must be made to the following Service Law Enforcement office:

Division of Law Enforcement
U.S. Fish and Wildlife Service
4900 Quality Drive
Fredericksburg, VA 22408-2462
(703) 898-1755

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures, the Service believes that minimal direct impacts to adult beetles will occur within the action area. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

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 and other recovery activities, or to develop information to benefit the species.

The Service recommends that the Corps conduct before and after surveys to determine the impact of groins and spur on adult and larval tiger beetles. Because most projects the Service reviews within the range of the northeastern beach tiger beetle include a bulkhead or riprap along with groins, this project represents a unique opportunity to examine the impact of groins. The Service will be pleased to work with the Corps in designing appropriate survey methodology and reporting requirements.

In order for the Service to be kept informed of actions that minimize or avoid adverse effects or benefit listed species or their habitats, the Service requests notification of the implementation of any of these conservation recommendations by the Corps.

V. REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the Corps' 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 and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the 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.

Unless information in this biological opinion is protected by national security or contains confidential business information, the Service recommends that you forward a copy to the following agency:

Plant Protection
Virginia Department of Agriculture and Consumer Services
P.O. Box 1163
Richmond, VA 23209

If this opinion is not provided by the agency and does not contain national security or confidential business information, the Service will provide a copy to this State agency ten business days after the date of this opinion.

The Service appreciates this opportunity to work with the Corps in fulfilling our mutual responsibilities under the ESA. Please contact Cindy Schulz of this office at (804) 693-6694 if you require additional information.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

Enclosures

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bcc: ARD-South, Region 5
Endangered Species Coordinator, Region 5
CBFO Reading File
Endangered Species Biologist, CBFO
Law Enforcement, Fredericksburg
Law Enforcement, Richmond
(Attn: Senior Resident Agent)

10 business days after the date of this letter, mail copies to:
VDGIF, Richmond
(Attn: Environmental Services)
DNH, Richmond
(Attn: Tom Smith)
VDACS, Richmond
(John Tate)