SUMMARY REPORT

FOR THE

2012 RARE SPECIES MONITORING SERVICES

For

SEA GIRT NATIONAL GUARD JOINT TRAINING CENTER (NGJTC)

BOROUGHS OF SEA GIRT AND MANASQUAN
MONMOUTH COUNTY, NEW JERSEY

November 2013

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1.0 INTRODUCTION

1.1 Background

The Summary Report is an overview of activities conducted during the 2012 season by Amy S. Greene Environmental Consultants, Inc. (ASGECI) (March to December, 2012) for the work performed under Delivery Order No. W912KN-F-0190 of Contract No. GS10F0002T. The monitoring conducted this season is part of a larger continuing effort to provide monitoring and other environmental services for the facility. The findings from 2012 and previous seasons have been incorporated into the Sea Girt National Guard Joint Training Center (NGJTC) Integrated Natural Resources Management Plan (INRMP), which has been prepared for 2013. Environmental coordination for the facility remained under the guidance of the 2006 INRMP through the end of 2012.

The NGJTC is located in the Boroughs of Sea Girt (Block 106, Lot 1) and Manasquan (Block 54, Lot 2.01), Monmouth County, New Jersey (Appendix A, Figure 1). The Sea Girt NGJTC contains two Federally-listed and multiple State-listed Threatened or Endangered species that utilize the facility during part of the season. The services performed by ASGECI help the NJ Army National Guard (NJARNG) protect and maintain the Sea Girt NGJTC's rare species and natural resources. By sustaining the biodiversity of the training facility, the NJARNG may achieve and sustain its military mission at the facility. The NGJTC facility is subject to environmental regulation under Army Environmental Regulation AR 200-1, the Federal Endangered Species Act (16 U.S.C. §§ 1531-1544), the Sikes Act (16 USC 670a-670o, 74 Stat. 1052), Section 404 of the Clean Water Act (33 U.S.C. § 1251 et seq.; 40 C.F.R. §§ 104.1 et seq.), and the Department of the Army's National Guard Bureau (NGB) INRMP Policy memo entitled *Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys and INRMPs*.(21 March 1997). The facility is subject to regulation regarding wetland protection from the NJ Freshwater Wetland Protection Act, the NJ Wetlands Act of 1970 (N.J.S.A 13:9) and the NJ Coastal Areas Facilities Review Act (N.J.S.A. 13:19-1 et seq.).

Protection activities conducted during 2012 included a combination of site monitoring and onsite protection enforcement for the Federally- threatened target species piping plover (*Charadrius melodus*) and seabeach amaranth (*Amaranthus pumilus*); and surveying/monitoring of State-listed species. These species include: least tern (*Sterna antillarum*), seabeach knotweed (*Polygonum glaucum*), osprey (*Pandion haliaetus*) and other beach nesting species, such as American oystercatcher (*Hamaematopus palliatus*). Other protection activities involve maintenance and enforcement of species protection areas and policies as well as awareness briefings for stakeholders utilizing the NGJTC. Photographs of monitoring activities are presented in Appendix B.

During previous seasons (2008 - 2010) ASGECI conducted a study of the topography, vegetation cover, density and other metrics for the NGJTC beach. This study was not conducted in 2011 and was resumed in 2012, and is incorporated as an appendix in this document. The data collected from this study may be used as guidance and potential habitat enhancement for piping plover and seabeach amaranth in the future.

Two additional NGJTC studies were authorized and started during summer/fall of 2012 and will continue until the fall of 2013. These studies include a Predator Population Study and a Canada Goose Population Study. Summaries of work for these studies conducted during 2012 are incorporated into this report.

Sea Girt NGJTC implements protection measures for endangered and threatened species onsite as specified in the INRMP. This includes the establishment and regular monitoring of the Northern and Southern Protection Areas (NPA and SPA respectively), in which public entry is not permitted. Additional protections include vehicle restrictions and limitations on the beach including a "No Rake

Zone" in front of the NPA; limitation of vehicles within the 100M buffer during the monitoring season; a vehicle ban within the 100M buffer zone (of the NPA) when nesting birds are present; and the installation of a "no pet" policy onsite. Each season, the NJDMAVA staff consults with U.S. Fish and Wildlife Service (USFWS) and Endangered and Nongame Species Program (ENSP) to review and improve protections at NGJTC.

Species protections (in addition to the 2006 INRMP guidance) were approved by stakeholders and incorporated by NGJTC in 2008. Protections include increased trash containment and starting the full vehicle restriction in the NPA buffer at the first sign of piping plover nesting (i.e. once an egg is laid). Additional protections are discussed in the relevant sections of this report. Each season, appropriate signage regarding policies and restrictions is installed onsite. Endangered and threatened species briefings are prepared to assure that regulations are understood by all parties utilizing or involved with operation of the NGJTC including the National Guard, State Police, Coast Guard, and others. Endangered species protection is promoted onsite through the Youth Camp presentation, written educational materials and regular informal interaction with the visiting public. Some changes and additions to protections are expected to be incorporated in 2013 upon final approval of the updated INRMP.

1.2 Protocols and Methodology

Protocol modifications and adjustments from the previous season are typically discussed in a pre-survey season conference call involving stakeholders and agencies. ASGECI participated in the conference call on February 21, 2012 in anticipation of conducting work at the NGJTC during the 2012 season. USFWS, New Jersey Department of Environmental Protection (NJDEP), NJDMAVA and AECOM also participated in the phone conference. The 2012 Monitoring Season Protocols included the methodology utilized by Amy S. Greene Environmental Consultants, Inc. (ASGECI) staff scientists for the Targeted Species Surveys. Protocols for the vegetation cover survey were included in the 2012 protocols as were protocols for the predator population study and Canada goose monitoring and control studies. Protocols for the invasive species survey and wetland delineation were removed from the 2012 protocols as these field studies were completed in 2011. The protocols established for the 2012 Season are included in Appendix E of this summary. Protocols for 2012 included all activities conducted by AECOM including continued assistance with weekly monitoring and emergency monitoring (as needed) in the event of beach nesting bird presence as well as the protocols for the Predator Population Study, which AECOM has designed and is implementing.

As with the previous seasons, the study area for ASGECI for 2012 primarily focused on the beach and dune communities. Included in the primary dune community are the NPA and the SPA, which were similar to the standard protection areas established at the beginning of previous seasons. Intertidal and waterfront areas were also surveyed for wildlife. The secondary dune community was evaluated for vegetation species variety; however, it was not regularly included as part of the endangered and threatened species surveys. The secondary dune area is specifically important to the predator population study, as foxes regularly den, rest and forage in this area. All urban and field portions of the NGJTC including the ball fields, open wetland areas, bulkheads, and building grounds were evaluated as part of the Canada goose population study. A map showing the study area and protection areas is included in Appendix H of this report.

During the 2011 season, NPA fencing was set by NJDEP on April 4, 2012. Additionally, SPA fencing as well as "No Pet" signs and "Raise Your Rake" signs were installed by ASGECI and AECOM on April 4. The NPA fencing was removed by NJDEP during the week August 30, 2012, in anticipation of coastal storms. The NPA fencing was not reinstalled after this date due to the fact that no plovers had been observed late in the season. During the summer, "No Pet" signage was reinstalled with cement bases and

included municipal signage. ASGECI did not reinstall this signage and it was assumed it was installed by the municipalities. Most SPA fencing and signs, both interpretive and information were lost as a result of Hurricane Sandy in late October.

In addition to regular season seabeach amaranth surveys, one joint seabeach amaranth survey was conducted on July 18, 2012. This survey was conducted by ASGECI and AECOM. No interagency surveys were completed during the 2012 monitoring season due to adequate regular season monitoring, onsite conditions resulting from storm events and scheduling conflicts of USFWS, NJDMAVA and NJDEP. Total site visit time for general surveys typically lasted 3 to 6 hours per visit. Species and vegetation cover surveys were conducted by one to two ASGECI/AECOM surveyors.

Seabeach amaranth/rare vegetation surveys were performed by walking in a uniform grid pattern throughout the beach including intertidal areas, the NPA, the SPA, and other primary dune areas. Surveys of these areas were conducted during regular species monitoring visits, unless use of the shooting range prohibited access to the areas. Access is restricted in the NPA while practice shooting occurs at the range west of the NGJTC beach. The 2012 season had fairly continuous use of the range. ASGECI continued to work around the shooting range schedule to minimize scheduling conflicts.

During early season visits, individuals from NJDEP regularly swept the beach watching and listening for plover activity. Upon each visit performed by ASGECI/AECOM, surveyors scanned the beach and open water noting birds and other wildlife. Binoculars and/or a spotting scope were used during each survey. Survey sheets were distributed to the Endangered and Nongame Species Program (ENSP), USFWS, Wreck Pond Watershed Association (WPWA), NGJTC, and NJDMAVA and AECOM.

1.3 Impacts of Hurricane Sandy

On October 29, 2012, Hurricane Sandy made landfall near Atlantic City, New Jersey and caused unprecedented damage along coastal Monmouth and Ocean Counties. The maximum wind gusts at Sea Girt NGJTC registered at 79 mph. The facility received approximately 2.5 inches of rain according to the NGJTC facility weather station. The barometric pressure was as low as 28.23" during October 29. Flooding occurred throughout much of the eastern and southern portions of the facility. Areas that flooded included the majority of the primary and secondary dune, beach parking lots, and much of the fields, facilities and buildings bordering Stockton Lake and on the southern end of the grounds.

Following the storm, AECOM returned to the site on November 1, 2012 to continue predator population surveys and assess damage on cameras and trapping equipment. AECOM noted that there was minimal damage to the trapping equipment and cameras. ASGECI waited to return to the site on November 19, to allow for restoration of power and major clean up within the region. ASGECI preliminarily assessed impacts to beach habitats and communities. Damage included the following vegetation and habitat impacts, each of which is discussed in greater detail in the appropriate sections within the report:

- The loss of the osprey tower, which snapped at its base;
- The loss of the osprey nest atop the facility cell tower;
- Flooding and sand deposition within portions of the secondary dune habitat;
- Flooding within the freshwater wetland and adjacent fields;

- The loss of nearly all above ground vegetation and much of the root systems within the primary dune, including the NPA, SPA and the SBA; and

- Major topographic alterations to the primary dune and the unconsolidated shore/intertidal zone.

ASGECI revisited the NGJTC on January 10, 2013 to further assess topographic and tidal impacts to the beach and primary dune areas. Within the NGJTC beach, preliminary observation indicates that the total topography has dropped by a range of three to six or more feet depending on the location. Evidence of this decrease in topography is apparent by the new exposure of old bulkhead remains in both the NPA and SPA, which include erect wooden planks two or more feet above ground. In addition, two jetties have been exposed in the NPA with rocks ranging from several inches to over one foot above the sand level. These jetties run in an east-west orientation from the middle-western portion of the NPA to inside the "no rake" zone east of the NPA. These jetties are associated with the onsite rock piles that were exposed in the no rake /intertidal zone before the Hurricane. Some larger pieces of loose debris, including large pieces of wood, remained on the beach, primarily within the SPA.

At the time of observation in January of 2013, most of the NGJTC beach topography extended in a relatively uniform slope toward the ocean, with a very slight upward berm in portions of the intertidal zone. The steepest portions of the NPA (excess of 30% slope) remained primarily along its western boundary to the secondary dune. Variation in primary dune topography in protection areas including peaks (of 13 feet AMSL or more) in the middle-frontal portions and troughs in rear areas were no longer present in the protection areas. Observations of the beach front revealed a steep shelf of several feet just before the tide line in the intertidal zone. This shelf was most prominent in the "no rake" zone east of the NPA.

Based on these preliminary observations, it appeared that spring high tides, under calm conditions, would not infiltrate the NPA; the tidal inundation would stay below the shelf described above. It would appear; however, that high tides combined with moderate surf could regularly inundate the NPA frontal portions based on the lowered topography. The wrack line on January 10, which appeared to have occurred under moderate wave conditions sometime previous to the spring high tide was close to the typical NPA boundary and approximately 175 feet from the concrete sea wall at the western end of the NPA (see Appendix A - Figure 3).

Remaining above ground vegetation onsite within the primary dune protection areas amounts to approximately less than five percent cover. Few root systems appeared to remain intact and those remaining, primarily in the westernmost portion of the NPA and SPA, may not be viable. American beachgrass thrives in dynamic beach environments, and it would be expected to recolonize the protection areas in upcoming seasons; however, it would likely take multiple seasons of relative stability to recover to cover levels and densities seen previous to Hurricane Sandy.

The combination of low topography combined with the exposure of jetties and high tides/moderate surf could make lifeguard passage in front of the NPA on a regular basis more difficult. It is possible there could be some sand recovery on the NGJTC beach as the spring approaches; however, it appears likely that overall beach topography will generally remain several feet below previous seasons. Based on current and previous observations, the reduction of vegetation could result in a higher probability of nest attempts by beach nesting birds in the spring. It would be expected; however, that there would be a greater probability of nest inundation from spring high tides and storm surges during the incubation period. Regular occurrences of fox have been observed onsite following the storm. During the January 10, 2013 visit, two foxes were seen in the fields and fox tracks were visible throughout the protection areas.

Large portions of secondary dune were also inundated during Hurricane Sandy. It appears large areas of shrub flora, particularly Northern bayberry in the lowest areas, were impacted by wind and water during the storm. Many of these shrub limbs and trunks are cracked, but may still be viable. The storm surge appears to have extended through beach access points north and south of the secondary dune (along the alternate driving route) and into the eastern portions of the field and parking lot. Several feet of sand accretion occurred within the northern and southern ends of the secondary dune habitats from the storm's wave action. It is possible that the ratios of plant composition and structure within the secondary successional areas will change in some areas as a result of the storm. These areas should be monitored to see how various invasive species and other vegetation onsite respond to the impact.

The full impacts and necessary courses of action resulting from Hurricane Sandy, including lifeguard beach access and protection area maintenance, will be continually assessed by NJDMAVA in conjunction with USFWS and NJDEP as the active season in 2013 approaches. Photo documentation of impacts is included in Appendix B of this report.

2.0 RARE SPECIES / WILDLIFE SURVEY RESULTS

2.1 Plant Communities/General Vegetation

The vegetation study conducted between 2008 - 2010 evaluated plant communities within designated protection areas and immediate adjacent habitats that comprise NGJTC's coastal dunegrass community. The vegetation cover and topography study was suspended in 2011 due to lack of funding and was resumed in 2012. The primary dune extends from the intertidal area westward to near the cement bulkhead in the NPA and from the foot of the dune, west to the western end of the SPA (see Appendix H). Secondary dune areas west of the protection areas include successional dune communities and coastal dune shrubland. Secondary dune areas are occasionally monitored, but not included in the regular Threatened and Endangered species or vegetation cover surveys. Plants observed in and immediately adjacent to the primary dune areas are identified and are included in Appendix C. This list includes species identified between 2007 and 2012. A complete list of all species identified at NGJTC has been prepared for the 2013 INRMP.

The primary dunes at the NGJTC have been dominated by American beachgrass (*Ammophila breviligulata*). Several forbs are typically present in small pockets or generally interspersed among the beachgrass. These species include sea rocket (*Cakile edentula*), seaside goldenrod (*Solidago sempervirens*) and seaside spurge (*Chamaesyce polygonifolia*) in the foredune.

During the course of all plant community surveys from 2008-2010, plant diversity increases in more open areas west of the fore dune on the back end of the dunes. Forbs and grasses identified in the protection area dunes include purple sandgrass (*Triplasis purpurea*), saltmeadow cordgrass (*Spartina patens*), beach cocklebur (*Xanthium strumarium*), spoonleaf yucca (*Yucca filamentosa*), horseweed (*Conyza canadensis*), and poorjoe (*Diodia teres*), beach pinweed (*Lechea maritime*), beach pea (*Lathyrus maritimus*), Oake's evening primrose (*Oenothera oakesiana*), and *Digitaria* crabgrass. In 2011, Hurricane Irene significantly reduced and altered the cover and density of vegetation in portions of the habitat areas (see Appendix G, Vegetation Survey Report).

During the vegetation study that was conducted between 2008 and 2010, American beachgrass remained the dominant cover with a net coverage (by Daubenmire estimation) of approximately 40-45% throughout the study area. In 2010, the NPA had a net decrease of cover of approximately 12% primarily due to storm impacts along the easternmost (A and B) lines. Large amounts of sand accretion in the NPA buried

vegetation along portions of the B Line, and heavy frontal erosion removed the majority of vegetation along the A Line, leaving a sharp shelf-like effect at the dune toe. Storms in 2011, particularly Hurricane Irene in August 2011, further impacted the NPA and SPA with severe amounts of erosion and/or accretion. This impact resonated in the results of the 2012 Vegetation Survey with cover levels reduced by as much as 60% or more onsite with the most significant vegetation losses within the NPA. The impacts from Sandy, mentioned above were not captured in this data set and will be incorporated into the Vegetation Study planned for September 2013. Based on spring 2013 field observations, the vegetation recovery is generally minimal in the NPA.

For three consecutive seasons between 2007 and 2009, clusters of approximately 20 fruitless Asiatic sand sedge (*Carex kobomugi*) plants were identified at a single location in the back side of the primary dunes within the NPA. No Asiatic sand sedge populations were identified onsite during 2010. This species was again identified in 2011 in the same location and in a similar sized cluster as previous years. Following a series of storms in late 2011, the topographic conditions in the NPA, including in the previous sedge location, had been extensively altered and the plant was not identified onsite during 2012. During previous seasons, all visible root material has been carefully removed by hand and disposed of offsite. This area is regularly monitored each season and no additional locations or populations have been identified to date. This location and the entire site will be carefully monitored for this species in upcoming seasons, particularly with the alteration of habitat caused by Hurricane Sandy.

Dominant vegetation within the secondary dune areas includes extensive patches of Northern bayberry (*Morella pensylvanica*), poison ivy (*Toxicodendron radicans*), and rugosa rose (*Rosa rugosa*). These species, particularly Northern bayberry, may also be found in the west portion of the NPA primary dune area. Successional habitats within the secondary dune include goldenrods (*Solidago* spp.), knapweeds (*Centuria* spp.), winged sumac (*Rhus copallinum*), blackberry species (*Rubus* sp.). The more disturbed portions of this community are dominated by invasives including common reed (*Phragmites australis*), oriental bittersweet (*Celastris orbiculatus*), Japanese knotweed (*Polygonum cuspidatum*) and Japanese honeysuckle (*Lonicera japonica*). See Appendix C, Plant and Wildlife lists for the full list of plants observed in the rare species Study Area between 2007 and 2012.

2.2 Seabeach Amaranth

Background

Seabeach amaranth surveys conducted by the NJDEP revealed the presence of Seabeach amaranth between 2001 through 2006. During 2005, 12 plants were identified and during 2006, four plants were identified. The greatest number of plants at the NGJTC occurred in 2002, with 18 plants identified. After two consecutive years without an observation, three plants were identified during the 2009 season. No seabeach amaranth plants were identified in 2010, 2011 or 2012.

Populations of seabeach amaranth are declining regionally since an initial explosion in population from around 2000 to 2004. New Jersey plant numbers dropped from 6,522 in 2006 to 2,185 in 2007 (Stephanie Egger, USFWS, Personal Communication, 2008). Disease may be responsible for some population loss; however, habitat loss and lack of beach nourishment projects that may have deposited old seed from off shore onto the beaches is suspected as the primary reason for major population decline. Herbivory by webworms has also been identified as a threat to seabeach amaranth in some areas of the country. Seabeach amaranth was extirpated from NJ from around 1913 until it was rediscovered in 2000. Its return roughly corresponds with the onset of beach nourishment projects conducted by the US Army Corps of Engineers and several large storms that have occurred locally.

Seabeach amaranth surveys were conducted throughout the beach and dune area from the high tide line to the landward limit of the beach (dune line or seawall) during most site visits. Additional surveys for

seabeach amaranth were conducted as part of the process for collecting data during the vegetation cover survey. During targeted plant surveys, surveyors generally followed a grid pattern to ensure full coverage of the beach. During the seabeach amaranth surveys, surveyors looked for other potential rare species including seabeach purslane (*Sesuvium maritimum*) and seabeach knotweed (*Polygonum glaucum*).

2.3 Seabeach Knotweed

Seabeach knotweed was also surveyed for in conjunction with seabeach amaranth surveys. Seabeach knotweed was documented at Sea Girt NGJTC by the USFWS in 2004 (2 plants), 2005 (1 plant) and 2006 (5 plants). Seabeach knotweed has not been identified at the NGJTC from 2007 through 2012.

2.4 Piping Plover

Background

Each season, piping plovers are typically identified during migration and territory establishment at NGJTC by early April. Typically, first sightings are related to foraging activities in and around the NPA. Scraping and clear nest attempts have also been recorded onsite with some regularity and the NPA has also been recently utilized for resting and foraging by a fledgling plover and its parents.

In 2002, a pair of piping plovers unsuccessfully nested at NGJTC, followed by minimally observed nesting activity onsite for several years. The 2007 season was the first season in which nesting piping plovers were observed successfully hatching a chick at NGJTC. During 2007, one chick hatched out of the four eggs that were laid onsite. The remaining eggs were impacted by unusually high tides during an early season storm. After a short period of observed normal behavior with no apparent stress, the hatchling chick rapidly began showing signs of illness and expired on July 7, 2007. A necropsy coordinated by USFWS revealed that the chick died from pneumonia and its stomach was empty. Based on the occurrences of the 2007 season, there was a high expectation of a piping plover nesting attempt in 2008. After some initial onsite plover nesting activity, a large Nor'easter occurred along the NJ shore on May 12, 2008. This storm drastically impacted the profile of the NGJTC beach, particularly the nesting habitat around the NPA, which was severely eroded and its' plover nesting suitability was temporarily reduced. Piping plovers were not observed after that date onsite.

