



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Ecological Services
6669 Short Lane
Gloucester, VA 23061

August 4, 2005

Colonel Yvonne J. Prettyman-Beck
U.S. Army Corps of Engineers
Norfolk District
803 Front Street
Norfolk, Virginia 23510-1096

Attn: Gerry Tracy
Regulatory Branch

Re: Bay Creek Subdivision, Project No.
04-V2843, Northampton County,
Virginia

Dear Colonel Prettyman-Beck:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the above referenced shoreline stabilization project located in Northampton County, Virginia, and its effects on the northeastern beach tiger beetle, *Cicindela dorsalis dorsalis*, federally listed threatened. This biological opinion is submitted in accordance with Section 7 of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). Your March 18, 2005 request for formal consultation was received on March 23, 2005. Comments submitted under the Fish and Wildlife Coordination Act of 1958 (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) follow the Biological Opinion.

The U.S. Army Corps of Engineers (Corps) is considering issuing a permit to Baymark Construction Corporation (Applicant) for the construction of three breakwaters with backfill of sand behind two of the breakwaters. This biological opinion is based on information provided in the Corps' March 18, 2005 letter, Dr. Barry Knisley's November 7, 2003 tiger beetle survey of the project area, a April 19, 2005 site visit, emails, telephone conversations, and other sources of information. A complete administrative record of this consultation is on file in this office.

Consultation History

- 11-07-03 Dr. Barry Knisley submits a tiger beetle survey of the project area (conducted for the Applicant under a previous Corps permit number 03-V1185) to the Service.
- 03-23-05 Service receives Corps' March 18, 2005 request to initiate formal consultation.

- 03-28-05 Service submits letter to Corps stating that all information necessary to initiate consultation had been received and that its biological opinion would be provided to the Corps no later than August 5, 2005.
- 04-19-05 Service and Corps conduct a site visit.
- 06-15-05 The Applicant informs the Service and the Corps that beach nourishment for the northern breakwater has been dropped from the application.
- 06-27-05 The Service requests the Applicant update the estimated impacts to intertidal substrate and submerged aquatic vegetation. Also, the Service requests that the Applicant recheck sand grain quality for nourishment material.
- 07-01-05 The Service receives the updated figures for the project, and a sand grain analysis report for the materials to be used for the project.

BIOLOGICAL OPINION

I. DESCRIPTION OF PROPOSED ACTION

The Applicant, Baymark Construction Corporation, proposes to construct three breakwaters and backfill the area behind two of the breakwaters with sand. The project is located at the Bay Creek Subdivision, located along the Chesapeake Bay (Bay) between Cape Charles and Old Plantation Creek in Northampton County, Virginia (Figure 1).

Each breakwater will be 250 feet long, with a bottom width of 33 feet and a top width of 8 feet. They will extend 5 feet above mean low water (MLW) and 2.6 feet above mean high water (MHW). They will be placed approximately 420 feet apart at the MLW shoreline and, due to the curve, 210-250 feet channelward of the MHW shoreline (Figures 2-9). The breakwaters and sand backfill will occur over 1,590 linear feet of shoreline. The breakwaters will cover approximately 24,750 square feet of intertidal substrate. Backfilled sand will cover 135,000 square feet of intertidal substrate, but sand migration may result in covering a total of 300,000 square feet of intertidal substrate (due to the tombolo effect). The Applicant dropped the proposed beach nourishment for the northern breakwater on the request of the Service to lessen the potential direct impacts to the tiger beetle. Sand will come from Gary's Pit, located two miles south of Eastville in Northampton County, Virginia.

During the construction, there will likely be impacts to submerged aquatic vegetation (SAV). The project plan shows no direct impact to eel grass (*Zostera marina*) beds, and only indirect impacts of 7,300 square feet resulting from sand drift. The Applicant proposes compensating for SAV impacts at a ratio of 1:1 due to no direct impacts. The purpose of the construction of breakwaters and beach nourishment is to produce a stabilized shoreline by the tombolo effect. Placement of only a portion of the sand needed between the middle breakwater and shore will most likely still result in the loss of the SAV beds that would have been lost directly if

nourishment materials were placed in a normal manner. Twelve months following construction, the Applicant and the Corps will determine what impacts occurred. Mitigation is proposed by transplanting adult plants collected from adjacent beds. Plants would be collected by either core plug removal or whole plant removal from donor beds. Impacts to donor populations will be limited to one third of existing plants.

