Colonel Robert H. Reardon, Jr.

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: Ralph Zwicker, Permit Application No. 95-1237, Northumberland County, Virginia

Dear Colonel Reardon:

The U.S. Fish and Wildlife Service has reviewed the Department of the Army permit application 95-1237, submitted by Ralph Zwicker, to construct three timber groins in Northumberland County, Virginia. Your October 19, 1995 request for formal consultation was received on October 23, 1995. 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

09-18-95 The Service received the U.S. Army Corps of Engineers' request to review the proposed project for impacts to Federally listed species.

09-28-95 The Service sent the Corps a letter stating that the northeastern beach tiger beetle had been documented at the project site.

10-16-95 The Service participated in a site visit with the Corps.

10-23-95 The Service received the Corps' request to initiate formal consultation.

II. BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The applicant has applied for a permit to construct three 72-foot long, low-profile, timber groins on the Chesapeake Bay in Northumberland County, Virginia (Figure 1). The groins will be 70 feet apart and

the landward end of the groins will be constructed at the base of an eroding six-foot high bank (Figure 2). The action area for this project is the approximately 700-foot undeveloped shoreline on either side of and encompassing the project site.

RANGEWIDE STATUS OF THE SPECIES

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 permanent, 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 centimeters [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 burrow 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 meter (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 also 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 on the beach 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). Because of winter mortality, number of active larvae are lower in the spring that in fall (A. Ringgold, Cape Cod National Seashore, *in litt*. 1993). 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 increases after a rainfall. The number of adults increases rapidly in June, peaks in mid-July, begins to decline through August, and by September few adults can be found.

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 kilometers [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 numbers at 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). Larvae are not found, or may not survive, at many sites.

Adult and larval northeastern beach tiger 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). Ideal tiger beetle beaches are greater than 5 - 8 m wide (C.B. Knisley, pers. comm. 1994). “Adults tend to be concentrated on wider sections of beach, and occur in smaller number or may even be absent from nearby areas of narrow beach” (U.S. Fish and Wildlife Service 1994).

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. Except for two Massachusetts populations, one on Martha's Vineyard and one near Westport, the species is now extirpated from Massachusetts, Rhode Island, Connecticut, New York (Long Island), and New Jersey (U.S. Fish and Wildlife Service 1994). The stronghold of tiger beetle distribution is the Chesapeake Bay in Maryland and Virginia. 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 northeastern beach tiger beetle sites were 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 resulting 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 found in Virginia, resulting in approximately 60 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). Few of these sites are protected 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). The greater survival of this species in the Chesapeake 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). Although most Virginia and Maryland sites are believed to have been identified, it is likely that additional tiger beetle sites exist within the Chesapeake Bay.

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

- 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. 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. 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 construction of a small outflow pipe to the Chesapeake Bay in Mathews County. 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. 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. 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.

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 structures, 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 usually are not 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 over the last 10 years 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 study north and south of the mouth of the Little Wicomico River (Smith Point area), and at Duck Pond, Gwynns Island, and Jarvis Point on the western shore of the Chesapeake Bay and at Peaceful Beach, Silver Beach, Cape Charles, Picketts Harbor, and Elliotts Creek on the eastern shore of the Bay. Numbers of adults were lowest at modified sites (i.e., sites with bulkheads, groins, riprap, and/or dredge 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 at 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 shows 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."

Additional work has been done on a few of the areas from 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."

At the northern end of Silver Beach is an area known as Peaceful Beach 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).

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).

"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 has been 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).

Recovery for the tiger beetle will depend to a large extent on re-establishing the species 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, two in Maryland, and three in Virginia

(eastern shore of Chesapeake Bay, western shore of Chesapeake Bay north of the Rappahannock River, and the 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 Bay GRAs. Within the Chesapeake Bay, delisting can be considered when a total of 25 populations are 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) at extant sites distributed among the five Chesapeake Bay GRAs as follows: Calvert County, Maryland, 4 largest populations; Tangier Sound, Maryland, two large ($\geq$ 500 adults) populations; Eastern Shore, Virginia, four large populations and three others; western shore of Bay (Rappahannock River north), Virginia, three large populations and one other; western shore of Bay (Rappahannock River south), Virginia, two large populations and three others (U.S. Fish and Wildlife Service 1994).