ASGECI conducted the first 2009 piping plover presence /absence investigation on April 8, 2009 and also met with Endangered and Nongame Species Program representatives to install NPA and SPA fencing onsite. No evidence of plovers was observed onsite. ASGECI again visited the site on April 21, 2009, however, storm conditions did not allow for a beach survey. On April 24, May 21 and June 16, 2009, ASGECI observed plover tracks around the middle portion of the NPA as is typically seen at NGJTC in the early season; however, no scrapes or hard evidence of plover nesting was observed.

On June 25, 2009, a pair piping plovers and a single chick had migrated from the Wreck Pond beach (approximately one mile north), where it had hatched, to the southern portion of the NPA at the NGJTC. The chick moved several times between Wreck Pond and NGJTC before fledging around July 16, 2009.

In 2010, spring surveys for piping plover were conducted by NJDEP and Wreck Pond Watershed Association. The first piping plover of the season identified at NGJTC was spotted by Nancy Hayduk of the Wreck Pond Watershed Association on April 7, 2010. The bird was foraging in the wrack line. No additional spring foraging or breeding activity including scrapes was identified after that date. ASGECI was rehired in October to finalize endangered species monitoring and vegetation surveys for the season. ASGECI spotted three piping plovers briefly resting on jetties in front of the NPA during migration in October 2010 during the vegetation cover surveys. No other piping plovers were observed during 2010.

In 2011, the first piping plover was observed foraging on April 8 at the wrack line in front of the NPA. No scraping, courtship or territorial behavior was observed at this time. On April 19, 2011, two piping plovers were observed foraging along the wrack line in front of the NPA. The plovers then flew south to the jetty located immediately south of the NPA and continued foraging. No scraping, courtship or territorial behavior was observed. No piping plovers or evidence of nesting plovers was observed during the remainder of the targeted species surveys during the 2011 monitoring season.

2012 Activity

On Saturday May 19, 2012 ENSP monitors identified a piping plover at NGJTC within an open (blown out) portion of the central NPA. Todd Pover of ENSP confirmed that this plover was separate from the individuals at Wreck Pond and therefore may be interested in nesting. On May 27, 2012, AECOM again confirmed the presence of this piping plover within the NPA. The bird was observed for 20 minutes loafing and traveling between the blow out portion of the NPA and the intertidal zone to forage. The plover was again observed loafing and foraging for approximately one hour within the same location within the NPA by ASGECI on June 8, 2012. ASGECI did not see a nest exchange or other evidence of nesting during this time. Piping plovers were not observed within the NPA or at NGJTC in general during the season by ASGECI after June 8.

In conclusion, no definitive evidence of a piping plover nesting attempt was observed by ENSP, AECOM or ASGECI during the 2012 season. At least one piping plover did regularly utilize the NPA habitat for resting and foraging during the 2012 season.

2.5 Osprey

Background

A pair of ospreys nested at the NGJTC for the first time in 2004 on a temporary cellular tower structure along Stockton Lake that was owned and operated by a private company. The pair successfully fledged two chicks. Following the 2004 nesting season, the cellular company constructed a permanent cellular phone tower on the installation and removed the temporary structure. In 2005, an osprey pair established a nest on the permanent cellular tower structure and in multiple seasons since. After a failed nesting attempt in 2008 (chick mortality), a pair of ospreys utilized the cell tower nest site and appeared to fledge two chicks during the 2009 season. During the 2010 season, three osprey chicks were observed and appeared to have successfully fledged from the tower nest.

In August of 2008, the NGJTC received approval from the NJDEP for a Coastal General Permit #22 for Avian Nesting Structures to erect an alternate nest platform. The pole and platform were installed adjacent to Stockton Lake on September 16, 2008. The pole and platform was constructed onsite by ASGECI and is approximately 25 feet above ground and set 5 feet below ground. Some branch material was attached with strings to the base of the platform to encourage nesting. To date, no osprey nesting activity has been observed on the platform that was erected in 2008 on the NGJTC property. Ospreys have occasionally utilized the platform to rest.

Ospreys are typically observed at the cell tower from late March/early April to September. Ospreys were identified at the NGJTC by ASGECI in April of 2011 at the existing cell tower in the westernmost portion of the project area adjacent to the backwaters of Stockton Lake (see Appendix A, Figure 2). Ospreys were regularly observed foraging over the Atlantic Ocean and Stockton Lake through late August during the 2011 season. Two osprey chicks were observed and appeared to have successfully fledged from the tower nest.

Additional actions have been considered by the cell tower company (Cingular) in the future to encourage ospreys to move from the cell tower site to an alternate site location. Actions considered include

discouraging nest establishment by enclosing the structure with screens to discourage the ospreys from utilizing it. These actions have not yet been implemented.

2012 Nesting Activity

Ospreys were first identified flying over and resting on the cell tower during the first season visit on April 4, 2012. Ospreys were observed regularly on the platform between April and September during every visit. On June 8, 2012, one osprey chick was observed with an adult in the nest on the cell tower. It is assumed that one or possibly two osprey chicks fledged in early October.

On October, 29, 2012, impacts from Hurricane Sandy broke the osprey pole installed in 2008. The platform pole which consisted of three 2 x 8 planks, snapped at the base likely from a combination of wind and possibly waves from flooding. It was determined that more than three feet of water covered the base of the pole during the storm. The platform portion of the osprey structure was recovered after the storm. The existing osprey nest was blown off of the cellular tower during the storm. Chicks had fledged by this time so it is expected that no ospreys were impacted by this event.

ASGECI is currently considering options for reinstallation of the osprey pole at the same location. Reinstallation may include the use of a telephone type monopole capable of better withstanding hurricane force wind or flooding. The reinstallation will not require an NJDEP permit. Activities that are improvements or replacements to structures damaged by Hurricane Sandy and within the same original footprint are exempt from NJDEP permitting.

2.6 Least Tern

Least terns (*Sterna antillarum*) have been observed nesting on the beach at the NGJTC by NJDEP ENSP from 2000 to 2003 and again in 2005, with the successful fledging of chicks in 2000, 2001, and 2002. However, no least tern nesting attempts have been observed at the NGJTC since 2005. Least tern, along with Forster's tern (*Sterna forsteri*) and common tern (*Sterna hirundo*), are regularly observed utilizing Stockton Lake, and the NGJTC beach and nearshore habitats for resting and foraging.

During the 2011 season, least terns were observed from May through July resting on the beach and foraging over the Atlantic Ocean and Stockton Lake. However, no least tern nesting activity was observed at the NGJTC during the 2011 season.

Changes in onsite conditions caused by previous season storms including Hurricane Irene in August of 2011 drastically changed the topographic and vegetation conditions at NGJTC. These topographic and vegetation changes persisted throughout the 2012 season and resulted in a leveling and reduction of the topography of more than 5 feet AMSL where dunes were breached by storm surges (see Topographic Survey - Section 5.2). The NPA had a reduction of vegetation cover from approximately 37.45% in 2010 to 17.38% (7.01% American beachgrass) as of September 2012 (this number has been since been reduced to near 0 after Hurricane Sandy – See Section 1.3). The increase in flatter, sparsely vegetated areas in the NPA between August 2011 and August 2012 likely played a role in the reappearance of least terns attempting to nest on the beach.

On May 15, 2012, Todd Pover of NJDEP ENSP contacted Bill McBride of NJDMAVA to notify him of the observation by NJDEP staff of least terns attempting to nest in areas in front of the SPA. At that time Bill McBride sent out correspondence to all parties concerned (ASGECI, NGJTC Staff, Sea Girt Borough, NJDMAVA, ENSP) that directed all parties to suspend all vehicle usage and scraping on the NGJTC beach until a determination about the colony establishment could be made. ASGECI confirmed the presence of approximately 34 least terns scraping and showing courtship displays, including food sharing and loafing on the beach in front of the NPA, on May 17, 2012. On May 20, 2012, Todd Pover

confirmed that courtship activity of the terns and several nest attempts had shifted to the NPA and he had expanded fencing during his visit to the beach. An email was sent to all concerned (see above) by Bill McBride on May 21 that noted that ENSP had confirmed the presence of eggs in the NPA on or around May 19 and scrapes in the vicinity of the NPA with some minor activity remaining in the SPA vicinity. Vehicle usage was restricted to the alternate route (that avoided areas in front of the NPA) at this time.

Melissa Smith of AECOM monitored the population of least terns during the Memorial Day Weekend. Melissa identified one incubating nest and a total of four adults within the NPA on May 26 and 27, 2012. During this time, lifeguards were observed traveling in front of the NPA with dune vehicles. M. Smith informed them that they are to use the alternative route. The lifeguards told M. Smith they were unaware of the policy and that they would immediately alert other staff. On May 28, 2012, M. Smith returned to the site and observed two adult least terns, one of which was incubating the nest. M. Smith again observed the lifeguards passing in front of the NPA. They stated that they were informed by NGJTC that it is acceptable to pass in front of the NPA because they were least terns and not moving by foot to the intertidal zone. M. Smith stated that, per the Annual Awareness Brief and standard agreed upon protocols, that the presence of beach-nesting birds, including least terns, showing nesting activity triggers the vehicle restrictions and that they need to use the alternate route. The lifeguards agreed and said they would comply.

June 6 2012 correspondence from General Pierson of NGJTC to Sea Girt Borough Officials Al Bunting and Tim Harmon indicated that the alternate path should be used in the presence of beach nesting birds. Tim Harmon concurred that the alternate route will be used by lifeguards. ASGECI performed a site visit on June 8 and did not observe any nesting least terns. Todd Pover confirmed that NJDEP were unable to identify any least tern nests around this time. Personal communication with NJDEP monitors indicated that fox harassment and/or predation may have played a role in the nest abandonment.

In conclusion, a least tern colony attempted to nest on NGJTC first in front of the SPA and then within the NPA starting around May 15, 2012. At least 34 least terns were observed during this time. Eventually one pair nested but the nest failed around June 8, 2012, possibly due to predator presence. No further nesting attempts by least terns occurred at NGJTC in 2012. Post Hurricane Sandy conditions on the NGJTC beach include a leveling of beach topography and massive reduction in vegetation (American beachgrass) cover to what will likely be under 20% in the upcoming season. Based on the early season habitat observations, which are conducive to least tern nesting, it is possible that least terns again attempt to nest onsite in 2013.

2.7 Additional Wildlife Observations

Though limited in size, the unique interconnected patchwork of natural communities within and adjacent to NGJTC, including freshwater wetland, open field and early succession habitats, salt marsh, mudflat, sheltered open water, primary and secondary dunes, and beach and ocean habitats, make the site extremely important for a variety of resident and migratory bird species. The NGJTC provides shelter and foraging habitat for a variety of rare, endangered and threatened bird species as well as nesting, foraging and migratory habitat for a number of non-listed passerines, shorebirds and waterbirds that rely on this patch of habitat in an otherwise highly developed urban landscape. In addition to bird species, a variety of mammals and great variety of insects including butterflies, dragonflies and beetles utilize the NGJTCs dunes and adjacent vegetated habitats. Beaches and the nearshore aquatic habitats support a variety of resident and migratory marine life ranging from a plethora of invertebrates to marine mammals. A complete list of species observed onsite during rare species monitoring and vegetation surveys between 2007 and 2012 is included in Appendix C. Table 1 reflects rare, threatened and endangered species identified by ASGECI during 2012 rare species monitoring surveys.

ASGECI/AECOM conducted general wildlife observations at the NGJTC during the 2012 season. Observations were primarily conducted within the beach and primary dune areas with some observations within the secondary dune community, fields, wetlands and Stockton Lake. Wildlife observed during the 2012 monitoring season included a number of landbird, waterbird, waterfowl and shorebird species, of which twelve (12) were endangered, threatened or special concern bird species, including the Federally-threatened piping plover.

Confirmed occurrences of threatened, endangered, and special concern species identified by ASGECI/AECOM onsite in 2012 are reported to the NJDEP Natural Heritage Program (see Appendix F). Species only listed as NJ special concern-breeding species that were not observed showing evidence of nearby nesting or breeding were not reported to NHP unless there are new or unique circumstances to report, such as an unusual behavior, atypical numbers of a species, or the utilization of a new area of the Facility.

Table 1: Rare, Threatened and Endangered Species NGJTC – 2012
Observed by ASGECI/AECOM During Endangered Species Monitoring

Species	State/Federal Status	2012 Date(s)	Location	Activity/Notes
Piping Plover	L-T; SE	May 27 and June 8	NPA beach	Single plover regularly observed resting inside the NPA and foraging at wrack line. Within a three week period Determined by ENSP not to be associated with Wreck pond, but showed no nesting behavior.
Glossy Ibis	SC - breeding	May 28	Freshwater Wetland	One observed by AECOM foraging in the wetland.
Least Tern	SE	May-July; Breeding activity between May 15 and First week of June.	Stockton Lake (foraging) , Nest Activity on NGJTC Beach (egg laid in NPA)	Observed by ASGECI and AECOM foraging. As many as 34 observed attempting to colonize SPA and NPA on May 17, nested in the NPA on May 19. Observed until May 28 by AECOM.
Osprey	ST - breeding	Most obs. April - October	Utility Pole, Stockton Lake, Cell Tower, Atlantic Ocean, Artificial Nesting Platform (resting)	Observed on the cell tower regularly between april and October. One juvenile observed. Often observed flying and foraging over Stockton Lake and the ocean. Nest destroyed by Hurricane Sandy.
Cooper's Hawk	SC - breeding	September 19 and 21 and November 12	Secondary Dune	Observed by ASGECI flying south low over the secondary dune during vegetation surveys
American Oystercatcher	SC	May, June	NGJTC Beach, NPA area and Freshwater Wetland	First observed a Pair on May 4 by ASGECI and AECOM. Scrape observed on May 17. Observed by AECOM between May 26-28. Territorial behavior observed on May 27. Observed foraging in freshwater wetland on May 28.
Common Tern	SC - breeding	May-October	Beach, Stockton Lake, Atlantic Ocean	Does not breed onsite. Observed by ASGECI/AECOM resting on the beach and foraging over Stockton Lake and the Atlantic Ocean.
Semipalmated Sandpiper	SC - non-breeding	May 4, June 8 and August 16	Fields, Wetlands, Beach	Foraging in modified wetlands. Flyover in July.
Sanderling	SC - non-breeding	August - November	Along NGJTC beach	Typically observed foraging at water's edge.
Brown thrasher	SC –breeding	May 4 and 17 and June 8	Secondary dune	Likely breeder onsite. Normally seen in the coastal dune shrub habitats

Species	State/Federal Status	2012 Date(s)	Location	Activity/Notes
Great Blue Heron	SC - breeding	August 16 and November 12	Freshwater Wetland	Observed resting in the freshwater wetland. Not known to nest within the vicinity of NGJTC.
Snowy egret	SC-breeding	June 8 and 20	Stockton Lake	Observed foraging on the mudflats of Stockton Lake.
Caspian tern	SC-breeding	October 8	Beach	Observed flying over the Atlantic Ocean.
Horned lark	T-breeding; SC-non-breeding	November 12	Fields	Observed resting/foraging in the fields.
Fowler's toad	SC	July 20	Dune	Observed within the SPA.

L-T – Federally-Listed Threatened; SE – State Endangered; ST - State Threatened; SC - State Special Concern

Bird Species

As previously mentioned, the NGJTC hosts a very wide variety of resident and migratory birds each season. The small freshwater wetland complex onsite consists of a mixture of mid and early successional plant species including switchgrass (*Panicum virgatum*) and other grasses, high tide bush (*Baccharis halimifolia*), common reed (*Phragmites australis*), and *Aster* spp. This wetland typically floods in the spring and regularly provides foraging habitat for waterfowl including mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*) and other species, and shorebirds including greater yellowlegs (*Tringa melanoleuca*), lesser yellowlegs (*Tringa flavipes*), least sandpiper (*Calidris minutilla*), black-bellied plover (*Pluvialis squatarola*) and solitary sandpiper (*Tringa solitaria*). Other species, including a variety of passerines, snipe (*Gallinago gallinago*), sora (*Porzana carolina*), great blue heron (*Ardea herodius*) and glossy ibis (*Plegadis falcinellus*) have been identified utilizing this wetland habitat.

Migratory shorebirds continued to utilize mowed and open portions of the wetlands during migration; however, ASGECI did not see them in the volumes as observed in 2011 when the site was exceptionally flooded in late August. Migratory birds including black bellied plovers, semipalmated plovers, greater and lesser yellowlegs and sandpipers [including least sandpiper, semipalmated sandpiper (*Calidris pusilla*) and locally less common sandpipers such as western sandpiper (*Calidris mauri*), and pectoral sandpiper (*Calidris melanotos*)] have been identified in these wetlands and adjacent uplands.

Mudflat and marsh habitats (dominated by stands of *Spartina alterniflora* and *Phragmites australis*) within Stockton Lake are particularly important for shorebird, waterfowl, and waterbird species. Mudflats are typically exposed at low tide on both the easternmost and westernmost ends of Stockton Lake. The easternmost mudflat typically supports the greatest variety of foraging shorebirds at certain times of the year. Species that have been observed utilizing these areas include spotted sandpiper (*Actitis macularia*), solitary sandpiper, semipalmated plover (*Charadrius semipalmatus*), black-bellied plover, least sandpiper, American oystercatcher (*Haematopus palliatus*), greater and lesser yellowlegs, and dowitchers (*Limnodromus sp.*). At the request of NJDEP and USFWS, ASGECI has frequently scanned the mudflats of Stockton Lake for red knot (State endangered, Federal Candidate *Calidris canutus rufa*). To date, this species has not been observed at the NGJTC. Waterbirds including great blue heron, great egret (*Ardea alba*), snowy egret (*Egretta thula*), and green heron (*Butorides virescens*) commonly use these mudflats. Both black-crowned night-heron (*Nycticorax nycticorax*) and yellow-crowned night-heron (*Nyctanassa violacea*) and rails have also been identified using both marsh fringes and mudflat areas for foraging.

Stockton Lake also supports a variety of wintering duck species including bufflehead (*Bucephala albeola*), hooded merganser (*Lophodytes cucullatus*), red-breasted merganser (*Mergus serrator*), black duck (*Anas rubripes*), mallard, Canada goose (*Branta canadensis*), Atlantic Brant (*Branta bernicla*), gadwall (*Anas strepera*), canvasback (*Aythya valisineria*), ruddy duck (*Oxyura jamaicensis*), and American widgeon (*Anas americana*).

Northern harrier (*Circus cyaneus*) and peregrine falcon (*Falco peregrinus*) are often observed flying within the NGJTC fields, wetlands, and beaches, particularly in the fall. The Northern harrier is typically observed passing over the secondary dunes or marsh habitats onsite. However, no harriers were observed during the 2012 season. Peregrine falcon was observed during monitoring surveys during 2011. Peregrine falcons are seen regularly at the NGJTC migrating and foraging over Stockton Lake and the eastern end of the field areas. American kestrel (*Falco sparverius*) and merlin (*Falco columbarius*) are occasionally seen foraging over the field areas. These species were not observed by ASGECI in 2012.

Black skimmers (*Rynchops niger*) were a key species not observed during endangered species monitoring between 2009 and 2012. This species is not commonly observed at the NGJTC and is only occasionally seen passing through the nearshore habitat.

The beach and nearshore habitat typically contains a variety of shorebirds throughout the year. Sanderling (*Calidris alba*) is the most common wading shorebird, particularly in the late summer, fall and winter. Semipalmated sandpiper, semipalmated plover, black-bellied plover and ruddy turnstone (*Arenaria interpres*) are also typically seen on the beaches in the spring and fall and occasionally winter.

Small groups of American oystercatchers are regularly observed flying over the NGJTC grounds during the breeding and migratory seasons; and occasionally observed on the beach at the NGJTC and on adjacent Stockton Lake mudflats. Some scraping activity was observed in 2011. Similarly to the 2011 monitoring season, an American oystercatcher pairs were occasionally observed on the beach at the NGJTC. No evidence of egg laying or nesting behavior was observed by ASGECI/AECOM during the 2012 monitoring season.

The secondary dune is host to the greatest variety of migratory and resident passerines and similar landbirds onsite. The patchwork of shrub and vine communities, including poison ivy (*Toxicodendron radicans*), Northern bayberry, rugosa rose, blackberry and Virginia creeper (*Parthenocissus quinquefolia*) create a densely vegetated habitat with well protected nesting and foraging opportunities for songbirds. Common early season residents include song sparrow (*Melospiza melodia*), mourning doves (*Zenaida macroura*), gray catbird (*Dumetella carolinensis*), Northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), Northern cardinal (*Cardinalis cardinalis*), Northern rough-winged swallow (*Stelgidopteryx serripennis*), barn swallow (*Hirundo rustica*), common yellowthroat (*Geothlypis trichas*) and yellow warbler (*Dendroica petechia*). There is strong evidence that the brown thrasher (*Toxostoma rufum*) nests in the NGJTC secondary dune. Large numbers of red-wing blackbirds (*Agelaius phoeniceus*) typically dominate the reproductive activity in the secondary dune and freshwater wetlands. Cooper's hawks (*Accipiter cooperii*) utilize the secondary dune for foraging, particularly during migration periods. This species was identified by ASGECI hunting in the secondary dune in September of 2012.