The "action area" is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this project is the 2,000 linear feet of beach just north of the previous beach fill permitted under Corps permit 03-V1185 (Figure 2). The action area includes the area directly impacted by the construction, and areas both north and south of this project that will be impacted by sand transfer as a result of the tombolo effect. The area to the south of the breakwaters has already been impacted by a previous shoreline project (03-V1185) and was not included in the action area.

II. STATUS OF THE SPECIES RANGEWIDE

Please refer to the Status of Species provided in the Service's March 31, 2004, biological opinion for Project No. 03-V1185 (Baymark Construction Corporation's Shoreline Stabilization, Northampton County, Virginia). That information remains pertinent to this biological opinion.

III. ENVIRONMENTAL BASELINE

Status of the Species Within the Action Area - Knisley and Hill's 1999 and Knisley's 2002 comprehensive northeastern beach tiger beetle survey of the Virginia Eastern Shore revealed large populations of tiger beetles at beach 27 (Cape Charles South). Knisley (2002) counted 2,458 beetles on beach 27 (down from 3,452 in his 1999 survey). The northern section of the beach was ideal habitat for the tiger beetle with a long natural shoreline and a wide beach. As Knisley traveled south, the beach became less and less ideal.

Hurricane Isabel struck Virginia on September 19, 2003, causing impacts to beaches throughout the Bay. For a previous Corps project (03-V1185) adjacent to this action area, Knisley was hired by the Applicant to survey this beach area October 2003. Knisley's 2003 report showed that this section of beach 27 was degraded, and he considered the beach marginal habitat for the middle and southern breakwater. However, the beach section behind the proposed northern-most breakwater is considered good beetle habitat. The Service's April 19, 2005 site visit confirmed the habitat status. Because this section is considered good habitat, the Service requested the Applicant drop the beach nourishment for this breakwater.

Factors Affecting Species Habitat Within the Action Area - Generally, the action area's beach is narrow and is considered marginal habitat, only the section adjacent to the proposed northern-most breakwater would be considered good habitat. The proposed action would occur in the Cape Charles macrosite (Donoff et al. 1994) but south of the priority conservation area. The Corps conducted beach nourishment in 1987 just north of the action area. This northern section

of beach 27 has high concentrations of tiger beetles today. It is possible that the long-term effect of the 1987 nourishment was beneficial to the tiger beetle in helping create a wide beach. The general movement of sand in the project area is north to south, so one would expect the northern section of beach 27 to provide a sand source for the southern section over time.

Beach erosion and modification, from natural and anthropogenic modifications, affect the habitat in the action area. Sea level rise is accelerating erosion throughout the Chesapeake Bay. There was evidence of erosion prior to Hurricane Isabel (Knisley 2003), and the hurricane exacerbated the erosion in the action area. Human use of the beach will increase as the area develops, and this increased human use will adversely affect the tiger beetle. Human use of the beach will crush larvae, interrupt feeding and breeding, and potentially cause compaction of the sand. Generally, only concentrated human use creates significant adverse effects for the tiger beetle.

IV. EFFECTS OF THE ACTION

Direct Effects - Direct impacts to both adult and larval tiger beetles will result from the crushing and subsequent injury or death, during construction of the breakwaters from use/placement/stockpiling of equipment and materials on the beach and foot traffic within the construction area. The backfill of sand will bury and suffocate larvae. The particle size analysis showed the two sand samples from the source have a D_{50} of 0.28 and 0.26, both of which fall in the suitable sand grain size for tiger beetles, so repopulation by adults is expected to occur over time. Construction will result in temporary loss of habitat for adults through disruption of their daily activity patterns (i.e., foraging, mating, basking, egg-laying) and the redistribution of sand. Larval beetles not killed outright may be prevented from feeding during that time due to their sensitivity to vibrations, movements, and shadows, resulting in injury and potentially death.

Interrelated and Interdependent Actions - An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. No activities interrelated to and interdependent with the proposed action are known at this time.