ENVIRONMENTAL BASELINE

Status of the Species - The shoreline of the action area is south of the confluence of the Little Wicomico River and the Chesapeake Bay. The area around the project site has been subdivided into lots, approximately two acres in size, for single-family, residential-type development. No structure has been placed on the project site, but is soon to be marketed for that purpose. The site has a sandy beach approximately 15-feet wide from the base of the eroding bank to mean high water and approximately 150-feet long. To the south of the site is approximately 275 feet of undeveloped shoreline, and further south is approximately 120 feet of riprap. North of the site is approximately 275 feet of undeveloped shoreline, and further north is a bulkhead with groins. The beach in the action area is a high-energy beach with an easterly fetch to the Chesapeake Bay and is estimated to have an erosion rate of 6.1 feet per year by the Virginia Institute of Marine Science. The applicant cites a shoreline loss of 65 feet in the past five years. 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.

This project is located within the tiger beetle population known as Smith Point South (SPS), and north of the Little Wicomico River is the Smith Point North (SPN) tiger beetle population (Figure 3). Several northeastern beach tiger beetle studies have been conducted at Smith Point. 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 1,463 adults (42.2%). At SPS, they captured 1,981 adults and recaptured 932 (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) conducted additional 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 and southern ends. The north end had very coarse sand and was quite narrow with the tide cutting into the bank; the south end also had coarse sand but a wide beach. At SPN, the mean larval density was 9.1 larvae per transect (total number of larvae = 164), this included eight transects with no larvae; 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 beetles) but larval numbers and densities were low (58 larvae total; mean of 3.6 larvae/ transect). The northern section approaching the channel was a very steep, narrow beach and apparently unsuitable for larvae while the southern end had no larvae, probably because it also was narrow and very eroded. The southern half of SPS had fewer larvae (42 total; mean of 3.0 larvae/transect). The natural beach had a total of 29 larvae (mean of 3.2/transect). Some of this lower section had groins and bulkheads and larval densities were higher (mean of 6.2) in this portion. This area was not surveyed for adults.

Effects of the Action - In evaluating the effects of the Federal action 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 action 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 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 120 square feet landward of mean low water).

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 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. Thus, the approximately 700-foot long 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."

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 or permanent 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 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, stockpiling of equipment and materials, and habitat loss 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 200 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 (120 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 measure(S) to be necessary and appropriate to minimize take of the northeastern beach tiger beetle.

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

- o Construction activities must be conducted during an appropriate time of year to minimize impacts to adult 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 construction materials or equipment, or maintenance of structures will occur between June 1 and September 15 of any 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 on the beach outside of the property boundaries.

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

5. 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
(804) 693-6694

6. 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
P.O. Box 187
Yorktown, VA 23690
(804) 890-0003

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 no direct impacts to adult beetles will occur within the action area and no direct impacts to larval beetles will occur outside of the property boundaries. 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 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

Colonel Robert H. Reardon, Jr.

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 Corps 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

LITERATURE CITED

Buhlmann, K.A. and C.A. Pague. 1992. Natural heritage inventory of *Cicindela dorsalis dorsalis* (northeastern beach tiger beetle). Natural Heritage Technical Report #92-16. Department of Conservation and Recreation, Division of Natural Heritage. Richmond, VA. 41 pp.

Donoff, M.A., S.M. Roble, and C.A. Caljouw. 1994. Conservation strategy for the northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) in Virginia. Natural Heritage Technical Report 94-7. Department of Conservation and Recreation, Division of Natural Heritage. Richmond, VA.

Hill, J.M. and C.B. Knisley. 1994a. A metapopulations study of the threatened northeastern beach tiger beetle *Cicindela dorsalis dorsalis* in Northumberland County, Virginia, 1994. Report to the Virginia Department of Conservation and Recreation, Richmond, VA.

Hill, J.M. and C.B. Knisley. 1994b. Current and historic status of the tiger beetles, *Cicindela d. dorsalis* and *Cicindela d. media* in New Jersey, with site evaluations and procedures for repatriation. Report to U.S. Fish and Wildlife Service, New Jersey Field Office. 40 pp.