Herptiles

Herptiles appear to be uncommon at the NGJTC as a result of the marine conditions and the relative urban isolation. Certain disturbance tolerant reptile and amphibian species such as box turtle (*Terrapene carolina*), garter snake (*Thamnophis sirtalis*), spring peeper (*Pseudacris crucifer*), and green frog (*Lithobates clamitans melanotus*) are likely to occur within the general vicinity of the NGJTC, but have not been identified onsite by ASGECI to date. Fowler toads (*Anaxyrus fowleri*), a relatively common NJ State-listed special concern resident in the sandy soils of southern New Jersey and NJ coastal habitats, were first identified by ASGECI in 2007. During the late winter and spring, the onsite freshwater wetland adjacent to the parking lot typically retains up to one foot or more of standing water. Although not observed in 2012, the toads are fairly common and have been confirmed breeding in the freshwater wetland area onsite. During wet periods in the spring, numerous fowler toads can be observed in and around the freshwater wetland habitat. During the warmer portion of the year, Fowler's toads may be observed in the secondary dune, secondary successional habitats, or in urban areas under shrubs, boards, etc. They are also occasionally observed in the primary dune.

Red Fox and other Carnivore Mammals

Red fox (*Vulpes vulpes*) remains the most commonly observed non-domesticated predatory mammal at the NGJTC. Red fox, by evidence of direct observation, tracks, foraging signs and scat, have been quite reproductively successful at the NGJTC in recent years and appear to have a major influence in trophic interactions within the dune areas. The current Predator Population Study (see Section 5.3), is documenting red fox presence and movement onsite. Red fox tracks, scat, and direct observations typically occur anywhere between the waterline west to the grass field areas by the freshwater wetland. Most evidence of their activity was observed by ASGECI in the western portion of the primary dune areas and around the secondary dune areas. Dens have been identified in the secondary dune areas west of both

the NPA and SPA onsite. Well established travel corridors within this community are typically covered with adult and juvenile tracks, and frequent forage remains and scat. Foxes have also been recently documented within the urban end field portions of the NGJTC. This includes observations of foxes within the athletic fields (seen by ASGECI January 2013) and a den site near building 7. Preliminary tracking evidence (performed by AECOM) suggests that foxes also periodically move offsite.

It appears that fox presence contributed to the least tern nesting failures in 2012 (personal communication, NJDEP), as evidence of tracks and disruption from foxes was observed around abandoned nest areas.

In recent years, domestic cats and their tracks have been observed in the primary and secondary dune areas and the adjacent beach parking lot. Unleashed dogs remain common after October on NGJTC beaches. Most activity appears to occur along the beach line with evidence of occasional entry into protection areas.

Other predatory/omnivore mammal tracks including raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*) and skunk (*Mephitis mephitis*) have been identified onsite as part of the mammal survey. Evidence of river otter (*Lutra canadensis*) has also been identified in Stockton Lake.

Rodents and Lagomorphs

Eastern cottontail rabbit (*Sylvilagus floridanus*) scat is observed throughout the dune areas each season and evidence of beachgrass herbivory is most commonly identified within the protection areas during the Vegetation Cover Surveys. Clippings of American beachgrass throughout sections of the NPA and SBA appear to be partially for the establishment of travel corridors through dune areas.

Evidence of small rodents are occasionally observed onsite. This includes fragments of voles or mice in fox scat and small rodent tracks in the primary dune. Based on the size, observed tracks likely come from Norway rat (*Rattus norvegicus*) which are somewhat secretive but are commonly found around jetties and bulkheads within the region. Muskrats (*Ondatra zibethicus*) have also been observed by ASGECI in recent seasons near Stockton Lake and the onsite freshwater wetland. Groundhogs (*Marmota monax*) and gray squirrels (*Sciurus carolinensis*) remain the most commonly observed animals in the urban areas and fields of NGJTC. One ungulate, white–tailed deer, (*Odocoileus virginianus*), occasionally occurs onsite.

Fish

Each season ASGECI observes evidence of a variety of resident and migratory fish within nearshore marine habitats of the NGJTC. Occasional fish migrations or movements are typically observed within several hundred meters of the NGJTC beach each season. The species likely associated with these movements include Atlantic menhaden (*Brevoortia tyrannus*), sand lance (*Ammodytes sp.*), and bay anchovy (*Anchoa mitchilli*). Often these movements are identified by the associated feeding predators including terns (*Sterna sp.*), gulls (*Larus sp.*), northern gannets (*Morus bassanus*), double crested-cormorants (*Phalacrocorax auritus*), loons (*Gavis sp.*) and bluefish (*Pomatomus saltatrix*). ASGECI has occasionally observed cetaceans, presumably bottlenose dolphin (*Tursiops truncatus)*, feeding on schooling fish.

The NGJTC beach is also utilized by a variety of ecologically and recreationally significant nearshore fisheries including summer flounder (*Paralichthys dentatus*), bluefish and striped bass (*Morone saxatilus*). These species are regularly pursued by anglers at the NGJTC throughout the monitoring season. The small near shore jetties at the NGJTC would be expected to provide habitat for small structure oriented species such as cunner (*Tautogolabrus adsperus*). In addition to summer flounder, bottom-dwelling species such as windowpane (*Scophthalmus aquosus*), clearnose skate (*Raja eglanteria*), Northern sea robin (*Prionotus carolinus*) and kingfish (*Menticirrhus saxatilis*) would be expected at varying times of the year in the NGJTC inshore waters. Other species such as juvenile bluefish (snapper)

appear to forage on killifish or spearing in Stockton Lake, particularly at high tide. These species appear to be the main forage fish for the various heron and shorebird species utilizing the tidal lake.

Invertebrates

Common invertebrates observed each season within the dune area include sand wasps (*Bembix* sp.), *Sphecidae* wasps and seaside grasshoppers (*Trimerotropis maritima*). Other observed dune insects include caterpillar hunter (*Calosoma* sp.), Chinese mantis (*Tenodera sinensis*), cow killer (*Dasymutilla occidentalis*), lady beetles (Coccinellidae) and ctenuchid moth (*Ctenucha virginica*). Monarch butterflies (*Danaus plexippus*) are regularly observed onsite; however, no evidence of successful reproduction has occurred; possibly due to the very limited population of milkweed host plants. Large numbers of common buckeye butterflies (*Junonia coenia*) are also regularly observed feeding on goldenrod flower nectar onsite. Burrowing wolf spiders (*Geolycosa* sp.) have been observed each season during the vegetation survey in the NPA and SPA.

The marine invertebrate community at the NGJTC is typical of coastal New Jersey. Various shrimp-like Amphipods (scuds and sand fleas) have been observed throughout NGJTC's marine and aquatic environments and appear to be important forage species for shorebirds in Stockton Lake, the freshwater wetland, and the NGJTC beach. Commonly observed crab species include blue crabs, which are often fished for by NGJTC visitors at Stockton Lake. In addition, mole crabs (*Emerita talpoida*), lady crabs (*Ovalipes ocellatus)*, green crabs (*Carcinus maenas*), invasive Asiatic shore crabs (*Hemigrapsus sanguineus*), and ghost crabs (*Ocypode quadrata*) have also been observed. Ghost crab burrows are common in the American beachgrass areas of the NPA and individuals may be regularly observed in evenings or on cooler days during the season.

Common mollusks observed at the NGJTC beach include blue mussel, surf clam, coquina clam, sea clam, moon shell and sea scallop. Most often these species are identified by their empty shells in the intertidal zone. Ribbed mussels (*Aulacomya ater*) and remains of razor clam (*Ensis directus*) and stout tagelus clam (*Tagelus plebeius*) are most commonly identified near Stockton Lake. Sea stars (*Asterias forbesi*) are the most common Echinoderm (sea stars, sand dollar, and urchins) observed along the NGJTC nearshore marine habitat.

3.0 PROTECTION AREA MAINTENANCE AND ENFORCEMENT

3.1 Observed Threats to Wildlife - Public

Threats to wildlife related to both human and wildlife activity were observed during the 2012 monitoring season.

Pets

Each season, the most common public threat to wildlife onsite is violation of pet policies. As with past monitoring seasons, occasional evidence of pet policy violations was identified in 2012. Most commonly, dog tracks on the beach on multiple occasions during the monitoring season from April through November. Dog tracks are typically observed on the beach and occasionally within protection areas. During 2012, ASGECI did not observe any impacts to rare, threatened or endangered species as a result of pet policy violations.

ASGECI ordered and installed "No Pet" signage on April 4, 2012. These signs were later placed on larger posts with cement bases (possibly the borough). In addition, the NGJTC provided standard letters to the Monmouth County Animal Control and Sea Girt and Manasquan Police explaining the "no pet" policy. The NGJTC also provided an open letter to pet owners to be posted on the municipal websites (see Appendix F).

Entrance of Protection Areas

ASGECI has in this season, as well as past seasons, observed people and/or evidence of unauthorized entrance into the SPA and NPA. When observed, monitors ask individuals to refrain from entering the area. To date, all individuals have been cooperative when asked by ASGECI to not enter protection areas. ASGECI did observe evidence of disturbance to the SPA including digging, footprints and uprooted sea rocket in the SPA on August 30, 2012. ASGECI has not witnessed an unauthorized entry that directly jeopardized endangered or threatened species. AECOM/ASGECI did not witness unauthorized individuals entering the NPA while nesting least terns were present during 2012.

Vehicle Usage

During the 2012 season, vehicle usage on the beach was initially subject to the typical restrictions: lifeguard vehicles and emergency vehicles as needed. Due to the presence of nesting least terns, additional vehicle limitations or restrictions were put into effect via Bill McBride email to all stakeholders on May 21, 2012 at the NGJTC. Vehicle restrictions included limiting the use of vehicles in front of the NPA, with the exception of a bona fide emergency. The alternate route was activated prior to the confirmed presence of beach nesting birds.

Lifeguard Activity

During Memorial Day weekend, May 26-28, 2012, AECOM observed lifeguard vehicles making routine passes in front of the NPA (see Section 2.6) while vehicle restrictions were in effect. M. Smith of AECOM discussed with the lifeguards that they should not pass in front of the NPA in accordance within the existing policies identified in the Annual Awareness brief and emphasized in correspondence sent out from Bill McBride to the Borough on Sea Girt. The lifeguards first indicated that they were unaware of the policy and later indicated they had clearance from NGJTC to pass in front of the NPA since the beach nesting birds were least terns and do not travel to the water to feed. Following this event, it was communicated to the Borough that they should follow the restrictions. It did not appear that the vehicle activity impacted nesting terns. No incidents requiring emergency access to driving restricted areas were reported by lifeguards during the 2012 season. Access policies and protocols regarding all beach nesting birds should be emphasized in the 2013 Annual Awareness Brief to avoid policy confusion in 2013.

Beach Visitor Activity

NGJTC beaches typically appear to get the greatest number of visitors around the July 4th weekend. Most beachgoers utilize the beach in front of the SPA and SBA, where lifeguards are present. In autumn, fishing and walking appear to be the most common beach visitor activities. Generally these activities have not appeared to impact endangered species or wildlife. There were no specific incidents of beach visitor violations reported to ASGECI or AECOM during 2012.

Vandalism

On several occasions, monitors did observe some downed NPA and SPA fence posts. It is believed that these occurrences were the result of vandalism; however, ASGECI did not witness any of them taking place. Cement foundations and heavier bolts on signage may have prevented theft or vandalism of signage in 2012. These fence posts will be utilized by ASGECI in 2012.

3.2 Observed Threats to Wildlife – Non-human

Invasive species

Approximately 25 Asiatic sand sedge plants were first identified onsite in 2007 in an approximate 5 x 5 foot location and despite annual hand removal, subsequently reappeared during several recent seasons in the past. Recent storms including Hurricanes Irene and Sandy resulted in the major alteration of the dune habitats in the NPA. The area formerly containing the cluster of approximately 20 plants (above ground)

of Asiatic sand sedge (last identified on June 17, 2011) was severely eroded. No Asiatic sand sedge was identified in that location or elsewhere onsite in 2012. Due to the significant changers in topography and vegetation caused by Hurricane Sandy and other storms, careful attention should be given to all parts of the primary dune for evidence of reestablishment of this species onsite.

No other exotic or invasive species occurring at NGJTC appear to be impacting the primary dune area; however, several exotic and/or invasive species are dominant in the secondary dune community. ASGECI conducted an Invasive Species Survey between July and September 2011 in which numerous exotic and invasive species were identified of which continue to be present onsite. Dominant invasive species in sensitive wildlife areas include Oriental bittersweet, Japanese honeysuckle, Japanese knotweed, common reed, spotted knapweed, and purple loosestrife.

Predator Activity

Foxes appear to be the primary mammal predator present at NGJTC. Some domestic cats are also present as are other species such as raccoons and opossums. NJDMAVA, in conjunction with ENSP, removed several foxes and one cat the predator population onsite for the 2009 season by undergoing active predator removal during the winter months. No predator removal occurred in 2010 or 2011; however, a Predator Population Study was initiated in September of 2012 and is currently underway (see Section 5.3).

As with previous seasons, fox activity was widespread throughout the NGJTC beach area with the secondary dune areas supporting den sites and high activity levels. Evidence of predator activity included observations of cat tracks, fox dens, fox scat, adult fox and pup tracks, digging and prey remains. ASGECI observed fox dens (both abandoned and current) within the secondary dune community during the invasive species survey in 2011 and an additional den was identified near building 7 in January 2013.

In addition to mammal predation, avian predation from raptors is a regularly observed occurrence at the NGJTC. Species most often observed foraging include merlin, peregrine falcon and Cooper's hawk. Avian remains of raptor predation are found at multiple locations in and around the NGJTC beach each season. Other species observed onsite which are known to harass or predate plover chicks include fish and carrion crows (*Corvus* sp.) and *Larus* gulls including herring gull (*Larus argentatus*).

Beach Erosion, Habitat Succession and Habitat Loss

Each season, particularly in the spring and fall, storms impact the NGJTC beach by flooding portions of the primary dune with storm surge and changing the dune profile. At times, particularly during the winter months, sand is deposited in the back dune area and eroded at the dune toe; resulting in a dramatic shelf effect. This condition tends to level off over the course of the summer and or during durations without heavy eroding storms.

The full impact of Hurricane Sandy on the primary dune topography and vegetation will be better revealed during the topographic survey planned for Fall 2013. The result of storms that flatten the beach topography and create more sparsely vegetated areas may, as previously mentioned, encourage beach nesting birds to nest onsite. The long term impact of beach erosion may ultimately result in a loss of habitat onsite without periodic sand replenishment or a similar intervention.

3.3 Signage and Fencing

Each season 8.5" X 11" signs are ordered and are designed to notify the public of the protection area rules and regulations. Sign sets included "Raise Your Rake," "Lower Your Rake," "No Pets," and "No Vehicles Allowed" to detour vehicles around potential nesting areas. Each season, surpluses of fencing, rope and signs are ordered to replace missing or vandalized materials. An inventory of signage was taken

and new signs ordered in 2012. The order included additional "no pet" signs but did not include "no vehicle" signs since there was a surplus of these signs.

NPA and SPA fencing, rake signage and "No Pets" signage was installed on April 4, 2012 by ENSP, ASGECI and AECOM. Additionally, "No Pets" signs and "Raise Your Rake" signs were installed by ASGECI and AECOM on April 4. During the 2012 season, the signs were posted on reinforced post with cement bases. These signs remained until Hurricane Sandy on October 29, 2012. During the hurricane, the" no pet" signs, "raise and lower rake" signs, and the informational beach nesting bird sign adjacent to the NPA were lost/destroyed. In addition, the SPA fence was mostly destroyed in the storm. ASGECI evaluated the site and recovered very little of the fence on November 11, 2012. The NPA fence had been removed by ENSP in mid-October. NPA fencing was not reinstalled during the 2012 season due to the fact that no beach nesting birds had been observed late in the season. Additional SPA fence material will be purchased in January for the 2013 season.

Evidence of minor vandalism of fencing was observed on two occasions during the summer. On both occasions, the fencing was knocked down and reinstalled by ASGECI during visits. ASGECI or AECOM did not witness any vandalism taking place onsite.

3.4 Trash Collection

ASGECI collected approximately one 20-gallon bag of trash from the beach and protection areas during most targeted species surveys. The most common trash items collected in the dune areas remain plastic containers (water bottles, juice jugs, etc.) and a variety of rubber or plastic items ranging from toys, lighters, hoses, and hygiene products. Mylar and rubber balloons attached to strings are also common within the protection areas and present a hazard to birds and other wildlife. Some larger pieces of debris washed in with storms are occasionally removed from the site. After Sandy, debris including large pieces of wood or composite material were removed from the site.

Trash around the lot area was generally contained within the cans and was not observed by ASGECI. No anthropogenically produced bio waste such as domestic animal waste or discarded fishing bait was observed on the beach or dune areas by ASGECI in 2012. Trash remained contained within the receptacles during the summer season.

4.0 EDUCATION AND AWARENESS BRIEFS

4.1 Annual Youth Camp

The annual Youth camp was held in early July 2012. ASGECI contacted the Youth Camp administrator via email on June 20 and offered to provide a youth camp program similar to those conducted from 2007 to 2010. Between 2007 and 2009, ASGECI conducted the annual Youth Camp presentation at NGJTC. Initially the program was conducted on the beach for small groups of 10-20 children during the course of a single day. At the request of the camp, the program was changed in 2008 to a longer (approximate 2 hour) evening program indoors for all 150 children. The program was not requested by the NGJTC Youth Camp in 2012, presumably due to tight scheduling issues. ASGECI will continue to offer youth camp program and attempt to work out any scheduling issues early in 2013.

4.2 Annual Awareness Brief

The Annual Awareness Brief is designed to educate Sea Girt NGJTC staff, key military and police personnel, and other stakeholders about the installation's rare species management program. The program is important to establish lines of communication and rules to prevent impacts to threatened and

endangered species or their habitat. The Annual Awareness Brief was conducted on March 28, 2012 by Harry Strano and Jennifer LaStella of ASGECI for NGJTC Staff, Military and State Police Personnel, and the Borough of Sea Girt Staff. Topics discussed during the 40 minute program included:

- Species habitats occurring at NGJTC;
- Rare, Threatened and Endangered Species potentially occurring at NGJTC;
- Rare species protection measures taken by NGJTC;
- Regulations when beach nesting birds are not present; and
- Regulations when beach nesting birds are present and actively nesting.

4.3 Military Training Briefings

The military training briefings are designed to inform units conducting military exercises on the beach of the endangered and threatened species policies. The brief is required as part of preparation for any formal planned beach training exercises. The briefs are not held for units jogging on the beach, etc. since the command staff and cadre of those units are briefed during the annual awareness brief, but rather units conducting full training exercises. The brief lasts for approximately 1/2 hour which includes a PowerPoint Presentation and is structured similarly to the Annual Awareness Brief. ASGECI did not conduct a military briefing in 2012.

On May 5, 2012 Bill McBride and Harry Strano of ASGECI jointly conducted an educational program at the NGJTC beach for a group of approximately 20 visiting scouts and accompanying adults. The subject matter was similar to what is included in the Youth Camp Program including shorebird identification and bird flyways, rare and unique wildlife to the NGJTC, vegetation communities at NGJTC, and threats to wildlife. Visitors were given a copy of the NGJTC field guide and plover buttons.

5.0 ADDITIONAL TASKS

5.1 Vegetation Cover Survey

In order to improve the onsite habitat for endangered and threatened species, the NJDMAVA has considered the potential for various active management practices including American beachgrass control. To help determine long term ecological trends in vegetation community structure in relation to habitat suitability for rare species the NGJTC, ASGECI conducted a detailed vegetation analysis of the beach communities during the late summer/early fall between 2008 and 2010. ASGECI did not conduct the Vegetation Cover survey in 2011 due to funding. The study was, however, resumed in 2012. ASGECI utilized the same survey protocol from year to year with minor adjustments each season.

The study used multiple (qualitative and quantitative) sampling methodologies to assess the condition of the American beachgrass (*Ammophila breviligulata*) community (Study Area) at NGJTC. ASGECI analyzed dominant plant densities, cover percentages, frequency, species composition, biomass, species diversity, and population health and vigor within the NPA, SPA, and the adjacent non-protected area. Protocols from year to year remained nearly identical to the 2008 study to allow for direct comparison of data. One additional method of cover analysis (point intercept canopy cover) was incorporated during the 2009, 2010 and 2012 survey seasons.

Between 2008 and 2010, the American beachgrass community at the NGJTC was of extremely low diversity with the beachgrass generally comprising approximately 80%-90% of the community under all evaluated study metrics. The mean beachgrass cover within the study area remained at around 40-50% during this time.

During the 2012 study, the mean percent of AB cover for the **SPA** is 30.33 ± 9.05 (95% confidence interval) with a 24.79% standard deviation (SD) from the mean. The 2008 result for the SPA was 38.18 ± 10.46. The coefficient of variation for cover (Cc – SD/mean) among the sample is 81.73%, which indicates a fairly uneven cover distribution. This cover variation is up approximately 7% from a 75.06% Cc in the 2008 SPA data. The mean percent of AB cover for the **SBA** is 33.25 ± 12.47 (95% confidence interval) with a 26.44% standard deviation. A percent cover result of 52.94 ± 14.28 was identified in 2008. The coefficient of variation for cover among the sample in 2012 is 79.53%, which indicates a fairly uneven cover distribution of AB within the SBA. This number is higher than the 57.18% Cc determination in 2008. The mean AB cover percentage for the **NPA** is 7.01 ± 4.00 (95% confidence interval) with a 15.88% standard deviation. These results vary from the 2008 data of 41.91 ± 7.58. Similarly the coefficient of variation for cover among the sample is 226.60%, up significantly from 72.36% Cc in 2008.

The overall mean cover percentage for the **Study Area** was determined to be 17.57 ± 4.50 (95% confidence interval) with a 23.68% standard deviation from the mean. These results are much lower than the 2008 results of 42.69 ± 5.67 and other seasonal results which were all between 40 and 50%. The coefficient of variation for cover (Cc) among the sample is 134.80% which indicates a high variability level of AB cover distribution among the entire Study Area. The cover variation is up nearly 65% from the cover variation of 70.27% determined from the 2008 data.