Indirect Effects - Indirect effects are defined as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02). Breakwaters are designed to dissipate wave energy to help ensure that a beach continues to exist at this site. The breakwaters may require repair in the future. Repair activities would likely have adverse effects on tiger beetles. Impacts for repair activities would be of a smaller scope than construction activities. Furthermore, the infrequent nature of repair activities would provide time for some recovery of tiger beetle populations.

Future shoreline stabilization may be required due to the very close proximity of the development to the shoreline. This activity may result in disruption, injury, or death to adult and larval tiger beetles through habitat loss, heavy foot traffic on beach areas, use/stockpiling of equipment, and stockpiling/ placement of materials.

V. CUMULATIVE EFFECTS

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

As more people move into the Baymark community, more and more people will use the beach. People will use the beaches most often during the summer months, when impacts to both adults and larvae will occur. Human disturbance will harm and harass adult tiger beetles by interrupting feeding, breeding, and sheltering activities. Adult beetles will use energy to avoid pedestrian use that they would otherwise use in feeding and mating.

SAV contributes to shoreline stability, and removing SAV may increase shoreline erosion. An increase in shoreline erosion would likely cause adverse effects to the tiger beetle. Even if the proposed mitigation is successful, there will be a temporal loss of shoreline stability.

While the long-term effects of beach nourishment on northeastern beach tiger beetles are not fully understood, the results of the 1987 nourishment just north of the project area indicate that nourishment may provide tiger beetle habitat in the long term.

VI. CONCLUSION

Regulations implementing Section 7(a)(2) of the ESA (50 CFR 402) require the Service to formulate its biological opinion as to whether a Federal action that is the subject of consultation, taken together with cumulative effects, is likely to jeopardize the continued existence of listed species or the adverse modification of critical habitat. "Jeopardize the continued existence of" is defined by this regulation as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." "Destruction or adverse modification" of critical habitat is defined as "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical."

The northeastern beach tiger beetle's range runs from Cape Cod, Massachusetts to the mouth of the Chesapeake Bay, Virginia. Almost all extant tiger beetle sites occur in the Chesapeake Bay. In 2004, there were 928 beetles at Martha's Vineyard, Massachusetts, but the population at Westport appears to have been extirpated (VonOettingen, USFWS - New England Field Office, pers. comm. 2005). The one extant site in New Jersey is a reintroduction, and numbers have dropped to 43 in 2003 (Scherer, USFWS - New Jersey Field Office, pers. comm. 2004). Therefore, the tiger beetle populations in the Chesapeake Bay are critical to the survival of this species. As one of the largest populations in the Chesapeake Bay, the Cape Charles South

population (beach 27) is important to the survival of the species overall. Within beach 27, the best habitat and the most beetles are found in the northern section, just north of the action area.

Since 1994, this is the 63rd non-jeopardy biological opinion anticipating take of northeastern beach tiger beetles that has been completed on the effects of shoreline stabilization activities in Virginia. This alteration of tiger beetle habitat shows no sign of slowing down. Furthermore, unpermitted activities may be contributing to the reduction of tiger beetle habitat in Virginia as there appear to be more groins and other structures than have been permitted.

These impacts were evaluated within the context of the following: the large amount of remaining suitable habitat, the terms and conditions provided in the biological opinions that reduce the amount of take, and past and current comprehensive surveys in Virginia. Time of year restrictions have largely been successful in reducing impacts to adults, allowing them to recolonize areas during the next breeding season. The comprehensive surveys from 1998-2004 have indicated a stable population in Virginia overall, though some populations are experiencing population fluctuations. The overall stability indicates that many impacts are temporary and that the tiger beetle may not yet be experiencing chronic impacts due to shoreline stabilization activities.

After reviewing the status of the northeastern beach tiger beetle, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the construction of three breakwaters and fill of sand, 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.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity.

Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by the Corps and become binding conditions of any permit issued by the Corps 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 assume and implement the terms and conditions, or (2) 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, the protective coverage of Section 7(o)(2) may lapse. To monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR Sec. 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service anticipates incidental take of the northeastern beach tiger beetle will be difficult to quantify and detect because any beetles (adult or larvae) that are killed during breakwater construction, sand backfilling, and stockpiling of equipment and materials 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 habitat affected. The 2,000 linear feet of shoreline in the action area contains appropriate habitat for the northeastern beach tiger beetle, with most beetles and the best habitat in the northern section. The backfill of sand will cause more adverse effects than the construction of the breakwaters. This incidental take statement anticipates that construction activities and modifications to the beach profile and distribution of sand within this area will result in habitat alteration, temporary habitat loss, and death of both adult and larval tiger beetles during the construction year. The Service further anticipates take throughout the entire action area of adult tiger beetles during the construction year due to disruption of their daily activity patterns (i.e., foraging, mating, basking, egg-laying). Based on extensive surveys in the action area and the nature of the sand backfill, the Service believes larvae will be buried and killed within the area of actual construction (1,590 linear feet of shoreline). Larval beetles outside the construction area but within the action area will be taken by being prevented from feeding during construction due to their sensitivity to vibrations, movements, and shadows. Impacts to adults will occur throughout entire 2,000 linear feet of the action area. After the sand nourishment, adult beetles are expected to return to the area in a few years.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the northeastern beach tiger beetle:

- o Construction activities must be conducted when adult beetles are not present.
- o Human activity, materials, and equipment on the beach must be minimized to reduce

the impact to adult and larval tiger beetles.

- o Minimize shoreline erosion caused by the loss of SAV.

TERMS AND CONDITIONS

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

1. No construction, earth-moving, or placement of materials or equipment will occur on the beach between June 1 and September 15 of any year.
2. No placement and operation of heavy equipment on the beach area for the purpose of maintenance of the breakwaters or sand replenishment between June 1 and September 15 of any year.
3. No refueling of equipment or vehicles will occur on the beach.
4. No use of pesticides on the beach.
5. The Corps (or the Applicant) is required to notify the Service before initiation of construction and upon completion of the project at the address given below. Any other additional information to be sent to the Service should be sent to the following address:

Virginia Field Office
U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, VA 23061
Phone (804) 693-6694
Fax (804) 693-9032

6. Pursuant to 50 CFR 402.14(i)(3), in order to monitor the impacts of incidental take, the Federal agency or the Applicant must report the impact of the action on the species to the Service. To meet this requirement, adult and larval tiger beetle inventories must be conducted along with assessments of beach characteristics. The survey area shall cover the 2,000 linear feet designated as the action area. Surveys shall be performed by a Service-approved surveyor. A list of pre-approved tiger beetle surveyors is enclosed. The Applicant is not required to select someone from this list, but if someone else is selected, the proposed surveyor's qualifications must be sent to the Service for review at least 60 days prior to the survey. Surveys shall be conducted during the following years: 1, 4, 7, and 10 after construction is complete.

Adult tiger beetles shall be inventoried on warm, sunny days between July 1 and July 25. The total number of adults observed on the Applicant's beach will be recorded. Larval inventories shall be conducted between October 10 and 30 during low tide on cool and/or cloudy days. The total number of larval burrows observed on the applicant's beach will be recorded. An attempt to identify instar stage of larvae shall be made. The inventories shall be conducted in sufficient detail to assess the value of the beach habitat to the tiger beetle population and shall include detailed descriptions of the beach width and profile the entire length of shoreline. The Corps or the Applicant shall submit to the Service a report documenting the surveyor and dates, methods, and results of the inventories and beach measurements within 30 days following completion of the larval inventory each year. Capture and/or collection of beetles is not authorized under this requirement of the incidental take statement, except as permitted by appropriate federal and state regulatory agencies.

As part of the monitoring, photographs shall be taken to document changes to the beach over time. Photographs, at least 4 x 6 inches in size, shall be taken from five different fixed points in the action area. These photographs shall be included in the monitoring reports.

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, notify the Service at the address provided above.