Knisley, C.B. Undated. A study of the effects of dredge spoil placement on the federally threatened tiger beetle, *Cicindela dorsalis*, at Winter harbor, Mathews County, Virginia. Proposal - Report to the Civil Programs Branch, Norfolk District Army Corps of Engineers, Norfolk, VA.

Knisley, C.B. 1987a. Status survey of two candidate species of tiger beetles, *Cicindela puritana* G. Horn and *C. dorsalis* Say. Report to U.S. Fish and Wildlife Service, Newton Corner, MA.

Knisley, C.B. 1987b. Habitats, food resources, and natural enemies of a community of larval tiger beetles in southeastern Arizona (Coleoptera: Cicindelidae). Canadian Journal of Zoology 65: 1191-1200.

Knisley, C.B. 1990. A survey of the Cape Charles (Virginia) Accawmacke Plantation for the northeastern beach tiger beetle, and possible impact of the proposed development on this beetle. Final Report for Espey, Huston and Associates, Incorporated.

Knisley, C.B. 1991. Northeastern beach tiger beetle. Pages 233-234 in K. Terwilliger, ed. Virginia's Endangered Species, Proceedings of a Symposium. McDonald and Woodward Publishing, Co., Blacksburg, VA.

Knisley, C.B. 1993. Survey for the northeastern beach tiger beetle, *Cicindela dorsalis*, at Peaceful Beach Estates, W. O'Leary property. Report to U.S. Fish and Wildlife Service, Virginia Field Office, White Marsh.

Knisley, C.B. 1994a. Adult and larval inventory of the northeastern beach tiger beetle, *Cicindela*

dorsalis at Peaceful Beach Estates, Northumberland County, Virginia. Report to the U.S. Fish and Wildlife Service, White Marsh, VA.

Knisley, C.B. 1994b. Adult and larval inventory and habitat study of the northeastern beach tiger beetle, *Cicindela dorsalis dorsalis* at Peaceful Beach Estates, Northumberland County, Virginia. Unpublished report to the U.S. Fish and Wildlife Service, White Marsh, VA.

Knisley, C.B. and J.M. Hill. 1989. Impact of human activity on *Cicindela dorsalis* and *C. puritana*: Part 1. Subfinal Report. The effects of different levels of visitor use on *Cicindela dorsalis* at Flag Ponds, Calvert County, Maryland. Unpublished report to Maryland Natural Heritage Program, Annapolis, MD.

Knisley, C.B. and J.M. Hill. 1990. Studies of two endangered tiger beetles, *Cicindela dorsalis dorsalis* and *Cicindela puritana*, in Maryland, 1989. Part I. Human impact and biological studies in Calvert County. Part II. Survey of abundance and distribution at various sites in Calvert County and at additional sites in St. Marys County and along the Sassafras River. Unpublished report to Maryland Natural Heritage Program, Annapolis, MD.

Knisley, C.B. and J.M. Hill. 1994. Distribution and abundance of *Cicindela dorsalis dorsalis* in relation to shoreline structures and modifications in Virginia. Unpublished report to U.S. Fish and Wildlife Service, Annapolis, MD.

Knisley, C.B, J.I. Luebke, and D.R. Beatty. 1987. Natural history and population decline of the coastal tiger beetle, *Cicindela dorsalis dorsalis* say (Coleoptera: Cicindelidae). Virginia Journal of Science 38: 293-303.

Roble, S.M. 1994. Population surveys for the northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) at twenty selected sites in Virginia. Natural Heritage Technical Report 94-19. Department of Conservation and Recreation, Division of Natural Heritage. Richmond, VA.

Stamatov, J. 1972. *Cicindela dorsalis* endangered on northern Atlantic coast. Cicindela 4: 78.

U.S. Fish and Wildlife Service. 1993. Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis* Say) Recovery Plan/Agency Draft. Hadley, MA. 50 pp..

U.S. Fish and Wildlife Service. 1994. Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis* Say) Recovery Plan. Hadley, MA. 51 pp.

(Cschulz:10/23/95)
(filename:zwckrbo)

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

<u>10 business days after the date of this letter, mail copies to:</u>
VDGIF, Richmond
(Attn: Ray Fernald)
DNH, Richmond
(Attn: Tom Smith)
VDACS, Richmond
(Attn: John Tate)