Hurricane Sandy in October of 2012 occurred only weeks after data collection for the 2012 Vegetation Survey was completed. As a result the data collected in the 2012 study does not reflect the post –Sandy condition of leveled/lowered topography and less than 5% overall vegetation (based on qualitative observation). As a result, ASGECI's recommendations in the report, in order to be relevant, have considered Hurricane Sandy's impacts.

In 2012, the recommendations included suspending the consideration for small unit level (transect section) vegetation management for the foreseeable future. Larger topographic management actions such as sand shifting or grading using mechanized equipment may be considered in the future pending available resources and need based on site response to storm conditions.

No active dune vegetation or topographic management should be implemented at NGJTC in the immediate future. Key management actions should include a "wait and see" approach of continued observation of vegetation reestablishment and predator observation and control. The 2013 vegetation and topographic survey, which will incorporate Sandy impacts, will help direct further management recommendations. See the complete 2012 Vegetation Study in Appendix G for further information on site conditions and management considerations.

5.2 Topographic Survey

Abiotic site conditions including topography, erosion potential, substrate condition, storms, tides, trash and other disturbances may impact the vegetation community and the site potential for rare species. As a result, ASGECI contracted the land surveyors VS Land Data to prepare a Topographic Survey of the NGJTC beach area during the fall between 2008 and 2010. No topographic survey was conducted during the 2011 season due to funding restrictions. A survey was included in 2012 which reflected impacts from Hurricane Irene in 2011, but not Hurricane Sandy in 2012.

The topographic survey was conducted in early October of 2012, prior to Hurricane Sandy. The topographic map was prepared at 1-foot contours and includes all onsite features including vegetation limits, Protection Area boundaries, bulkheads, seawalls, jetties, structures, and benchmarks (see Appendix

H). ASGECI utilized the topographic data collected from 2008 to 2012 to identify and map topographic changes between them (see Appendix G, Vegetation Survey Report).

Between 2008 and 2012, topographic conditions within the protection areas have fluctuated with some dune peaks and troughs shifting with subsequent storms. Generally the topographic conditions with the NPA have remained between 9 to 16 ft. AMSL. Fluctuations in NPA topography generally ranged from 0-2 feet between 2008 and 2012, with accretion or depletion occurring in many locations.

Localized topography, particularly dune slope steepness within protection areas, changed significantly in several locations a result of Hurricane Irene. A storm surge breach of the dunes created more flat expanses between subsections 4 and 5 of the NTA - NTD transects. This expanse dropped in topography by at least 2 feet in portions of these subsections, particularly between NTC 4-5. Dune peaks located near the NTB 4 and NTB 5 points became steeply sloped and elevated by one foot or more in some spots. In general this surge resulted in a reduction of established AB vegetation as reflected in the vegetation data discussed in Section 5.1.

Other areas, including transect subsection NTD 5-6, had sand accretion by as much as 2 feet between 2008 and 2012. The SBA had similar sand accretion between one and three feet, particularly along frontal transects SBTA and SBTB. A steep sloping dune condition similar to those occurring in the NPA developed on the southern end of the SPA. A flat level expanse also developed between the central portions of the STA and STD between 2008 and 2012. The 2013 topographic study, which will reflect Hurricane Sandy's impacts, study is expected to show a loss of overall elevation and a general leveling of micro-topography within the study area.

5.3 Predator Population Survey and Red Fox Radio Collar Survey

5.3.1 Predator Population Survey

AECOM is currently conducting mammal and predator studies throughout NGJTC grounds. This study also tracks red fox (*Vulpes vulpes*) offsite to adjacent properties when feasible.

The Mammal Population Survey (MPS) was initiated in September 2012 and will continue through September 2013 (see Appendix E 2012 - Survey Protocols). The MPS occurs at the end of each month (when the moon is at its fullest to provide additional light for the nocturnal survey). To date, MPS's have occurred in September, October, November, December and January. Also in November, a seasonal three-consecutive night survey occurred. During the MPS, the survey commences several hours before sunset and ends about 4-5 hours after sunset. During the MPS, scientists walk fixed transects. Periodically, the scientists stop and illuminate the area with floodlights to identify mammals. When sighted, the mammal species and location is recorded. Other components of the MPS include identifying den locations/travel paths; track plates, camera traps, snow tracking, and a pet survey.

- Den/travel path survey – AECOM scientists traverse the NGJTC identifying den locations and travel paths. To date, two red fox den locations have been identified in the inter-dune area. Also, observed were hutches for rabbits and holes for ground hogs. Fox travel paths occur throughout the NGJTC.

- Track Plates - Also as part of the MPS, track plates are located in likely travel paths to identify mammal populations. The plates are reviewed to determine the tracks of mammals that have stepped on them.

- Camera traps - Game cameras (5) are erected throughout the NGJTC. The cameras continuously record photographs day and night. Once a month, the photos are downloaded and reviewed. Mammals and their locations are identified. In addition to the permanent cameras, several temporary cameras are randomly placed throughout the NGJTC during the MPS to further identify mammals.

- Snow tracking – To date, two snow tracking events have occurred: November 8, 2012 and January 22, 2013. During the snow tracking, the travel paths, destinations, frequency of mammals, (with emphasis on red fox) are recorded.

- Pet survey - AECOM is contacting the Boroughs of Sea Girt and Manasquan to determine the number of licensed cat or dog owners. Other data such as if the cat is kept in the house rather than let out shall be gleaned from public records.

Animals observed to date in the MPS include: cat (feral and domestic), *Felis catus*; dog (feral and domestic), *Canis lupus familiaris*; eastern cottontail rabbit, *Sylvilagus floridanus*; groundhog, *Marmota monax*; raccoon, *Procyon lotor*; rat, *Rattus* sp.; red fox, *Vulpes vulpes*; striped skunk, *Mephitis mephitis*; Virginia opossum, *Didelphis virginiana*; and white tailed deer, *Odocoileus virginianus*.

5.3.2 Fox Radio Collar Survey

The Fox Radio Collar Survey (FRCS) is planned to capture and radio-collar up to five foxes in order to ascertain the foxes' daily and seasonal movements. To date, one fox was captured in late November, 2012. When captured, the fox was transported to a local animal hospital where the organism was sedated. Once sedated, AECOM scientists recorded physiological data (height, weight, etc.) and affixed a radio-collar around the fox's neck.

Fox trapping and radio collaring are dependent on the animal hospital being open. During 2012, the amount of trap nights was considerably reduced due to Hurricane Sandy and its aftermath as well as the holiday periods near Thanksgiving and late December. Also, the traps have often captured other mammals (e.g., Virginia opossum, etc.). In order to increase trapping, an additional trap was placed on site in December, 2012. Due to the difficulty of trapping foxes using box traps onsite, AECOM is currently preparing to use snares as an additional means of trapping foxes for this study. This methodology has been approved by NJDEP and the 2013 protocols will outline methodologies designed to minimize impacts to foxes trapped onsite.

FRCS survey days occurred in mid-December and mid-January. In addition, foxes are also tracked during the MPS surveys. The FRCS commences several hours before sunset until four hours after sunset, then again the next morning the survey re-commences, approximately 3-4 hours before sunrise and continues until 1-2 hours after sunrise. During the FRCS, foxes are tracked via radio telemetry equipment. The tracking of foxes occurs on site as well as in the neighboring towns. To date, the collared fox has been tracked to an onsite den, within the dunes, and as far south as the Fisherman's Cove Conservation Area, located approximately 4,000 feet south of the NGJTC.

A full report of the both the MPS and the FRCS will be prepared following the full completion of the study and incorporated within the 2013 season report.

5.4 Goose Hazing Control and Management

5.4.1 Goose Hazing Activities

ASGECI contracted Geese Chasers, Inc., local goose control specialists, to harass resident goose populations through hazing techniques. Geese Chasers utilized trained border collies at least one time per day on a regular (near daily) basis at varying times of the day between August 30 and November 30, 2012 to chase off resident geese onsite and within Stockton Lake, where harassed geese take refuge. Hazing was most intensive during an initial 2 week clearing period. Both kayaks and remote control boats were utilized to continually harass geese that relocated in Stockton Lake.

Within two weeks of harassment, ASGECI identified a distinct drop in geese present onsite. The drop was reflected in both direct observation and fecal counts (see Section 5.4.2). It could not be determined at this time to what extent harassment vs. seasonal behavioral change resulted in the sudden drop in goose numbers. Although the harassment may have been effective, personal communication from NGJTC staff indicates that goose activity typically drops off onsite in the early fall under normal circumstances. The hazing effectiveness will be further evaluated in the spring and summer of 2013.

During the summer and fall season, there were no reported ecological, staff or visitor issues with the hazing dogs onsite. The dogs would quickly displace geese onsite and effectively followed commands from the trainers. Goose hazing was suspended in late November due to the influx of Atlantic brant and the general lack of use of recreational facilities and beach visitors in the winter months.

Harassment of geese will resume in March of 2013 and continue into the fall. Onsite Canada goose egg addling registration with the USFWS has been completed and addling is expected to be conducted by Geese Chasers in the spring of 2013, as needed.

5.4.2 Goose Population Study

In order to gauge the effectiveness of hazing techniques and addling, ASGECI developed a goose population study that corresponds with hazing. The study involved direct counts on most visits and a fecal count of predetermined plots on an approximate weekly basis.

<u>Fecal Count</u>
ASGECI established a series of 15 linear plots on the NGJTC grounds measuring thirty (30) feet by six (6) feet. This methodology is a modified version of one established by USDA (2008) for Canada goose monitoring in Orange County, New York. Initially ASGECI, considered fewer large transect-type plots of up to 100 feet; however, it was determined that a greater number smaller plots would allow for greater flexibility and more efficiency of sampling throughout the facility grounds. The use of more small linear plots allowed ASGECI to include samples in more diverse locations utilized by geese such as between various buildings and along walkways. Plots were located along bulkheads, in freshwater wetlands, between buildings, along roadsides, within the ballfields, and on sparsely vegetated recently disturbed grounds. Baseline fecal data collection started on August 8, approximately three weeks before hazing commenced and was completed on October 8, 2012. Several goose counts were made after that date.

For data collection, each goose feces larger than 1.3 cm that is partially or completely within the plot is counted as a single (1) feces. A total number of feces is derived for each plot during the weekly visit. These numbers ranged from 0 to 27 feces in a single plot (t) during the 2012 study period. The raw total number for all plots (T) is determined by adding the 15 plot (t) totals. The raw total T is then weighted by dividing the number of days between surveys (D) to compensate for variations in visit time (i.e. greater

accumulation period). This number (T/D) equals the rate of accumulation between surveys. This number is then divided by the plot number p =15 to get a rate of fecal accumulation per day per plot (T/D/p).

Fecal levels dropped from a total fecal count peak of 114 T in 12 plots on August 30 and to a count of 4T in 3 plots on September 28, 2012. Weighted averages ranged from a peak of 1.32 T/D/p on August 21 to 0.07 T/D/p on September 21. The complete preliminary data set for the initial study period (between August and October 2012) is included in Appendix I.

Canada Goose Direct Observation Counts

At the start of data collection on August 8 and continuing through August 30, an average of 210 (range of 206-215) resident geese were regularly identified onsite.

These geese fed on all mowed vegetated areas onsite including the croquet court, ball fields, lawns, freshwater wetlands, and sparsely vegetated disturbed grounds. During plot area selection, ASGECI noticed fecal matter fairly evenly distributed on all mowed areas of the NGJTC. Adjacent impervious surface areas, including roads and sidewalks, also often contained dense levels of fecal matter. Some observations indicate the geese spend greater amounts of time foraging and loafing around the bulkhead area of Stockton Lake in the late fall and spring.

Starting in September, goose counts were all less than 75 individuals onsite with no birds observed onsite on three occasions (9-7, 9-21 and 9-28). Fecal distribution also tended to be concentrated along bulkhead areas or in the ball fields.

After completion of the molting season for 2013 and ASGECI has completed one year's worth of hazing and data collection, ASGECI will prepare a full summary report (as part of the final summary report) on the NGJTC goose population and impact of hazing and addling. At this time the full effectiveness of hazing on the goose population may become more evident.

5.5 Freshwater Wetlands Letter of Interpretation

ASGECI performed a wetland and open waters delineation of Block 106; Lot 1 (Borough of Sea Girt) and Block 54; Lot 2.01 (Borough of Manasquan) of the NGJTC on June 17, 23 and 30, 2011 and September 12, 2011. Additionally, a small portion of the onsite wetlands were delineated on December 3, 2010 as part of the NJDEP Freshwater Wetlands GP1 permit application. In order to be identified as wetlands, an area must have hydrophytic vegetation, hydric soils, and be saturated by groundwater or inundated by surface water for one week or more during the growing season. Vegetation, soils, and hydrology were examined for evidence of wetland characteristics according to the methodology outlined in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (Federal Interagency Committee on Wetland Delineation, 1989) and the *1987 U.S. Army Corps of Engineers Manual for Delineating Jurisdictional Wetlands*. Use of these methodologies is required by the NJDEP, Division of Land Use Regulation and U.S. Army Corps of Engineers, respectively.

On December 8, 2011, ASGECI submitted a request to NJDEP for a Letter of Interpretation (LOI), Regulatory Line Verification to verify the delineation of freshwater wetlands at the NGJTC. The application was approved by NJDEP on August 3, 2012. NJDEP assigned a 50 foot wetland transition area to the large managed freshwater wetland onsite and larger wetlands connected to Stockton Lake. Remaining small and isolated wetlands were not assigned transition areas. A copy of the NJDEP Freshwater Wetlands LOI is enclosed in Appendix I.

5.6 NGJTC Field Guide

ASGECI made major revisions to the "*Field Guide to the Beach Habitats of the National Guard Training Center*" during the fall of 2011 including major formatting changes and additions of many common species and additional information on listed species. This field guide was prepared for the purpose of providing visitors and staff with a resource that summarizes key habitats and species at the NGJTC. The guide was again evaluated in the fall of 2012 with only minor changes made.

6.0 GIS DATA

6.1 Introduction

ASGECI has provided NJARNG GIS electronic deliverables as a downloadable file. ASGECI developed all GIS data following the United States Army CADD and GIS Center's Spatial Data Standards for Facilities, Infrastructure and the Environment (SDSFIE) standards, V2.6, the NGB CIP QAP, and the contract Scope of Work (SOW). GIS data developed by ASGECI during the 2012 season is compatible with the most recent NJARNG GIS and ESRI's ARCGIS v9.1.

6.2 Data Collected and Quality Control

GIS data points were taken with a Trimble Pathfinder Pro XT GPS unit and made at the specifications designated in the SOW including acceptable number of satellites, PDOP level and sampling intervals.

During the 2012 season, GPS data points were taken to define Goose Survey Sample Locations. GPS points were taken during good weather conditions with little PDOP interference or difficulty achieving satellite numbers.

The locations of bird species were estimated using aerial photo interpretation (i.e. heads-up digitizing) and notes regarding their location taken in the field. The general plant communities identified as primary and secondary dune in the GIS data were identified using a combination of aerial photo interpretation and field observations. The osprey nest location was taken using aerial photo interpretation in which the base of the cell tower was easily identifiable.

The locations of certain species of interest including least terns and flying or hovering ospreys were not included in the GIS mapping because they were regularly observed throughout the beach area.

ASGECI carefully reviewed GIS data to assure it is spatially accurate and representative data. Data was collected with appropriate quality assurance/quality control (QA/QC). Topology errors were not identified during the data analysis. The data collected during the 2012 season was not subject to topology error.

6.3 GIS Data and Metadata

A list of data tables utilized for the 2012 season and a sample of the metadata are included in Appendix D of this report. Included are all datasets outlined in Section 3.3.4 of the SOW.

All required attribute data was entered into the appropriate GIS Data tables following the same process that was used for the previous monitoring reports. ASGECI created ARCGIS layer files for both the existing and new graphic tables. In 2008, ASGECI created data tables for the vegetation cover survey and for the topographic survey. Spatial data pertaining to location of plot areas used in conducting the vegetation cover survey were recorded in existing flora and habitat sample site geodatabase tables and

populated with required attribute data. Additional attribute data regarding the vegetative cover survey was entered into a new non-graphic table. As required in the SOW, multiple fields were created in the Vegetation Assessment Survey data table and populated using field specific coding as needed. For a more detailed description of the coding parameters, see the table metadata in Appendix D. Spatial and attribute data, following the guidelines in the SOW, was also created from the Topographic Survey of the NGJTC beach area conducted by the land surveyors VS Land Data. In 2012, ASGECI added data tables for the Goose fecal study.

Metadata has been created for all of the feature class data sets. Metadata complies with the Federal Geographic Data Committee (FGDC) Standard Geospatial Positioning Accuracy Standards, Part 3: National Standards for Spatial Data Accuracy, FGDC-STD-007.3-1998, and the NGB Metadata Checklist Guidance, and the NGB metadata template. The metadata is available in the ARCatalog and a sample is also included in Appendix D of this report.

A Study Area Map illustrating GIS study area data collected during the 2012 monitoring season can be found in Appendix H of this report. This map includes all of the GIS data taken through GPS, and through a combination air photo interpretation and field observations. Mapping was created in World Geodetic System of 1984 (WGS84) datum and the North American Vertical Datum of 1988 (NAVD88). The GIS data collected for the NGJTC is projected in Universal Transverse Mercadum (UTM) Zone 18.

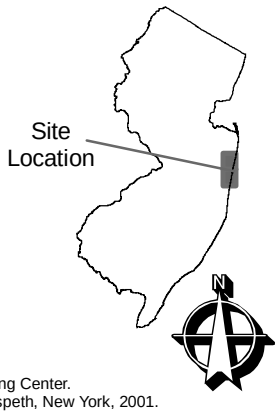
APPENDIX A

FIGURES

Legend

Installation Boundary

Note: Map not to scale



Sources:
Installation Boundary provided by National Guard Site of Sea Girt, NJ National Guard Training Center.
Street Map Monmouth County New Jersey published by Hagstrom Map Company, Inc., Maspeth, New York, 2001.

Figure 1
County Road Map

National Guard Training Center
Sea Girt Borough
Monmouth County, New Jersey

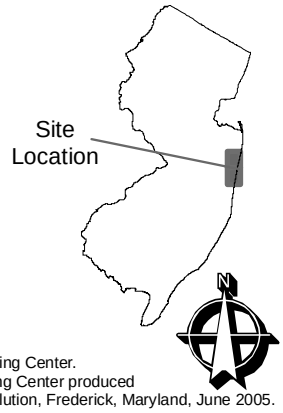
ASGECI Project # 3307

AMY S. GREENE ENVIRONMENTAL CONSULTANTS, Inc.

Legend

- Installation Boundary
- Osprey Nest Location

0 200 400 Feet



Sources:
Osprey Nest Location provided by Amy S. Greene
Environmental Consultants, Inc., based on fieldwork conducted August 2007.
Installation Boundary provided by National Guard Site of Sea Girt, NJ National Guard Training Center.
Digital Orthophotography for the National Guard Site of Sea Girt, NJ National Guard Training Center produced by EarthData International, LLC, at a natural ratio of 1 in 2,400 with a 0.25-meter pixel resolution, Frederick, Maryland, June 2005.

Figure 2
Osprey Nest Location

National Guard Training Center
Sea Girt Borough
Monmouth County, New Jersey

ASGECI Project # 3307

AMY S. GREENE
ENVIRONMENTAL
CONSULTANTS

HT1
SS1
HT2
SS2
RPK
SS3
RPJ
RPH
HT3
RPG
HT4
SS4
RPF
HT5
RPE
SS5
RPD
SS6
RPC
HT6
RPB
HT7
SS7
HT9
RPA
RP1
SS9
RP2
SS10
HT10
RP3
HT11
SS11
RP4
HT12
RP5
SS12

Legend

- Northern Protection Area
- Southern Protection Area

GPS Point

- HT
- RP
- SS
- High Tide Line (on 1/10/13)
- Regular Intertidal Line
- Storm Surge Line

Sources:
GPS Points taken by ASGECI January 2013.
Post Sandy Aerial (taken 11/1/12) provided by NOAA.