The Service believes that individual tiger beetles within the action area (2,000 linear feet) will be incidentally taken as a result of the proposed action. Due to the variability in numbers of adults and larvae from year to year, it is difficult to quantify incidental take; however, the Service anticipates a reduction in the numbers of larvae using the beach zone. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures. The Corps must immediately provide an explanation of the causes of the take, and review with the Service the need for possible modification of the reasonable and prudent measures and the terms and conditions.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the

purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to further minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Due to the amount of shoreline stabilization/alteration taking place along the shoreline of the Chesapeake Bay, the Service recommends that compensation for adverse impacts to and loss of northeastern beach tiger beetle habitat be undertaken. As the Corps continues to issue permits for shoreline alteration, the amount of habitat available for the continued existence of this species is decreasing. For recovery and delisting of the tiger beetle within the Chesapeake Bay area of Maryland and Virginia, at least 26 populations must be permanently protected at extant sites (U.S. Fish and Wildlife Service 1994). In Virginia, 4 large (>500 adults) populations and 4 other (100 to 499 adults) populations must be protected on the Eastern Shore; 3 large populations and 3 others must be protected on the western shore of the Chesapeake Bay north of the Rappahannock River; and 3 large populations and 3 others must be protected on the western shore of the Bay south of the Rappahannock River. Presently, there are 6 large (2 protected) and 6 other (3 protected) populations on the Eastern Shore; 9 large (2 protected) and 12 (1 protected) others on the western shore north of the Rappahannock; and 6 large (2 protected) and 6 (1 protected) others on the western shore south of the Rappahannock. The Service will be glad to work with the Corps and the Applicant to locate and preserve an appropriate compensation site.

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

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in your request to initiate formal consultation. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

FISH AND WILDLIFE COORDINATION COMMENTS

The Service is concerned about impacts to SAV. The success of any type of habitat mitigation is not assured, and SAV mitigation, in particular, is difficult to achieve. The Service strongly recommends that impacts to SAV be avoided rather than mitigated. Mitigation is proposed adjacent to the construction area. Mitigation will occur as close to the construction site as

possible, defined by the appropriateness of the sites. All mitigation will occur between Cape Charles and Old Plantation Creek. The Applicant believes that most mitigation will be possible within the action area. If mitigation must occur, the Service concurs that SAV mitigation should occur on site. The Service recommends a 2:1 mitigation for the impacts to eelgrass (*Zostera marina*).

According to the Applicant's report entitled "Submerged Aquatic Vegetation Compensation Plan" dated April 22, 2005 (with updates on July 1, 2005), impacts to SAV will be determined by inspection by the Corps and the Applicant 12 months following construction (the 12-month delay allows time for indirect impacts due to sand drift from the nourishment activities). Mitigation is proposed by transplanting adult plants collected from adjacent beds. Plants would be collected by either core plug removal or whole plant removal from donor beds. The Service concurs that impacts to donor populations be limited to one third of existing plants. While the Service recommends seeding rather than transplanting, if transplanting occurs, the Service concurs with the proposed harvest method.

The Service appreciates this opportunity to work with the Corps in fulfilling our mutual responsibilities under the ESA and the FWCA. If you have any questions, please contact Mr. Mike Drummond of this office at (804) 693-6694, extension 114.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

Enclosures

LITERATURE CITED

- 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. Virginia Department of Conservation and Recreation, Division of Natural Heritage. Richmond, VA.
- Knisley, C.B. 2002. A survey of *Cicindela dorsalis dorsalis* along the eastern shoreline of the Chesapeake Bay, 2002.
- Knisley, C.B. 2003. A survey of the Bay Creek property shoreline south of Cape Charles, VA, for the northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*). Report to the U.S. Fish and Wildlife Service, Gloucester, VA.
- Knisley, C.B. and J.M. Hill. 1999. A survey of the Eastern Shore of Virginia for the northeastern beach tiger beetle, *Cicindela dorsalis dorsalis*, 1999. Report to the U.S. Fish and Wildlife Service, Virginia Field Office, Gloucester, VA.
- Scherer, A. 2004. Personal communication. U.S. Fish and Wildlife Service, New Jersey Field Office, Pleasantville, NJ.
- VonOettingen, S. 2005. Personal communication. U.S. Fish and Wildlife Service, New England Field Office, Concord, NH.

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bcc: FWS, R5, ES, Hadley, MA (Mike Thabault)
FWS, R5, ES, Hadley, MA (Glenn Smith)
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