N
W
E
S

125
Feet

Figure 3 - Post Sandy
Tide Line / Surge Location Map

National Guard Training Center
Sea Girt Borough
Monmouth County, New Jersey

ASGECI Project # 3307

AMY S. GREENE ENVIRONMENTAL CONSULTANTS

APPENDIX B

SITE PHOTOGRAPHS/PHOTOGRAPH LOG

Photo #	Date	Time	Narrative
1	4-4-12	1336	Killdeer nest in SPA. Surveyors avoided this area after nest identification.
2	4-4-12	1356	View looking north at NPA fence installation.
3	4-4-12	1428	Fox tracks in the NPA. Fox tracks were common throughout the season.
4	4-17-12	1052	Osprey on the cell tower nest.
5	4-17-12	1257	View of a killdeer in the SPA.
6	4-17-12	1232	View of looking west SPA showing dune toe erosion from the previous season's storms.
7	4-17-12	1212	View looking west of NPA with posted signage
8	5-4-12	1030	View looking south at SPA showing vegetation loss in the frontal portions
9	5-4-12	1113	View of predated or scavenged gull (showing wing and sternum) in rear portions of the SPA.
10	5-4-12	1337	View looking east of a pair of American oystercatchers just east of the southern portion of the NPA.
11	5-4-12	1348	View looking south from the back central portion of the NPA showing sand accretion from storms.
12	5-17-12	1027	View of a group of least terns and a common tern east of the SPA.
13	5-17-12	1034	View of purple sandpipers foraging on rocks east of the NPA.
14	5-17-12	1002	View of a yellow warbler within the secondary dune areas.
15	5-26-12	1500	View of ATV driving in front of the NPA
16	5-26-12	1500	View of an American oystercatcher inside the NPA.
17	5-27-12	1230	View of a piping plover inside the NPA
18	5-28-12	1400	View of least tern nest scrape surrounded by fox tracks.
19	5-28-12	1400	View of the Memorial Day beach crowd south of the NPA.
20	6-8-12	1211	View of piping plover with thick incomplete neckband in the NPA wrackline.
21	6-8-12	1300	View of the adult osprey on the cellular tower nest.
22	6-8-12	1040	View of large pit dug by humans within the SPA.
23	7-10-12	0924	View of Canada geese observed in between NGJTC maintenance buildings.
24	7-10-12	1005	View looking south along the eastern portion of NPA dominated by sea rocket.
25	7-10-12	1239	View facing north from the southern boundary of the SPA.
26	7-20-12	1351	View looking north along central portion of NPA dominated by seaside goldenrod.
27	8-16-12	1142	View of adult osprey flying over the athletic fields with a fish.
28	8-16-12	1153	View showing great blue herons and Canada geese in the field to the north of the fenced wetland.
29	8-16-12	1120	View of a goose study plot between the camping area and the waterfront during a fecal count.
30	8-16-12	1132	View of black ducks near mowed portion of the large freshwater wetlands complex (wetland C).
31	8-30-12	1428	View of Canada geese grazing in the fields west of the shooting range.
32	8-30-12	1532	View of the northern portion of the SBA (foreground) and southern half of the NPA (background).
33	9-6-12	1507	View of quadrat during data collection in the SPA.
34	9-14-12	1510	View of open sandy areas during data collection in the NPA. Over vegetation cover dropped as a result of storms.

35	9-19-12	1140	View looking north from the center of the SBA while setting a transect for vegetation data collection.
36	9-19-12	1140	View of a transect marker in the center portion of the SBA.
37	9-28-12	1638	View of fox tracks in the NPA.
38	9-28-12	1638	View looking south from the central portion of the NPA. The vegetation composition changed from storm impacts.
39	10-8-12	1157	View looking east from the center of the secondary dune area.
40	10-8-12	1215	View looking north at tree swallows over coastal panic grass in the northern boundary of the secondary dune.
41	11-12-12	1052	View of the cell tower as a result of Hurricane Sandy on October 29, 2012. The osprey nest was destroyed.
42	11-12-12	1056	View of osprey platform snapped at the base as a result of Hurricane Sandy on October 29, 2012.
43	11-12-12	1128	View looking north at the SBA, which has been completely eroded away by the hurricane flooding.
44	11-12-12	1145	View southwest of the NPA showing the absence of vegetation and dune peaks.
45	11-12-12	1221	View south of Southern Protection Area showing impacts from Hurricane Sandy. Few plant root systems remain.
46	11-12-12	1219	View showing large wooden debris that was deposited within the SPA during Sandy.
47	1-10-13	0823	View looking east from NPA at newly exposed jetty areas.
48	1-10-13	0826	View looking west from the center of the NPA showing exposed bulkhead piers.
49	1-10-13	0941	View of bulkhead or old boardwalk planks previously buried by sand before the hurricane.
50	1-10-13	0946	View looking northwest at sand accretion within the southern end of the secondary dune community.
51	1-10-13	0955	View looking west at freshwater wetlands. This area was completely inundated during the hurricane.
52	1-10-13	1022	View looking south at sand accretion along the alternate route (north of the range).
53	1-10-13	1001	View of a red fox running through athletic fields and headed towards cover in the secondary dune.

Photo 1: 4-4-12

Photo 2: 4-4-12

Photo 3: 4-4-12

Photo 4: 4-17-12

Photo 5: 4-17-12

Photo 6: 4-17-12

Photo 7: 4-17-12


Photo 8: 5-4-12

Photo 9: 5-4-12

Photo 10: 5-4-12

Photo 11: 5-4-12

Photo 12: 5-17-12

Photo 13: 5-17-12

Photo 14: 5-17-12

Photo 15: 5-26-12

Photo 16: 5-26-12

Photo 17: 5-27-12

Photo 18: 5-28-12

Photo 19: 5-28-12

Photo 20: 6-8-12

Photo 21: 6-8-12

Photo 22: 6-8-12

Photo 23: 7-10-12

Photo 24: 7-10-12

Photo 25: 7-10-12

Photo 26: 7-20-12

Photo 27: 8-16-12

Photo 28: 8-16-12

Photo 29: 8-16-12

Photo 30: 8-16-12

Photo 31: 8-30-12:

Photo 32: 8-30-12

Photo 33: 9-6-12

Photo 34: 9-14-12

Photo 35: 9-19-12

Photo 36: 9-19-12

Photo 37: 9-28-12

Photo 38: 9-28-12

Photo 39: 10-8-12

Photo 40: 10-8-12

Photo 41: 11-12-12

Photo 42: 11-12-12

Photo 43: 11-12-12

Photo 44: 11-12-12

Photo 45: 11-12-12

Photo 46: 11-12-12

Photo 47: 1-10-13

Photo 48: 1-10-13

Photo 49: 1-10-13

Photo 50: 1-10-13

Photo 51: 1-10-13

Photo 52: 1-10-13

Photo 53: 1-10-13

APPENDIX C

SPECIES OBSERVED AT NGJTC 2007-2012

WILDLIFE OBSERVED AT NGJTC 2007-2012
(During Rare species and veg surveys)

Birds:	
Least tern (State endangered)	*Sterna antillarum*
Osprey (State threatened)	*Pandion haliaetus*
Northern harrier (State endangered)	*Circus cyaneus*
Piping Plover (Federally threatened, State endangered)	*Charadrius melodus*
Peregrine falcon (State endangered)	*Falco peregrinus*
Yellow-crowned night heron (State threatened)	*Nyctanassa violacea*
Black-crowned night heron (State threatened-breeding)	*Nyticorax nycticorax*
Bald eagle (State endangered)	*Haliaeetus leucocephalus*
Short-eared owl	*Asio flammeus*
Cooper's hawk (State threatened)	*Accipiter cooperii*
Red-tailed hawk	*Buteo jamaicensis*
Sharp-shinned hawk	*Accipiter striatus*
Turkey vulture	*Cathartes aura*
American kestrel	*Falco sparverius*
Northern bobwhite	*Colinus virginianus*
Merlin	*Falco columbarius*
Great black-backed gull	*Larus marinus*
Laughing gull	*Larus atricilla*
Herring gull	*Larus argentatus*
Ring-billed gull	*Larus delawarensis*
Glaucous gull	*Larus hyperboreus*
Black-headed gull	*Larus ridibundus*
Forster's tern	*Sterna forsteri*
Common tern	*Sterna hirundo*
Royal tern	*Sterna maxima*
Great egret	*Ardea alba*
Great blue heron	*Ardea herodius*
Snowy egret	*Egretta thula*
Green heron	*Butorides virescens*
Glossy ibis	*Plegadis falcinellus*
American oystercatcher	*Haematopus palliatus*
Sanderling	*Calidris alba*
Black-bellied plover	*Pluvialis squatarola*
Semipalmated plover	*Charadrius semipalmatus*
Solitary sandpiper	*Tringa solitaria*
Greater yellowlegs	*Tringa melanoleuca*
Lesser yellowlegs	*Tringa flavipes*

Willet	*Catoptrophorus semipalmatus*
Common snipe	*Gallinago gallinago*
Purple sandpiper	*Calidris maritima*
Semipalmated sandpiper	*Calidris pusilla*
Western sandpiper	*Calidris mauri*
Pectoral sandpiper	*Calidris melanotos*
Ruddy turnstone	*Arenaria interpres*
Killdeer	*Charadrius vociferus*
Spotted sandpiper	*Actitis macularia*
Least sandpiper	*Calidris minutilla*
Double-crested cormorant	*Phalacrocorax auritus*
Brown pelican	*Pelecanus occidentalis*
Northern gannet	*Morus bassanus*
Red-throated loon	*Gavia stellata*
Common loon	*Gavia immer*
Snow goose	*Chen caerulescens*
Canada goose	*Branta canadensis*
Mute swan	*Cygnus olor*
Atlantic brant	*Branta bernicla*
Bufflehead	*Bucephala albeola*
Mallard	*Anas platyrhynchos*
American widgeon	*Anas americana*
Hooded merganser	*Lophodytes cucullatus*
Black scoter	*Melanitta americana*
Surf scoter	*Melanitta perspicillata*
Fish crow	*Corvus ossifragus*
American crow	*Corvus brachyrhynchos*
Red-winged blackbird	*Agelaius phoeniceus*
Northern flicker	*Colaptes auratus*
Tree swallow	*Tachycineta bicolor*
Barn swallow	*Hirundo rustica*
Bank swallow	*Riparia riparia*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Yellow warbler	*Dendroica petechia*
Yellow-rumped warbler	*Dendroica coronata*
Palm warbler	*Dendroica palmarum*
Northern mockingbird	*Mimus polyglottos*
Brown thrasher	*Toxostoma rufum*
Blue jay	*Cyanocitta cristata*

Gray catbird	*Dumetella carolinensis*
Common grackle	*Quiscalus quiscula*
Ruby-throated hummingbird	*Archilochus colubris*
American goldfinch	*Carduelis tristis*
Rock dove	*Columba livia*
Mourning dove	*Zenaida macroura*
European starling	*Sturnus vulgaris*
American robin	*Turdus migratorius*
Song sparrow	*Melospiza melodia*
White-throated sparrow	*Zonotrichia albicollis*
Field sparrow	*Spizella pusilla*
House sparrow	*Passer domesticus*
Willow flycatcher	*Empidonax minimus*
Horned lark	*Eremophila alpestris*
Mammals:	
Bottlenose dolphin**	*Tursiops truncatus*
Red fox	*Vulpes vulpes*
Eastern cottontail	*Sylvilagus floridanus*
Feral cat	*Felis catus*
Groundhog	*Marmota monax*
Muskrat	*Ondatra zibethicus*
Rat sp.	*Rattus* sp.
Raccoon	*Procyon lotor*
Virginia opossum	*Didelphis virginiana*
Amphibians:	
Fowler's toad	*Anaxyrus fowleri*
Common Invertebrates:	
Cow killer	*Dasymutilla occidentalis*
Chinese mantis	*Tenodera sinensis*
Scuds	*Amphipoda* spp.
Sand wasp	*Bembix* sp.
Mud dauber wasps	*Sphecidae* spp.
European caterpillar hunter	*Calosoma scrutator*
Nine-spotted ladybeetle	*Coccinella novemnotata*
Seaside grasshopper	*Trimerotropis maritima*
Atlantic ghost crab	*Ocypode quadrata*
Mole crab	*Emerita talpoida*

PLANT SPECIES OBSERVED 2007-2012

Latin	Common	Primary Location
*Ammophila breviligulata**	American beachgrass	SPA, NPA, BA, SD
*Cakile edentula**	sea rocket	SPA, NPA, BA
Carex kobomugi	Asiatic sand sedge	NPA
Cenchrus tribuloides	sandune sand spur	SPA, SD
Centaurea stoebe	spotted knapweed	SD
Centaurea spp.	knapweed	SD
Celastrus orbiculatus	Oriental bittersweet	SD
*Chamaesyce polygonifolia**	seaside spurge	SPA, NPA, BA
*Conyza canadensis**	horseweed	NPA, BA, SPA
Cyperus grayi	Gray's flatsedge	SPA
Digitaria sanguinalis	large crabgrass	SPA, BA
Digitaria spp.*	crabgrass	SPA, NPA, SD
Diodia teres	poorjoe	SPA, SD
Eragrostis pectinacea	tufted lovegrass	SPA
Euthamia tenuifolia	slender fragrant goldenrod	SD
Linaria canadensis	toadflax	SPA
*Lathyrus maritimus**	beach pea	BA, SPA, NPA,SD
Lechea maritima	beach pinweed	SPA
Mollugo verticillata	green carpetweed	SPA, SD
*Morella pensylvanica**	Northern bayberry	NPA, BA, SD
Oenothera oakesiana	Oake's evening primrose	SPA, NPA, SD
Panicum amarum	bitter panicgrass	NPA
Phragmites australis	common reed	SD
Plantago psyllium	sand plantain	SD
Poa spp.	cool season grass	SPA, SD
Polygonum cuspidatum	Japanese knotweed	SD
Salsola kali	prickly saltwort	SPA
Saponaria officinalis	soapwort	SPA
Rhus copallinum	winged sumac	SD
Rosa carolina	Carolina rose	SD
Rosa rugosa	Rugosa rose	SD, NPA
Solidago canadensis	Canada goldenrod	SD
Solidago nemoralis	Gray goldenrod	SD
*Solidago sempervirens**	seaside goldenrod	NPA, SPA, BA, SD
Solidago spp.	goldenrod	SD
*Spartina patens**	salt meadow cordgrass	SPA, NPA, SBA, SD

Latin	Common	Primary Location
Spartina pectinata	prairie cordgrass	SD
Strophostyles helvula	trailing wild bean	NPA
Toxicodendron radicans	poison ivy	SD
Taraxacum spp.	dandelion	SPA, SD
*Triplasis purpurea**	purple sandgrass	SPA, BA, NPA
*Xanthium strumarium**	rough cocklebur	SPA, NPA
*Yucca filamentosa**	spoonleaf yucca	SPA

*** indicates plants identified within protection areas**
**** Possible sighting**
NPA – Northern Protection Area
SPA – Southern Protection Area
BA – Beach outside protection areas
SD – Secondary Dune Area

APPENDIX D

2012 GEODATA TABLES and METADATA SAMPLE

SEA GIRT NGJTC (ASGECI # 3307) DATA COLLECTION AND CORRELATION TABLE

Geodatabase Feature Class	Data Description
fauna_man_hab_buffer_zone_area	100-meter buffer zone around northern protection area.
	25-foot buffer area around base of cell tower osprey nest
fauna_special_species_area	Location of 'No Rake Zone'
	GPS location of habitat requiring special attention (north side).
	GPS location of habitat requiring special attention (south side).
fauna_special_species_point	Center point of 'No Rake Zone'
	Center point of habitat requiring special attention (north side).
	Center point of habitat requiring special attention (south side).
fauna_study_area	Area where monitoring occurred
fauna_viewing_point	Location of observed in-flight species.
	Location of observed land species.
nesting_area	Area around known nesting site
nesting_point	Location of known osprey, least tern, and fox nesting sites.
land_vegetation_area	Location of primary dune area (via aerial interpretation).
	Land and vegetation cover for entire installation (through fieldwork and aerial interpretation).
flora_special_species_area	GPS location of area with observed Asiatic sand sedge.
	Location of secondary dune area (via aerial interpretation).
flora_special_species_point	Center point of area with observed Asiatic sand sedge.
flora_special_species_mgt_area	Location of the northern protection area
	Location of the southern protection area
Installation_area	Installation boundary as determined by surveyor using property / deed records.
photograph_location_point	Location within study area where a photographic record was created
wetland_area	Location of wetland area located and surveyed on-site.
wetland_centerline	Location of wetland line defining wetland area.
wetland_buffer_area	Representation of regulated wetland buffer (transition area) determined for on-site wetlands.
land_restriction_area	Location of the northern and southern protection areas.
	Location of wetland areas located and surveyed on-site.
ecology_species_area	Location of the southern beach area
	Areas of field observed invasive species

DATA COLLECTION AND CORRELATION TABLE (Continued)

ecology_species_point	Centerpoint of the southern beach area
	Centerpoints for areas of field observed invasive species
ecology_management_area	Location of the northern and southern protection areas.
	Location of wetland areas located and surveyed on-site.
	Location of regulated wetland buffer (transition area).
ecology_management_point	Centerpoint of the northern and southern protection areas.
	Centerpoint of wetland areas located and surveyed on-site.
	Centerpoint of regulated wetland buffer (transition area).

Hide Thumbnail and Enclosures ▲

flora special species point ▶

Identification ▶

Citation
Citation Information
Originator Amy S. Greene Environmental Consultants, Inc. (ASGECI)
Publication Date August 31, 2013
Title
flora_special_species_point
Geospatial Data Presentation Form vector digital data
Online Linkage \\2012 GIS FILES\NJARNG_CY2012.mdb

Description
Abstract
This data is a digital representation of the Flora Special Species Point which involves the specific location of threatened, endangered, invasive, or threatened flora species. Sea Girt National Guard Joint Training Center implements protection measures for endangered and threatened species onsite as specified in the Sea Girt National Guard Joint Training Center (NGJTC) Integrated Natural Resources Management Plan INRMP. This includes the establishment and regular monitoring of the Northern and Southern Protection Areas (NPA and SPA respectively), in which public entry is not permitted. In particular, this data set include the specific location of known Asiatic Sand Sedge.
Purpose
This Geographic Information Systems data was developed for Rare Species Monitoring Services conducted during the 2012 season performed by Amy S. Greene Environmental Consultants, Inc. (ASGECI) for the work performed under delivery order no.: W912KN-10-F-0190 of contract no.: GS10F0002T. This is an updated data table incorporating data from the 2007, 2008, 2009, and 2010 monitoring seasons which includes data from previous years. The monitoring conducted is part of a larger effort to provide monitoring and other environmental services for calendar years 2010, 2011, and 2012; and is in support of monitoring and other environmental services conducted in prior years. The work will support the approved Sea Girt National Guard Joint Training Center (NGJTC) Integrated Natural Resources Management Plan (INRMP). The Sea Girt NGTC contains two Federally-listed and possibly six State-listed Threatened or Endangered species. The services performed by ASGECI help the NJ Army National Guard (NJARNG) protect and maintain the Sea Girt NGJTC's rare species and natural resources. By sustaining the biodiversity of the training facility, NJRANG may achieve and sustain its military mission at the facility. The NGJTC facility is under environmental regulation by Army Environmental Regulation AR 200-1, the Federal Endangered Species Act (16 U.S.C. §§ 1531-1544), the Sikes Act (16 USC 670a-670o, 74 Stat. 1052), Section 404 of the Clean Water Act (33 U.S.C. § 1251 et seq.; 40 C.F.R. §§ 104.1 et seq.), regarding wetland protection, the NJ Freshwater Wetland Protection Act, the NJ Wetlands Act of 1970 (N.J.S.A 13:9) and the NJ Coastal Areas Facilities Review Act (N.J.S.A. 13:19-1 et seq.). Protection measures for these endangered and threatened species include the establishment and regular monitoring of the Northern and Southern Protection Areas (NPA and SPA respectively), in which public entry is not permitted. Additional protections include vehicle restrictions and limitations on the beach including a "No rake zone" in front of the NPA; limitation of vehicles within the 100M buffer during the monitoring season; a vehicle ban within the 100M buffer zone (of the NPA) when nesting birds are present; and the installation of a "no pet" policy onsite. Each season appropriate signage regarding policies and restrictions is installed onsite.
Time Period of Content
Time Period Information
Single Date/Time
Calendar Date 2012

Currentness Reference
ground condition
Status
Progress In work
Maintenance and Update Frequency Annually

Spatial Domain
Bounding Coordinates
West Bounding Coordinate -74.032159
East Bounding Coordinate -74.025857
North Bounding Coordinate 40.137469
South Bounding Coordinate 40.117633

Keywords
Theme
Theme Keyword environment
Theme Keyword biota
Theme Keyword flora

Access Constraints
Permission of Amy S. Greene Environmental Consultants, Inc.
Use Constraints
None
Point of Contact
Contact Information
Contact Person Primary
Contact Person John R Pabish
Contact Organization Amy S. Greene Environmental Consultants, Inc.
Contact Position GIS Specialist
Contact Address
Address Type mailing and physical address
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City Flemington
State or Province New Jersey
Postal Code 08822
Country UNITED STATES

Contact Voice Telephone (908) 788-9676
Contact Facsimile Telephone (908) 788-6788
Contact Electronic Mail Address jpabish@amygreene.com

Native Data Set Environment
Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.2.6.1500

Hide Identification ▲

Data Quality ►

Logical Consistency Report

Data captured as GPS points during field surveys. Any points that were intended to be within certain geographic areas were checked for spatial accuracy to ensure topology.

Completeness Report

No information was ommitted while deriving this data set. Any minor generalization to the data only occurred to better represent the data more accurately. No features were excluded for any reason.

Positional Accuracy

Horizontal Positional Accuracy

Horizontal Positional Accuracy Report

Meeting National Map Accuracy Standards (NMAS) at a given printed map scale (hardcopy / paper sources).

Lineage

Process Step

Process Description

Bounded areas of known flora species were developed using a Trimble GPS unit in the field and supplemented with heads up digitized using aerial photography as a guide. Additional areas of potential flora habitat were generated on aerial photography based on field personnel observation.

Process Contact

Contact Information

Contact Person Primary

Contact Person John R. Pabish

Contact Organization Amy S. Greene Environmental Consultants, Inc.

Contact Position GIS Specialist

Contact Address

Address Type mailing and physical address

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Postal Code 08822

Country UNITED STATES

Contact Voice Telephone (908) 788-9676, ext. 18

Contact Facsimile Telephone (908) 788-6788

Contact Electronic Mail Address jpabish@amygreene.com

Hide Data Quality ▲

Spatial Reference ►

Horizontal Coordinate System Definition

Planar

Planar Coordinate Information

Planar Coordinate Encoding Method coordinate pair

Coordinate Representation

Abscissa Resolution 0.000063

Ordinate Resolution 0.000063

Planar Distance Units meters

Geodetic Model

Horizontal Datum Name D_WGS_1984

Ellipsoid Name WGS_1984
Semi-major Axis 6378137.000000
Denominator of Flattening Ratio 298.257224

Vertical Coordinate System Definition
Altitude System Definition
Altitude Resolution 0.000250
Altitude Encoding Method Explicit elevation coordinate included with horizontal coordinates

Hide Spatial Reference ▲

Entities and Attributes ►

Detailed Description
Entity Type
Entity Type Label flora_special_species_point
Entity Type Definition
The Flora Special Species Point involves the specific location of iondividual threatened, endangered, invasive, or sensitive flora species. These locations were determined during field surveys and positions taken using GPS equipment.
Entity Type Definition Source SDSFIE Release 2.600

Attribute
Attribute Label coord_y
Attribute Definition
The y component of individual coordinate point.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label OBJECTID
Attribute Definition
Internal feature number.
Attribute Definition Source ESRI
Attribute Domain Values
Unrepresentable Domain
Sequential unique whole numbers that are automatically generated.

Attribute
Attribute Label SHAPE
Attribute Definition
Feature geometry.
Attribute Definition Source ESRI
Attribute Domain Values
Unrepresentable Domain
Coordinates defining the features.

Attribute
Attribute Label map_id
Attribute Definition
Foreign Key. Used to link the record to the appropriate map.

Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label meta_id
Attribute Definition
Foreign Key. Used to link the record to the applicable feature level metadata record(s).
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label media_id
Attribute Definition
Foreign Key. Used to link the record to associated multimedia records that reference data such as imagery, video, audio, scanned documents, drawings, and other digital media.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label coord_id
Attribute Definition
Foreign Key. Used to link the record to the appropriate point coordinate record(s).
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label area_size
Attribute Definition
The size of the area, zone, or polygon in square units.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label area_u_d
Attribute Definition
The unit of measure for area.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label perim
Attribute Definition
The distance around the boundary of the area, zone, or subject item in linear units.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label perim_u_d
Attribute Definition
The unit of measure for length
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label user_flag
Attribute Definition
An operator defined work area. This attribute can be used by the operator for user defined system processes. It does not effect the subject item's data integrity and should not be used to store the subject item's data.

Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label coord_z
Attribute Definition
The z component of individual coordinate point.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label SUBTYPEID

Attribute
Attribute Label instln_id
Attribute Definition
Foreign Key. Used to link the record to the applicable INSTALLATION record.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label habcat_d

Attribute
Attribute Label facil_id
Attribute Definition
Foreign Key. Used to link the record to the Facility Record.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label coord_x
Attribute Definition
The x component of individual coordinate point.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label grid_value
Attribute Definition
A numeric identification of a raster element in an image or grid that represents the feature.
Attribute Definition Source SDSFIE Release 2.600

Attribute
Attribute Label sur_crs_id

Attribute
Attribute Label river_mile

Attribute
Attribute Label hab_use_d

Attribute
Attribute Label feat_desc

Attribute

Attribute Label pop_date

Attribute
Attribute Label pop_count

Attribute
Attribute Label flo_cls_id

Attribute
Attribute Label species_id

Attribute
Attribute Label plant_num

Attribute
Attribute Label spec_typ_d

Attribute
Attribute Label plnt_typ_d

Attribute
Attribute Label stem_diam

Attribute
Attribute Label crown_diam

Attribute
Attribute Label plant_ht

Attribute
Attribute Label dim_u_d

Attribute
Attribute Label veget_id

Attribute
Attribute Label flrange_id

Attribute
Attribute Label feat_name

Attribute
Attribute Label date_sampl

Attribute
Attribute Label hab_typ_d

Attribute
Attribute Label hab_stt

Attribute

Attribute Label flclass_d

Attribute
Attribute Label mantyp_d

Attribute
Attribute Label gnis_id

Overview Description
Entity and Attribute Overview
The Flora Special Species Point involves the specific location of iondividual threatened, endangered, invasive, or sensitive flora species. These locations were determined during field surveys and positions taken using GPS equipment.

Hide Entities and Attributes ▲

Distribution Information ►

Distributor
Contact Information
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Contact Organization Amy S. Greene Environmental Consultants, Inc.
Contact Position GIS Specialist
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State or Province NJ
Postal Code 08822
Country UNITED STATES

Contact Voice Telephone (908) 788-9676, ext. 18
Contact Facsimile Telephone (908) 788-6788
Contact Electronic Mail Address jpabish@amygreene.com

Resource Description Downloadable Data
Hide Distribution Information ▲

Metadata Reference ►

Metadata Date 2013-09-13
Metadata Contact
Contact Information
Contact Person Primary
Contact Person John R. Pabish
Contact Organization Amy S. Greene Environmental Consultants, Inc.
Contact Position GIS Specialist
Contact Address

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Metadata Standard Name FGDC Content Standards for Digital Geospatial Metadata
Metadata Standard Version FGDC-STD-001-1998
Metadata Time Convention local time

Hide Metadata Reference ▲

APPENDIX E

2012 SURVEY PROTOCOLS

SURVEY PROTOCOLS

For

TARGET ENDANGERED AND THREATENED SPECIES SURVEYS: PIPING PLOVER (*Charadrius melodus*) AND SEABEACH AMARANTH (*Amaranthus pumilus*)

VEGETATIVE ASSESSMENT

TOPOGRAPHIC SURVEY

PREDATOR POPULATION STUDY

RESIDENT CANADA GEESE HAZING

For

SEA GIRT NATIONAL GUARD JOINT TRAINING CENTER

SEA GIRT BOROUGH, MONMOUTH COUNTY, NEW JERSEY

July, 2012
Revised October 2012

PREPARED FOR:
New Jersey Army National Guard
101 Eggerts Crossing Road
Lawrenceville, New Jersey 08648
Attn: William McBride

PREPARED BY:
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ASGECI Project # 3307

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TABLES

APPENDICES

I. TARGET ENDANGERED SPECIES SURVEYS

A. Rare Species Survey Introduction:

The Sea Girt National Guard Joint Training Center (NGJTC) contains two Federally-listed and numerous State-listed Threatened or Endangered species. The services performed by Amy S. Greene Environmental Consultants, Inc. (ASGECI) help the New Jersey Army National Guard (NJARNG) protect and maintain the Sea Girt NGJTC's rare species and natural resources. As part of the 2012 season, AECOM will assist in regular rare species surveys and piping plover (*Charadrius melodus*) monitoring in the event of plover presence. As part of the monitoring services performed by ASGECI, survey protocols are prepared for approval by NJARNG, U.S. Fish and Wildlife Service (USFWS), and New Jersey Department of Environmental Protection (NJDEP) Endangered and Nongame Species Program (ENSP).

By sustaining the biodiversity of the training facility through monitoring and other measures, as outlined in the Sea Girt Integrated Natural Resources Management Plan (INRMP), NJARNG may achieve and sustain its military mission at the facility. The NGJTC facility is under environmental regulation by Army Environmental Regulation AR 200-1, the Federal Endangered Species Act (16 U.S.C. §§ 1531-1544), the Sikes Act (16 USC 670a-670o, 74 Stat. 1052), Section 404 of the Clean Water Act (33 U.S.C. § 1251 et seq.; 40 C.F.R. §§ 104.1 et seq.), regarding wetland protection, the NJ Freshwater Wetland Protection Act, the NJ Wetlands Act of 1970 (N.J.S.A 13:9) and the NJ Coastal Areas Facilities Review Act (N.J.S.A. 13:19-1 et seq.).

The following protocols were created to define the 2012 Monitoring Season survey methodology to be utilized by ASGECI staff scientists for the Targeted Species Surveys at the NGJTC in Sea Girt, New Jersey. Seabeach amaranth (*Amaranthus pumilus*) and piping plover surveys are to be conducted during each site visit. A total of 18 surveys (approximately once every two weeks) will be conducted during the monitoring season defined as between April and December.

ASGECI understands that the NGJTC Firing Range schedule may be subject to changes. ASGECI will adjust their survey methodology or timing to avoid conflicts. ASGECI will contact the facility point of contact (POC) to minimize interference with facility operations, including the firing range usage. ASGECI will also coordinate visits with ENSP volunteers that regularly visit NGJTC to monitor beach nesters. Coordination with ENSP, AECOM, Wreck Pond Watershed Association, and USFWS will better help coordinate observations of plovers and avoid unnecessary observation overlap.

All surveyors from ASGECI and AECOM will have experience in conducting piping plover/beach nesting bird surveys. Surveys will be conducted at varying times of the day to better observe wildlife activity patterns. A summary report of findings (see Appendix A and B) will be provided within five working days after each survey. Summary reports will be forwarded via fax and/or e-mail to the NGJTC Facility POC, New Jersey Department of Military and Veterans Affairs (NJDMAVA) Natural Resources POC, USFWS, New Jersey Division of Fish and Wildlife, ENSP, and Wreck Pond Watershed Association. ASGECI will forward the summary survey results to additional POCs as requested by NJDMAVA. During initial surveys in April and May, two staff surveyors will conduct plover and rare vegetation surveys. Surveys

will be conducted by one staff scientist from June 1 until December 1. Pending scheduling and agency requirements, three seabeach amaranth surveys will be coordinated with USFWS and ENSP representatives. Agency surveys are expected to occur during the last week in June, the third week of July and between August 15th and September 15th.

B. Piping Plover and Seabeach Amaranth Survey Information:

Pre-Survey Information Gathering

The INRMP for the NGJTC will be reviewed by all surveyors before visiting the site. To facilitate surveys, surveyors will review all available mapping of the site, including Geographic Information System (GIS) maps, showing protection area polygons and previous rare plant locations.

Equipment

Surveyors will carry binoculars and have a spotting scope available at all times. Surveyors will also utilize a Global Positioning System (GPS) unit to document rare vegetation and any nest locations (by estimation). One estimation method may include the installation of stakes in the protection area in a grid pattern before the breeding behavior is observed. These stakes can be located using a GPS and, using these stakes, ASGECI can offset and estimate the locations of any nests accurately. Surveyors may also collect GPS data on the site location once the nesting season has ended and access within the Northern Protection Area (NPA) is approved by the USFWS and the NJDEP. Surveyors will also carry digital cameras to photograph rare species, habitats, threats, etc. Appropriate species identification information and facility access letters will be kept by surveyors at all times.

Data Collection

During each visit, surveyors will collect survey data and keep detailed field notes of each visit onsite. Surveyors will carry special rare species surveyor identification created by NJDMAVA at all times and present it as requested. General data collected will include time of day; wind speed and direction; temperature; precipitation; surf conditions; approximate number of people on the beach; evidence of beach erosion; and other general conditions. ASGECI will record all threats to wildlife, which may include observed pets or stray animals; disturbance of symbolic fence; people within the protection areas; improper vehicle use; storm erosion; and invasive species. A list of both rare and common wildlife species observed will be kept during each visit. Particular behaviors of wildlife species will be noted. The rare species monitoring form (Appendix A) will be completed and forwarded to the appropriate POCs, including NJARNG, USFWS, and NJDEP, within five working days of each visit. ASGECI will prepare and provide copies of the Draft and Final annual survey report 60 calendar days and 30 calendar days, respectively, from the end of the 2012 monitoring season to the NJDMAVA Natural Resources, NGJTC Facility, USFWS, ENSP, Osprey, New Jersey Office of Natural Land Management (ONLM), Sea Girt Life Guard, and Sea Girt Department of Public Works (DPW) POCs. Lastly, ASGECI shall prepare NJDEP Natural Heritage Rare Species Reporting Form provided through the Natural Heritage Program for any rare species identified as part of the survey activities.

Particular attention will be given to observation of any "rare species" as outlined in Section 6 of the INRMP: Rare species include species listed as threatened or endangered under the

Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.) (Public Law 93-205); wildlife species listed by NJDEP as endangered or threatened under the New Jersey ENSP (N.J.S.A. 23:2A et seq.); species listed as special concern by NJDEP ENSP; and species listed as endangered by the NJDEP Division of Parks and Forestry under the New Jersey Endangered Plant Species List Act (N.J.S.A. 13:1B-15.151). In addition, the location, growth and size of any Asiatic sand sedge (*Carex kobomugi*) plants shall be noted.

ASGECI shall develop all GIS data developed following the United States Army, CADD and GIS Center's Spatial Data Standards for Facilities, Infrastructure, and the Environment (SDSFIE) standards v2.50, the NGB CIP QAP, and the contract Scope of Work (SOW). Typical datasets include nesting_site_area and point, fauna_management_habitat_buffer_zone_area, fauna_study_area, and flora_sample_site_point and area.

Enforcement of Special Protection Areas

Anyone observed driving vehicles, moving fence, walking dogs, entering dune areas, or conducting any activities detrimental to wildlife species will be politely asked to cease activities. All violations of policies will be immediately reported to NJDMAVA, ENSP, USFWS, and Facility POCs. If individuals are hostile or continue to act inappropriately, ASGECI staff will ask for their name and, if necessary, notify the appropriate authorities including the Sea Girt and Manasquan Police. All reports of policy violations provided by third parties to ASGECI will be reported to NJDMAVA, ENSP, USFWS, and Facility POCs.

ASGECI will be proactive in assuring that all parties are fully aware of the regulations to avoid any potential impacts to threatened or endangered species. Sea Girt Borough staff, including the Head of Lifeguards and the Public Works Director, will be asked to attend the Annual Awareness Brief at NGJTC in March so all parties are fully aware of the regulations in place to protect endangered species. During the monitoring season, ASGECI will regularly communicate with Borough lifeguards and other municipal staff to assure at all times that they are fully aware of the endangered and threatened species status and active regulations at NGJTC. If required, NJDMAVA/ASGECI will conduct additional awareness briefs or take other necessary actions to assure there are no endangered and threatened species violations are occurring onsite.

ASGECI will install at sufficient intervals "Sea Beach Amaranth" and "Endangered Birds Nesting" signs along the symbolic fencing so that beach visitors are aware of the protection areas. ASGECI will install "Raise Your Rake" and "Lower Your Rake" signs at the entrance and exits of the no raking area. Lastly, when required, ASGECI will install "No Vehicles Allowed" signs to detour vehicles around nesting areas. These no vehicle signs will be installed immediately upon observation of nesting activity of birds. ASGECI will maintain and replace these signs as necessary and order additional signage as needed.

Installation and Maintenance of Protection Areas

Maintenance of wildlife protection areas and appropriate signage will occur at all times during surveys. ASGECI will install the symbolic fencing in the Southern Protection Area (SPA) and aid ENSP in the installation of fencing at the NPA during the first week of April or sooner if rare birds are present. All appropriate signage will be installed at this time. ASGECI will maintain the wildlife protection areas throughout the entire survey period. Symbolic fencing and signage

will be maintained throughout the season (April - December). Any movement or damage to the fencing and signage will be noted and relayed to the agency POCs. ASGECI will remove signage and symbolic fencing at the end of the season (December) to avoid loss to winter storms. In the event that no threatened or endangered plant or animal species are identified onsite by November, ASGECI and NJDMAVA may request that the symbolic fencing and/or signage be removed before the December 1 date. Upon agency approval, ASGECI may also temporarily remove symbolic fencing during the active season in prior to large storms. Fencing would be immediately reinstalled to it original location following the storm. Removal of any protection measures before this date will only occur upon permission from both USFWS and NJDEP.

Threats to Wildlife (Non-Human)

In addition to the measures outlined in the Enforcement of Special Protection Areas, ASGECI will observe and record all non-human threats to endangered and threatened species at NGJTC during surveys. All predator monitoring activities and observations will be included in the 2012 survey and summary reports.

- Fox, cat and other predator activity will be closely monitored during the entire survey season. ASGECI will provide detailed documentation of the nature and location of tracks, scat, and prey remains. Trash receptacle areas will be closely monitored for overflow and evidence of wildlife (e.g. rat, fox, feral cat) interference.

- All invasive species, particularly Asiatic sand sedge, will be surveyed for and if identified, immediately reported to Facility and Agency POCs. ASGECI will qualitatively evaluate herbivory impacts to plant communities from rabbits and insects. If funding is allocated, a review of the 2011 Invasive Species Survey would also occur in 2012.

- ASGECI will seek approval from NJARNG, USFWS, NJDEP, and ENSP before any management procedures are implemented. Expected wildlife management activities conducted by ASGECI would be minor (minor removal of Asiatic sedge or adjusting fences).

- AECOM will perform a predator population study to document the density of and potential impacts to threatened and endangered species by fox, cats, and raccoons. ASGECI will assist AECOM in this task, when necessary. AECOM will be responsible for trapping and handling predators during the study.

Other Wildlife Observations

During each visit, ASGECI will note observed wildlife, including common species and all rare, threatened and endangered species. Some invertebrates may be identified to the Family or Genus level. Unusual wildlife activity (particularly activities in which habitats near shore or onsite are utilized), such as dolphin, bird, and fish migrations or feedings, will be noted in the survey reports.

ASGECI will observe and record nesting ospreys onsite during each regular visit. Behaviors that will be observed include including adult nesting and feeding activity and the presence/number of fledglings. ASGECI will check around the base of the cellular pole for dead fledges. ASGECI

will consult with the Wreck Pond Watershed Association to discuss activity on the nest during the season.

Upon each visit, ASGECI will monitor and maintain as necessary the installed osprey pole and platform for any species activity, damage, etc. ASGECI will continue to investigate ways to encourage transfer of nesting ospreys from the cell tower to the pole.

ASGECI will briefly investigate other natural areas onsite in addition to the beach and dune habitats (where rare or significant migratory bird sightings may occur) upon each visit. Key areas include the freshwater wetland area and the Stockton Lake (area including mudflats and *Spartina* marsh) adjacent to the NGJTC. ASGECI will record species observed in these areas.

Trash Collection

As part of the rare species surveys, ASGECI will remove at least one approximate 20 gallon bag (per person) of trash during each visit. If time and conditions permit, collection will typically be conducted after wildlife and plant surveys area complete to avoid interference with observations. Trash will be typically collected within the protection areas but may be collected outside of the protection areas if there are restrictions on entering those areas or large amounts of trash are observed elsewhere on the beach. Trash overflow at the trash stations will be observed and recorded. During visits, ASGECI will immediately alert the Facility POC if the trash is observed outside of the receptacles. ASGECI will look for and report any particular issues related to trash disposal on the beach, such as improperly discarded fishing bait or other specific litter observations.

C. Piping Plover Surveys

Since breeding plover individuals and chicks will likely occur from March 15 through August 31st, ASGECI will pay particular attention to any possible breeding or nesting behavior during this time period.

1. Surveyors will first scan the beach for rare bird species using binoculars. Particular attention will be given to rare wading birds and associate species, such as least tern (*Sterna antillarum*), American Oystercatcher (*Haematopus palliatus*), red knot (*Calidris canutus*), and black skimmer (*Rynchops niger*).

2. Surveyors will then "sweep" the survey area (NGJTC beach property). Sweeps will consist of individuals slowly walking the length of the survey area. If two surveyors are used, one will walk closer to the beach grass community and one closer to the intertidal zone. Surveyors will stop periodically to make observations with binoculars and listen for calls. Surveyors will also look for and report signs of breeding including scrapes, tracks from the dune areas, etc.

3. If piping plover calls are heard, the surveyors will stop and scan the vicinity before backing away from the general location and scan the location for birds and potential nests. Surveyors will look for courtship activity, juveniles, or other indicators of reproduction. Surveyors will not interfere in any way with nesting plovers.

4. Two sweeps of the site will be made per visit. These sweeps will be separated by at least two hours. During the interval, vegetation surveys may be conducted in the areas least likely (southern portions of the beach) to contain plovers. Additional activities such as note taking and additional fauna or predator observations, fence fixing, trash collection or any other duties will be completed from the periphery of the potential nesting areas.

5. After the second sweep of the beach, the vegetation survey will be completed. Improvements to fencing, trash collection, additional wildlife observation, and other duties will be completed.

6. Predator activity potential impacting plovers will be closely monitored throughout the site (see Non-human Threats to Wildlife), including identification and noting location of tracks, scat, and prey remains.

7. ASGECI or AECOM will conduct one weekend visit during the peak season (in June, July and August) to note differences in anthropogenic activity levels and wildlife behavior.

Piping Plover Nesting Activity Monitoring

1. ASGECI will pay particular attention to any observed plover courtship, breeding, or nesting behaviors. If piping plovers are actually observed nesting during surveys, all activities within the secured area of the plover nest (symbolic fence), including vegetation surveys will cease immediately. Both NJDEP and USFWS will be contacted within 24 hours of the observation and ASGECI and AECOM will assist in making all parties immediately aware of the "no driving" policy within the 300 foot vehicle buffer.

2. If plovers are determined to be nesting, ASGECI and AECOM will meet with the Agency POCs onsite to establish the surveying limitations, which will likely include surveying from outside symbolic fencing unless otherwise directed by Agency POC's.

3. ASGECI will identify the approximate location of the plover nest using GPS and estimating distances to nest. ASGECI and AECOM will make every effort to ensure plovers are not harmed by survey activity. Entrance into the secured areas will not occur unless permission is granted by the USFWS, NJDEP, and NJARNG POCs.

4. If funding permits, ASGECI and AECOM's site visit schedule will be adjusted from one visit per two weeks to five days per week with one weekend visit until the last plover chick has fledged. If funding is not available, ASGECI will be flexible as needed, prioritize plover monitoring efforts and identify efficiencies within the existing budget to maximize plover coverage. ASGECI will carefully coordinate with locals surveyors from AECOM and Wreck Pond Watershed Association to maximize survey coverage. This coordination may involve monitoring on alternating days or at maximum intervals (early morning/evening) on the same day.

5. During these visits, surveyors will monitor and record on monitoring report forms all behaviors, hatching dates, brood activity, and numbers as well as identify and minimize any potential threats to nesting birds. Surveyors will be vigilant in enforcing existing protections to plovers and will use their discretion to identify and prevent additional threats to plovers. In the event of unusual mobility outside of protection areas, ASGECI or AECOM will immediately contact NJDMAVA, NJDEP, and USFWS to identify and implement additional protections as needed.

6. The frequency of visits will be at its greatest close to plover hatching to assure that activity is immediately reported and that all protective measures are immediately implemented at this critical time. Observations will be made at a distance to avoid interference with plover nesting and rearing activities.

D. Seabeach Amaranth Surveys:

1. ASGECI will conduct vegetation surveys throughout the entire beach and dune area from the high tide line to the landward limit of the beach (dune line or seawall). Vegetation surveys shall occur during each site visit. In addition, ASGECI will coordinate a vegetation survey during the last week of June, third week of July, and between August 15 and September 15 with the Natural Resources, NJDEP, and USFWS POC's. ASGECI staff will follow a grid pattern to ensure full coverage of the beach. Any seabeach amaranth identified outside the protection areas will be immediately reported to USFWS and the appropriate Agency POCs. ASGECI will always keep additional fencing supplies available and be responsible for fencing these plants with symbolic fencing and providing a 3-meter (m) buffer for each plant.

2. ASGECI will make every effort to minimize impacts to the plant communities and wildlife during surveys. ASGECI will avoid trampling on dune grass and other vegetation during surveys. ASGECI will <u>not</u> survey for plants in the NPA or any other area if it is determined that piping plovers are nesting at that location. Plant surveys may continue in the NPA or other location once fledge notification is provided to ASGECI by ENSP and USFWS. Notification of fledging and allowance of surveys and other activities in restricted areas may only come from ENSP and USFWS.

3. ASGECI will locate, document in writing, photograph, and map by GPS seabeach amaranth and other rare plants. When possible, one GPS point will be taken for each individual plant. A specific code will be given to each data point indicating species name and specific data point number. Data points will be incorporated into the NJARNG GIS. If there is a high density of plants and individual mapping is not practical, plant locations may be mapped as polygons and the number of plants recorded.

   ASGECI will record the following information for each (or group) rare plant encountered during the survey: crown diameter (cm), flowering/fruiting status, damage, distance to disturbance (cm), type of disturbance, and evidence of damage from herbivory, drought, webworm, or fungus. In addition, changes observed to individual plants (such as damage

to previously identified healthy plants) shall be noted and recorded in both the GIS data and reports.

4. ASGECI will note general condition and imminent threats to rare vegetation including competition from associate or invasive species, evidence of foraging, foot traffic, or pests (fungus, herbivory, etc.). If applicable, additional data will be recorded including diameter of plant, flowering or fruiting status (see Appendix B).

5. ASGECI will install symbolic fencing and signs around all seabeach amaranth and seabeach knotweed plants and any other rare plants that may occur outside of the protection areas, allowing a 3-meter buffer around each plant or group of plants. Alternatives to this approach will be implemented in coordination with USFWS, if such fencing restricts routine use of the beach.

II. VEGETATIVE ASSESSMENT

A. Vegetative Survey Introduction

Proper beach dune and vegetation management is essential to provide suitable habitat for threatened and endangered species. To help determine trends in vegetation community structure in relation to habitat suitability for rare species at NGJTC, ASGECI will conduct a detailed vegetation analysis of the beach communities during the 2012 monitoring season. Part of this analysis includes a current determination of American beach grass cover within the plant communities at the NGJTC. Observations indicate that this species has substantially increased onsite since 1998. USFWS indicates that dense beach grass cover (over 50%) may reduce the probability of piping plover beach nesting and varying densities of vegetation (20% to 70%) may be optimal for key species including piping plovers, least terns, and rare plants such as seabeach amaranth. Results from the 2008-2010 vegetation surveys indicate that many of the crucial vegetation areas within the beach grass community are currently too dense for the key rare species. For the 2012 survey, ASGECI will closely follow the protocols established in 2010 to allow for direct comparison of data sets and the preliminary observation of potential topography and plant community trends.

The USFWS Atlantic Coast Piping Plover Recovery Plan (1996) encourages land managers to remove or reduce dense vegetation. The reduced vegetation reduces obstructions to piping plover nesting, foraging and chick movement. The Recovery Plan also discourages the planting of vegetation in potential or existing plover nesting habitat for beach stabilization. Piping plovers have been documented abandoning nest sites on Long Island, New York due to vegetation encroachment from beach grass stabilization projects (Wilcox 1959). According to USFWS recommendations, vegetation at nest sites should be low and sparse (Schwalbach 1988) or distributed in clumps (Cairns 1982; Prindiville-Gaines and Ryan 1988) to provide large areas of unvegetated habitat.

On stabilized beaches, periodic management of vegetation in piping plover nesting areas may be needed to provide such suitable areas of open beach interspersed with clumps of beach vegetation. The USFWS cites the following data in determining optimal cover conditions for

piping plover. Vegetative cover for nesting piping plovers of the Great Plains ranged from <10% up to 25% (Armbruster 1986; Faanes 1983). Vegetative cover within 12 meters from nest sites on Assateague Island (Maryland and Virginia) ranged from 7.2% to 17.4% (Patterson 1988). Similar results were reported on nourished beaches on Long Island, New York with 7.5 ± 1.7% vegetative cover around nests (Cohen *et al*. 2008). Fraser (2006) suggested approximately 5% vegetative cover may be ideal nesting habitat on Atlantic coast barrier island beaches.

Identifying cover, density, distribution and other characteristics of NGJTC dune vegetation will be critical in determining suitable management strategies. Management strategies may include the targeted reduction of dense vegetation in areas and the creation of a more clumped vegetation distribution within portions of the dunes. Uneven or sparse vegetation distribution has been found to correlate with higher reproductive success among piping plovers (Prindiville-Gaines and Ryan 1988). Piping plovers in Nova Scotia were found to nest on narrow beaches, where nests were located under clumps or tufts of beach grass which may allow the birds to avoid storm tides (Cairns 1982). The clumped grass arrangement may also provide protection from predators (Fraser 2006).

The USFWS, in its Sea Beach Amaranth Recovery Plan (1996), indicates that seabeach amaranth is intolerant of competition and therefore is absent from well-vegetated sites. The Plan specifically identifies a negative association with members of the beach grass (*Ammophila*) genus. Seabeach amaranth shares similar habitat with beach-nesting birds and is often found in areas managed for piping plovers. Based on the plant's preference of sites with lower vegetation densities, USFWS has determined that any vegetative management actions taken for the piping plover will likely benefit seabeach amaranth as well.

All activities will be conducted in coordination and approval of NJARNG, USFWS, and ENSP. Vegetation surveys will not occur within the NPA or any other area when beach nesting birds are present. As with the 2010 cover survey, vegetation and topographic surveys will be taken in late summer/early fall to A) Allow beach nesting birds to complete any nesting activities and B) Assure that the key representative beach vegetation is captured annually.

The 2012 Vegetative Assessment Survey will include the following as outlined in the Scope of Work:

- A quantitative vegetative cover analysis and other community metrics (listed in the attributes).

- A qualitative analysis of community health, plant vigor, impacts by invasive species including Asiatic sand sedge and various plant diseases and/or herbivory activities onsite.

- Conduct a literature review expanding upon information collected in 2010 and provide a discussion of appropriate beach vegetation management practices. Based on this review provide management proposals, required regulatory consultations and permitting requirements.

- Conduct a literature review of the relationship between topography and vegetative cover with regard to the NGJTC rare, threatened and endangered species.

- Identify the frequency, duration, severity and intensity of storm surges, and strong winds (particularly during fall and winter months) at the facility. This data will be a combination of data observed in the field and data provided by appropriate agencies such as National Oceanic and Atmospheric Administration (NOAA).

- Identify the mean high and low tide heights, particularly those tides that occur during new and full moons. ASGECI will GPS the storm surge tide line during the course of the season based on the highest tide from moon phase and/or storm and wave conditions.

- Determine the impacts of topography, storm and wind information to determine potential impacts to seabeach amaranth populations.

- All of this information will be incorporated into a Vegetative Assessment Survey Report and corresponding GIS Data.

- Copies of the Vegetative Assessment Survey Report will be provided to the NJDMAVA, USFWS, and the NJDEP ENSP for review. The report will include a hardcopy report, GIS and additional tables used in data compilation and analysis. Additional copies of the survey results will be provided to interested organizations or individuals at the discretion of the NJDMAVA.

B. Study Area and Sampling Methodology

To assure that our sample mean reflects the true population mean and can be directly compared to the 2010 data, several measures will be employed by ASGECI.

At the onset of the survey, perimeters of the study area will be reestablished using GPS locations recorded in 2010. This will be defined by the beach plant communities between the secondary shrub community and/or bulkhead wall at the NGJTC to the frontal edge of the foredune (where no vegetation is present). The study area is divided into three distinct management areas: the NPA, the SPA, and the Southern Beach Area (SBA). At the onset of the survey, accurate GPS coordinates of the boundaries of the study area will again be taken. For consistency purposes, these boundaries will be permanent for the duration of the 2012 survey and for future vegetative assessment surveys.

As previously mentioned, surveys will occur in late summer/early fall (post August 31, likely mid-September) when key vegetation is present and at maximum growth, and beach nesting birds are no longer onsite (to be confirmed with agencies). Based on 2010 results, it is estimated that the vegetation assessment will take approximately eight (8) full field days. ASGECI will attempt to collect all data within the smallest duration of time allowable. ASGECI will avoid collecting data during severe weather conditions such as high winds or lightning storms. Upon completion of the field surveys and the GPS collection of all transect and quadrat locations,

ASGECI will remove all survey materials from the site including transect markers, pin flags, lines, etc.

As with the 2010 study, the study area will be stratified via transects. The 2010 transect lines will be reestablished at the onset of the 2012 survey using previously established GPS coordinates. Data will be presented by transect and/or subtransect to address the community changes that that exist between the foredune and the trough and/or disturbed areas to the west. Dune troughs tend to have a higher diversity of plant species, including a variety of forbs and grasses uncommon or absent in the foredune, and therefore the data should be able to be analyzed both as a whole community and separately. The 16 original transects within the NGJTC beach area are identified in the table below.

A systematic sampling method will be employed in which a quadrat (sample unit) is established along line transects that intersect the foredune and dune trough subcommunities.

Table 1: Vegetation Study Transects

Study Area Section	Transect
NPA	NTA
NPA	NTB
NPA	NTC
NPA	NTD
NPA	NTE
SBA	SBTA
SBA	SBTB
SBA	SBTC
SBA	SBTD
SPA	STA
SPA	STB
SPA	STC
SPA	STD
SPA	STE
SPA	STF
SPA	STG

Muir et al (1997) and Gayton (Undated) outline methodologies for quadrat sampling and are two publications that will be utilized in determining appropriate methods and techniques of quadrat sampling at NGJTC.

The quadrat sampling methodology utilized in the 2010 study will be repeated. The quadrat frame will be laid out parallel and adjacent to the transect line. The quadrat will alternate between the right and left sides of the transect line. The frequency of sample units along the transects (distance between quadrants) and the number of transects is determined by calculating the required sample area to acquire a sufficient representation of the total population.

Performing both the transect and quadrat sampling process allows ASGECI to accurately and efficiently sample the entire plant community while still maintaining a significant degree of randomization in the sampling. As with the 2010 survey, ASGECI surveyors will use a randomized distance as a starting point and take subsequent quadrat points at equidistant lengths

along the transect. Although all transects and transect sections will be the same, the quadrat point itself will vary from the 2010 study. An adequate percentage of the population will be sampled to allow for this variation.

It is expected that a total of approximately 113 quadrat samples will be utilized (based on the 2010 study). The transect frame size will have an inside measurement of one (1) square meter (m^2) (Gauch 1982; Tiner 1999). The size of the quadrat may be increased to increase sample size and reduce the probability of boundary error. The quadrat frame itself is constructed using one inch PVC plastic and colored with alternate black and white decimeter markings to facilitate cover estimation. The center point of each of the quadrat points will be documented at the end of the vegetation survey through the use of GPS.

C. Ground Rules

To avoid error from variation in sampling and inconsistencies in estimation, ground rules consistent with the previous surveys (2008, 2009, 2010) will be reviewed and adhered to where required to remove some of the variability in sampling methodology.

Surveyor Qualifications
Lead surveyors involved will be qualified biologists with the ability to identify all species onsite and reduce the probability of identification error. It is expected that the same ASGECI surveyors will prepare and conduct the 2012 survey as previous surveys for consistency and efficiency purposes. The number of surveyors involved will be kept to a minimum to avoid bias. All methodologies will be reviewed and clearly communicated among and understood by all surveyors before the survey proceeds.

Practice
Upon each visit, surveyors will practice utilizing the quadrat and point sampling frames onsite to familiarize themselves with data collection and plot layout. Methodologies utilized from existing literature sources will be reviewed and clearly understood by all parties involved. At the start of the surveys, surveyors will carefully review and discuss the methodologies to assure consistency.

Data Collection
In addition to the attribute data collected onsite (see below), surveyors will collect general data at the start and finish of each survey session. Standardized survey forms for cover and species composition will be utilized. Log entries will be established for each quadrat. A single log will be utilized so different surveyors can review conditions under which data was previously collected, problems that occurred onsite, or methodology judgments that were made. All procedures will be addressed in great detail and included in the 2012 report.

In addition to the attribute data collected on the survey form general data to be collected includes the following:

- Date

- Time
- Temperature
- Wind Speed
- Cloud Cover
- Precipitation

The Quadrat Summary Form in Appendix C illustrates typical data that will be recorded for each quadrat. Each quadrat will be assigned an individual identification number, photographed from four (4) feet, and GPS coordinates taken for each center. For each quadrat, this same identification number will be utilized in the GPS data, photograph data, survey sheet data and log data.

Plant Removal
Plant removal for any purpose will not be permitted onsite. This includes for biomass determinations or for quadrat placement. Surveyors will avoid trampling or harming vegetation, particularly vegetation within the study quadrats. Surveyors will carefully free the plants from deposited sand when doing stem density counts.

Density Counts
What counts as an individual plant is clearly defined and understood by all surveyors. A stem is counted as the above ground tiller for grasses. For forbs, such as goldenrod and sea rocket, a single stem that branched above the sand at the time of growth is counted as one stem.

Boundary Decisions
The standardized quadrat boundary decision process utilized in 2010 will be understood by surveyors to avoid bias. For example, plants whose base falls under the frame of the quadrat will not be counted in density counts.

Point Intercept Decisions
Point intercept decisions for cover estimates made with point intercept methodology. This includes clear codes for what is considered a leaf or basal hit. One surveyor will make the judgment for all hits and one will record findings.

Rounding Error and Standardization of Measurements
Rounding at a predetermined digit will be utilized and understood by all surveyors.

Equipment Use
Equipment use standards will be followed for GPS utilization to ensure accuracy. This includes a significant number of satellites, a set number of sample intervals (40) and appropriate percent dilution of position (PDOP - geometrical strength of satellite positions) as outlined in the SOW. All surveyors will check all equipment including measuring tools for precision. This includes upkeep and regular examination of the quadrat grid. Where practicable, steel measuring tapes

will be used to avoid stretching which would result in inconsistent measurements. Weather measuring tools will be checked before surveys for accuracy. Cameras will be in working order. For consistency purposes, the same equipment (cameras, measuring tools, GPS and weather monitoring equipment) will be used for the length of the survey to the greatest extent practicable.

The following equipment is expected to be utilized for vegetation surveys:

- Digital Camera
- Trimble GPS Unit
- Kestrel 3000 Weather Meter
- Compass
- Nylon transect line
- Metal tape measures
- Quadrat (see description)
- Point Intercept metal rod (see description)
- Field Log
- Survey Forms
- Graph Paper
- Indelible Ink Pen/Lead Pencil
- Permanent markers
- Pocket calculator
- Pocket Lens
- Rebar metal stakes and flagging material (Transect markers)
- Tool kit (including mallet, hammer, sheetrock knife)
- Pin and tape flagging
- Electrical and duct tape

Regulations
No surveyors will enter protection areas unless cleared by the USFWS and ENSP. No surveys will occur in protection areas containing active beach-nesting birds. Surveyors will avoid conflicts with the range schedule by carefully planning survey dates in advance.

D. Attributes

ASGECI will collect the same attribute data utilizing the same methodology established in 2010. Upon completion of the survey and compilation of the 2012 data, ASGECI will analyze both data sets using appropriate statistical methods to determine trends between data sets. Some additional data may be collected during the 2012 season using previously established basic methods. Collection of additional data (such as shaft hits on point intercept) will not interfere with the accurate repeat of the 2010 study methodology.

Species Composition
ASGECI will determine the percentage contribution of each species to the beach vegetation. Percentages of each species to the total vegetation will be recorded within each quadrat. Methodology for determining percentage of each species will be conducted by using density methodology (see below). The dry-weight rank method will not be used as this method is potentially destructive to rare plants.

Biomass
ASGECI will utilize indirect methods to determine plant community biomass (in kg/ha and/or g/m) to assure that plants are not impacted during sampling. Biomass estimates will above ground estimates (forage mass) near the time of maximum production and will not involve clipping or removing plants.

ASGECI will estimate beach grass biomass in methods similar to the 2010 study. The method involves utilizing a combination of collected density data and plant weight data for the species provided by other studies. ASGECI will continue to conduct literature reviews and research non-invasive ways to refine and improve biomass estimation methods prior to the start of the 2012 survey.

Cover
Cover is expressed as a percentage value based on sampling in quadrats utilizing the Daubenmire Methodology as outlined in the US Fish and Wildlife Service's Fire Effects Monitoring Reference Guide (2006). Appendix C contains the 2012 Daubenmire data collection forms to be utilized in the field. The Daubenmire cover classes are shown in Table 1 below.

Table 2: Daubenmire Cover Classes

Cover Class	Range of Coverage	Midpoint
1	1-5%	2.5%
2	5-25%	15.0%
3	25-50%	37.5%
4	50-75%	62.5%
5	75-95%	85.0%
6	95-100%	97.5%

- Two surveyors will estimate cover for each species as a unit within the quadrat by observing the frame from directly above and estimating the polygon of the canopy of the plant. Surveyors will individually (and silently) determine percentages and then compare. If cover class discrepancies occur, surveyors may repeat the process together and openly discuss (discrepancies in 2010 were generally minor). ASGECI will record both estimated surveyor percentages and determined cover class.

- Canopies extending over the quadrat, but rooted outside of the frame, will be counted.

- Data will be recorded by quadrat, by species, and by cover class.

- By collecting data in the late summer, we will be collecting data at the maximum growth period.

- The presence of bare ground within the quadrat will indicate a value less than 100% vegetation cover. As each species is examined individually in situations where each species overlap, estimates may exceed 100%.

For comparative purposes, a second more objective methodology will again be used to determine cover. This involves point intercept methodology as defined by USDA (Caratti 2006). This method is particularly useful in grassland environments, such as dunes. Although it is less effective at detecting plants occurring at very low frequencies, it removes much of the subjectivity of estimation in comparison to the Daubenmire methodology.

Utilizing the established line transects specified above, ASGECI will utilize the point intercept methodology by sampling at 0.5 meter (m) intervals along the string transect using a pin guided vertically to the ground. The sampling pins are 0.25-inch diameter steel pins approximately 1 m long. The basal areas of species intercepted or adjacent to (less than 1") the pin point will be recorded or (bare) ground cover will be recorded. Non-plant ground cover types will be general and standardized to avoid error. These will include bulkhead, jetty, etc. Based on the number of intercepts in 2010, ASGECI expects to take approximately 4,400 sample points.

ASGECI surveyors will also record leaf hits along the shaft of the pin to provide an alternative cover estimation method directly comparable to the cover class estimation method. Any leaf contact with the pin shaft will be counted as a "hit" for that species.

Density

Density will be determined by counting the number of individual plants within each quadrat within the study area. This is the most effective methodology for determining species composition within the sample and population. Data collected will be represented as tillers or stems/m^2 (as identified in the SOW).

Frequency

Frequency data is collected by using the quadrats previously described. The frequency of each species represented is expressed as a percentage of the quadrats in which that species was found.

Plant Vigor
For each species in the sample quadrats, plant health including observed parasites, abnormal growth, dieback, mammal herbivory or other anomalies will be recorded on the survey forms and in the log. ASGECI will make vigor comparisons between 2010 and 2012 data sets to identify potential trends.

Habitat Quality
The overall habitat quality of the plant communities will be documented. Habitat quality is a qualitative documentation of the plant community conditions onsite to support various species. Threats to habitat quality, including invasive species, herbivory, trash deposition, human presence (walking and trampling) within the communities, erosion, and other factors, will be identified and recorded on the survey forms and in the log.

Soil Conditions
Single soil samples from a random selection of quadrats within each subsection will be collected to determine soil parameters, including pH, soluble salts, organic matter, organic carbon, Kjeldahl nitrogen and grain size using USDA sand sieve analysis. Individual sample sizes will be approximately 250 milliliter (ml) taken from the surface to 6-inches below surface at a set location (i.e. center point) within each quadrat. The number of samples will be the amount required to get an accurate representation of community soil characteristics. Soil samples will be collected in clearly marked (with quadrat #, collector, date, etc.) sterilized receptacles. Soils will be tested by Rutgers Cooperative Extension.

Erosion Potential
As part of the habitat quality analysis, surveyors will make observations and document (verbally and with photographs) erosion impacts and potential. As part of this analysis wind speeds will be calculated at a set height at random locations within both communities at random times throughout the survey period. Data from the topographic survey, the location of mean and extreme tides, and available data from government sources, such as the NOAA will be incorporated into the study along with onsite observations to determine erosion potential at locations within the study area.

III. TOPOGRAPHIC SURVEY

A topographic analysis of the entire beach area will be conducted as part of the vegetative assessment survey. The topographic analysis will allow us to determine correlations between topography and the various characteristics of the plant communities existing onsite and allow us to better determine optimal conditions for rare plant species development. Comparison of the 2012 survey to the 2010 survey will result in better identification of erosion and deposition areas onsite.

The surveyed beach area will extend from the mean low water mark to the westward limit of the beach (dune bulkhead and/or secondary shrub dune community) and northern and southern facility boundaries. The topographic survey will be conducted when there are no restrictions in

the protection areas due to the presence of beach nesting birds. The surveys will be coordinated with facility staff to avoid range schedule conflicts.

- Pending funding, the topographic survey will be repeated annually at the same time of the year to determine fluctuations in topography due to erosion from wind and tides.
- The topographic survey will be conducted by a New Jersey licensed land surveyor.
- The survey will include one-foot contours, spot elevations, beach height, width, and slope.
- This data will be presented in GIS and CADD format.
- Site features including existing fencing, bulkheads, pilings and other physical features will be incorporated into the survey and represented on the deliverable (plan).
- The 2010 benchmark will be reestablished onsite to perform additional future surveys.

IV. PREDATOR POPULATION STUDY

A. Introduction

The New Jersey Army National Guard (NJARNG) has been working cooperatively with the United States Fish and Wildlife Services (USFWS), New Jersey Department of Environmental Protection Endangered (NJDEP) Non-Game Species Program (ENSP), and the Wreck Pond Watershed Association (WPWA) to monitor and manage listed species on the National Guard Joint Training Center (NGJTC), Sea Girt's beach since 2000. The WPWA is a local non-governmental environmental organization the NGJTC has partnered with to supplement its own rare species monitoring program and promote awareness of the various beach nesting birds. Management procedures and protection measures have been developed and implemented through the formal consultation process with USFWS and significant support from ENSP. These procedures are documented in various sources including:

- Integrated Natural Resources Management Plan, Sea Girt National Guard Joint Training Center (NGJTC) dated February 2006;
- NJDEP Beach Raking Permit dated May 2009, and
- USFWS consultation letter dated 5 August 2008.

Within the NGJTC, Sea Girt site, piping plover, *Charadrius melodus,* and least terns, *Sterna antillarum,* nest along the shoreline. Piping plover are federally listed endangered species. Both the plover and tern are New Jersey-listed endangered species. Both of these species, especially chicks and eggs, are potential prey for mammalian predators. As such, in order to meet the goals of the INRMP, it is necessary to ascertain the onsite predator population and how developed and undeveloped areas adjacent to the NGJTC, Sea Girt property, support the local mammalian population.

Predator Population Survey
Detailed predator population studies have not been conducted at the NGJTC, Sea Girt, to date. However, the INRMP identified a fox den between the dunes and the range complex while the 2009 Rare Species Summary report noted fox activity was widespread throughout the NGJTC, Sea Girt's beach with the back portions of the NPA beach and adjacent secondary dune as an area of high activity. Therefore, in order to develop a successful and efficient predator control strategy, a predator population survey will be conducted annually.

Given that the NJDEP erects predator exclosures around nests to reduce predation of the eggs from gulls and crows, the predator population survey will be limited to foxes, cats, and raccoons.

The predator population survey will consist of two efforts:

1) Mammal population survey of foxes, cats, and raccoons; and
2) Fox radio collar of survey

B. Mammal Population Survey

The Mammal Population Survey (MPS) will employ non-invasive survey methods specifically targeted to identify fox, cat, and raccoon that may be on site. Other predatory mammals (e.g., feral dogs, etc.) that are observed during the survey will be noted. The non-invasive survey methods would include the following:

- Den Location/Travel Path Survey
- Camera Traps
- Nocturnal/Searchlight Survey
- Sand plots and track plates
- Pet Survey
- Snow Tracking

A description of these survey techniques are provided in the subchapters below. The variety of surveys is necessary as past studies have found that there is an increased chance of detection for various sized mammals when more than one detection technique is used (Gomper et al. 2006). Due to the different survey methods that will be used, a schedule of all survey methods is presented in Chapter 3. The survey schedule has been designed to accomplish multiple tasks (when possible) on the same day to reduce costs.

DEN LOCATION/TRAVEL PATH SURVEY

Purpose
The purpose of the Den Location/Travel Path Survey (DL/TPS) is to provide scientists with the following information:

- The number of active dens that occur seasonally on NGJTC, Sea Girt.

- Location and intensity of mammal activity (i.e., paths used to travel, hunting areas, etc.) that occur seasonally on NGJTC, Sea Girt.
- Provide necessary information for planning other surveys that would occur in concert with the DL/TPS (e.g., camera trap survey, etc.)

Location
The DL/TPS will occur throughout the NGJTC, Sea Girt (Figure 1). Also, up to two discreet areas offsite may be investigated if data gleaned from the radio collar fox survey (see subchapter 2.2) warrants. Offsite investigations would be limited to an investigation of the presence/absence of the collared fox(s) at Crescent Park and Wreck Pond (area east of 1st Avenue).

Measurements
Scientists will traverse NGJTC, Sea Girt looking for signs of mammal dens, travel paths, or other evidence (e.g., paw prints, scat, digging, prey remains, etc.). When located, the scientists will record the location of mammal dens or other mammal evidence with a hand held global positioning system (GPS) device and identify the evidence per taxa. Dens will be visually inspected to determine if they are actively be used. Travel paths will be traversed and recorded with a GPS track log or way-point feature. Scientists will record a back up of all data in water proof field books and sketch maps.

For all surveys, weather data will be collected for each survey (air temperature, rain or snow fall, wind speed, etc.). Additional weather data may also be recorded based on observations from the nearest weather station for which data are available (likely the weather station at Sea Girt operated by the Stevens Institute). Such measurements may include wind direction, cloud cover, precipitation, and visibility.

Frequency
During the first season of the survey, the scientists will spend two days collecting the data identified in subchapter 2.1.1.3. For each subsequent season, one day would be devoted to confirming the previous collected data and searching the site for additional dens, etc.

CAMERA TRAPS; NOCTURNAL/SEARCHLIGHT SURVEYS; AND TRACK PLATES

Purpose
The goal of these surveys is to identify the variety of predatory mammals that occur on site.

Location
The surveys will occur throughout the NGJTC, Sea Girt (Figure 1).

Measurements

Camera Traps
Using the information gleaned from the DL/TPS (Subchapter 2.1.1), scientists will install five camera recorders to further document mammalian activity. The protocol for this survey is as follows.

1. Scientists will select five locations where mammals are known to occur. Each camera trap location will be recorded by GPS.

2. At each of the five locations, scientists will erect a game camera (with flash and/or infrared capabilities) capable of collecting photos over a 24-hour period.

3. In the evening, prior to sundown, the scientists will place bait or scent spray within the camera's field of view. Baiting of cameras would occur over a 3-day period each season (see subchapter 2.1.2.4 for schedule of activities).

4. At two select locations on site, the cameras will be left in place for the entire year. These cameras would be set to capture photos only in the evening hours.

5. The captured photos will be saved and later analyzed in an office setting.

Nocturnal / Searchlight Surveys

Coinciding with the camera trap surveys, scientists will perform nocturnal searchlight surveys using the following methods:

Searches would start approximately 1 hour after sundown and last for several hours.

Using information gleaned from the DL/TPS, scientists will identify transects within and along the boundary of NGJTC, Sea Girt. While traversing the transects, scientists will stop, remain silent for a several minutes, and scan the area with a night vision monocle and identify all mammals observed. Scientists would then illuminate their searchlights and sweep their location by slowly rotating 360 degrees.

If a mammal is sighted, the organism will be identified, and location and activity will be recorded. Species will be determined by either visually seeing the entire animal or noting the reflection in the mammal's eyes.

So as to limit the amount of times scientists would need to illuminate their lights for foot travel and potentially startle predatory mammals, surveys would be timed to occur during periods of a full moon to provide the scientists additional ambient light.

Track Plates

1. Scientists will construct track plates using materials readily available in art supply stores and hardware stores (i.e., acetate sheets, graphite powder, ethyl alcohol and mineral oil) (Cary Institute, 2012).

2. Five track plates will be placed in areas where mammals travel within NGJTC, Sea Girt (scientists may also periodically place track plates within the view shed of the camera traps to confirm identification of mammals). The location of each track plate, on each survey day, will be recorded by GPS.

3. On the first day of the survey, the plate would be baited with chicken or other meat product suitable to attract a predatory mammal.

4. Each subsequent day of the survey, the track plate would be photographed and investigated for the presence of mammals. Tracks would be recorded in the field and identified using mammal track guide books.

Frequency
Each season, camera traps, nocturnal and search light surveys, and track plate surveys will be conducted over an intensive, four-consecutive day period. In addition, an additional nocturnal survey will also be conducted once a month (during a separate week) in conjunction with a radio collar fox study (see chapters 2.2 and 3).

PET SURVEY

Purpose
The pet survey will allow scientists to ascertain the number of potential domesticated predators within the vicinity of NGJTC, Sea Girt.

Location
The Boroughs of Sea Girt and Manasquan.

Measurements
AECOM will contact the Boroughs of Sea Girt and Manasquan to determine the number of licensed cat or dog owners. Other data such as if the cat is kept in the house rather than let out shall be gleaned from public records. Under this task, no interviews will be conducted with pet owners. Collected data on pets will be presented and evaluated in the predator population report.

Frequency
Pet surveys will occur once a year.

SNOW TRACKING

Purpose
Snow tracking will be a key tool in determining fox presence/absence, feeding areas, and movement routes on and off site of predatory mammals. Snow tracking provides supplemental data that radio tracking may not always be able to detect or confirm (Van Etten, 2007). The data gleaned from the snow track surveys, will complement the other surveys (e.g., camera trap, radio collar [see subchapter 2.2], etc.) to obtain a complete picture of mammal usage of NGJTC, Sea Girt during the colder months of the year.

Location
The surveys will occur throughout the NGJTC, Sea Girt (Figure 1).

Measurements

1. After a snow fall event, scientists will search the NGJTC, Sea Girt and identify predatory mammal tracks.

2. When observed, scientists will record the location with a hand-held GPS.

3. Scientists will traverse the tracks and note the number of sets of tracks and other mammal evidence (e.g., prey remains, scat, etc.). Also, if the tracks lead off the NGJTC, Sea Girt property, scientists will observe the track direction to ascertain the likely destination. If it appears fox tracks are leading to the offsite locations (i.e., Wreck pond east of 1st Ave and/or Crescent Park) scientist will determine the presence/absence of radio collared foxes in those locations via telemetry (see Chapter 2.2). Note, scientists will not traverse private property.

Frequency

Winter investigations would be timed to coincide with up to two suitable snow fall events. The suitability of a snowfall event is determined by the amount of snow and ability of the scientist to accurately identify and mammal tracks. Very deep snow (greater than 6 inches) or very light accumulations (that may melt during the investigation period) would be considered unsuitable snowfall events. Investigations would occur during the daylight hours, the day after a snow fall event.

C. Radio Collar Study of Red Fox

Purpose

The radio collar study will be implemented to determine home range of the red fox. The survey will be conducted over the course of a year and designed to determine seasonal (i.e. winter vs. summer) and temporal (i.e. dawn vs. dusk) differences within the target predator population.

Location

The survey will occur throughout the NGJTC, Sea Girt (Figure 1) and two offsite locations: Crescent Park and Wreck Pond (area east of 1st Avenue).

Measurements

Up to five foxes will be collared and tracked during the one-year survey. Foxes would be trapped with baited box traps or other suitable devices.

Biological Measurements

Each trapped fox will be transported to a nearby animal hospital and sedated by a veterinarian. After the sedative has taken effect, the scientists would record the following measurements:

- Weight – the fox will be placed in a canvas bag and weighed using a hand-held scale.
- Age – estimated by tooth wear and coat color (graying of coat, etc.).
- Sex – observations of the presence of male or female genitals.
- Body size - total length, height, chest size will be measured to nearest centimeter. Measurements based on Cavallinni, 1995.

- Tail length – measured with a board ruler to the nearest millimeter.
- Neck size - measured with a flexible tape to the nearest millimeter.
- Hind foot length – measured using a caliper, recorded to the nearest millimeter.
- Canine length – using a caliper, recorded to the nearest millimeter.
- General health –scientists familiar with mammalian physiology will assess external condition of fox.
- Affix ear tag.
- Any other notable information will be recorded.

Foxes will be released at their original capture point.

Each collar is affixed with an identification tag that indicates that if the collar is found, the Sea Girt Facility should be contacted. Contact information and phone number for the facility are provided on the collar.

D. Radio Telemetry Tracking

After the measurements identified above are completed, the scientists will affix a VHF radio collar with a mortality sensor. During each month, scientists would traverse NGJTC, Sea Girt, and using radio telemetry data to ascertain the foxes presence/absence on site. If collared foxes are not located within the NGJTC, the two off site locations (i.e. Crescent Park and Wreck Pond area east of 1st Avenue) will be investigated.

It should be noted that prior to the radio telemetry study, AECOM personnel will notify the local police that they are performing radio telemetry studies. Descriptions of the scientists and their vehicle will be provided to the police.

Radio telemetry would occur as per the methods below. Methods were adapted from literature pertaining to the radio telemetry tracking of foxes (Perrinne, 2005; NSW, 2012, etc.):

1. Scientist will inspect the transmitters and receivers to make sure they are operating properly prior to trapping and record each collar's frequency
2. Attach the radio collar around neck of fox.
3. Allow the foxes to become accustomed to the radio-collars and initiate tracking of the fox at least 72 hours after capture.
4. When tracking the fox, first sweep the area with the antenna receiver. Once the signal is obtained follow the transmitted signal's increasing strength. The transmitter emits a pulse that is recordable approximately for one mile. In order to prevent false readings from other transmission sources from developed areas, scientists would first attempt to face the ocean when recording the presence of fox.
5. Once the fox's position has been located, record the position. Also record time, habitat and animal behavior.
6. The scientist should attempt to locate the fox's position every hour for duration of tracking session. If time permits, the scientist would attempt to record the foxes' position at a greater frequency than once an hour.

Frequency

It is assumed that no more than five foxes will be trapped and collared. Each month scientists will ascertain the foxes' positions using radio telemetry methods. Telemetry studies would occur in conjunction with the nocturnal mammal surveys and again during a dedicated telemetry study nights / mornings. The dedicated nights/mornings would occur approximately two weeks before or after the nocturnal survey in order to permit the locating of foxes on an approximate bi-weekly schedule throughout the year. During the snow track survey, if fox tracks lead off site, scientists will visit offsite locations to determine the fox presence on those sites.

At the end of the year-long survey, the scientists would attempt to collect the radio collars by setting traps for three trap nights. If a collared fox is trapped, the collar would be removed and the fox released. Also, should the National Guard initiate a future predator removal program, AECOM scientists would advise as to the likely location of collared foxes to facilitate the capturing of the collared foxes by regulatory agency personnel who would subsequently remove the collars.

Schedule of Activities

The table below identifies mammal survey events that would occur on NGJTC, Sea Girt.

Table 3 : Mammal Survey Events and Schedule

Sept 2012-July 2013	DL/TPS and Camera Trap, Tract Plate, Nocturnal Survey[2] and Snow Tracking[3]	Dedicated Monthly Fox Night / Morning Telemetry Survey [4]
Sept[1]	See notes	
Oct[5]	Three nights	Two nights; two mornings
Nov	One night	One night
Dec	One night	One night
Jan / Feb [6]	Four nights and two days of snow tracking	Two nights; two mornings
Mar	One night	One night
Apr	One night	One night
May	Three nights	Two nights; two mornings
June	One night	One night
July	Three nights	Two nights; two mornings
Aug	One night	One night

Notes:

[1] Initial one-day site visit would also occur as well as one nocturnal survey night.

[2] Seasonal mammal survey would be timed to occur during periods of a full moon.

[3] Snow tracking would occur whenever there is a suitable snow fall. For display purposes Jan / Feb are identified.

[4] Night telemetry would begin in the evening approximately three hours before sundown. Morning surveys would begin approximately one hour before sunrise.

Table 3 : Mammal Survey Events and Schedule		
Sept 2012-July 2013	**DL/TPS and Camera Trap, Tract Plate, Nocturnal Survey[2] and Snow Tracking[3]**	**Dedicated Monthly Fox Night / Morning Telemetry Survey [4]**

[5] Some dedicated telemetry nights / mornings may be shifted into November depending on success and speed of fox trapping.
[6] Total survey dates for both months combined. Survey dates during these months are flexible so that scientists may select the optimum survey days that reflect typical winter conditions.

V. RESIDENT CANADA GEESE HAZING

A. Background

Although disease transmission is not well documented to humans, Canada goose feces may contain several zoonotic pathogens potentially harmful to humans, including *Cryptosporidium*; Toxoplasmosis; *Giardia*; various bacteria, including *Escherichia coli* (E. coli), *Listeria*, *Pasteurella*, *Salmonella*, *Psitticosis*, and *Campylobacter jejuni*; viruses, including avian influenza and Encephalatic viruses; and histoplasmosis fungi (ICFWC 2010). There are obvious quality of life and ecological hazards associated with the presence of resident goose as well, including aesthetic and sanitary issues, eutrophication (oxygen depletion) of water bodies, trampling and suppression of vegetation growth and subsequent erosion (ICFWC, 2010).

A single Canada goose is capable of producing up to 1.5 pounds of feces per day and may defecate every 20 minutes. When multiplied by dozens, hundreds or even thousands of resident and migratory geese, it will result in a consistent presence of high densities of goose feces within habitats conducive to the species. NGJTC currently has a condition similar to this, particularly during the resident season of April to August. At minimum, several dozen resident Canada geese (*Branta canadensis*) breed at the NGJTC facility during the resident season (NGJTC Staff, ASGECI observation). This population is currently creating unfavorable conditions for NGJTC staff and visitors in several locations.

The most intensive period for resident geese at the facility is between April and July when the geese are nesting and rearing young. Many of the nests occur within the vicinity of the bulkhead at Stockton Lake, but are frequently observed throughout the facility (Gary Schmitz, Personal Communication). It is noted that the geese tend to concentrate around the bulkhead and open athletic fields during hours of heavy activity, but disperse at night and on weekends (off hours) to high traffic areas throughout the facility when there is less regular disturbance.

In addition to the resident population, there is a migrant/wintering population of Canada geese and Atlantic brant (*Branta bernicula*) that use the facility, during wintering and migratory periods, goose flocks of several hundred (mixed or single goose species) may be observed at the facility between November and March. These migratory populations frequently move between the fields and open grassy areas of the facility and the waters of Stockton Lake, which they utilize for foraging (ASGECI, AECOM, Personal Observation).

Removal attempts of the resident population were made by a contractor hired by NGJTC in 2011 with limited success. Although adults and chicks were initially removed offsite, the resident geese returned after approximately one month (Gary Schmitz, Personal Communication). Because the geese create a consistent nuisance to NGJTC staff and visitors and create a sanitary/health hazard through their droppings, efforts are ongoing to control the resident population. Part of this effort includes the implementation of a long term resident goose control program that involves consistent hazing, egg addling or oiling, possible removal of birds from the facility, and monitoring to determine program success.

B. Hazing Methodologies

1. ASGECI has contracted Goose Chasers, local goose control specialists, to harass resident goose populations through hazing techniques. Other techniques, such as egg addling or goose removal, will be considered as needed.

2. The initial hazing procedures will involve the use of dogs (border collies) to harass resident geese. These dogs are specialized and highly trained to focus exclusively on geese and will avoid harassment of other species using the fields, such as killdeer. Dogs will only be permitted to move within the goose habitats onsite and will not enter the beach areas at any times. The facility managers will be made aware in advance of all visits and the presence of the dogs onsite.

3. Other techniques, such as green laser pointing or use of noise, will be considered and established as needed.

4. Hazing techniques will take into account careful consideration of other desirable wildlife species, such as migratory shorebirds, whose presence may overlap the presence of resident geese in the grass habitats. The contractor will be cognizant of the rare, endangered and unique species onsite and will take necessary measures to avoid displacement or harassment of these species during the goose hazing process.

5. Harassment sessions will last until resident geese have left the site. Initial hazing may involve multiple clearing sessions on a daily basis with follow up sessions as needed. Harassment of geese will occur during the entire duration of the molting period (mid-June to mid-August). Harassment will occur randomly and as needed throughout the day. Harassment of wintering or migratory populations, while allowed with proper permitting, will not be initially considered and would only occur after consultation with NJDMAVA, NJDEP, and USFWS.

6. Proper permitting, including depredation permits from USFWS, will be acquired for the NGJTC site prior to the commencement of any goose hazing, egg addling, or removal activities.

7. The Contractor will employ egg addling as needed during the nesting period (between April and July).

C. Monitoring Protocols

To determine the success of hazing techniques and other measures employed at NGJTC, ASGECI will implement a qualitative and quantitative monitoring program of resident goose populations before, during, and after controls have been established. Success will be considered when a 30% reduction in resident goose populations is documented on an annual basis.

ASGECI will establish a series of transects (minimally 10), measuring 100 feet by six (6) feet, at the NGJTC. This transect methodology is a modified version of one established by USDA (2008) for Canada goose monitoring in Orange County, New York. Transects will be used as an indirect method for monitoring the densities of goose feces and effectiveness of hazing, egg addling, or other control methods employed.

Transects will be located throughout the facility in areas conducive to Canada geese nesting and foraging (maintained areas and grassy habitats), specifically within the ball fields, along the Stockton Lake bulkhead, and between buildings in more urbanized areas. Transects will be placed in consultation and approval with NGJTC staff. Additional transects will be established in high traffic areas and areas identified as problematic by NGJTC.

Transects will be permanent in nature so data can be compared seasonally and from year to year. Transect points will be subtly marked with spray paint or similar method and will be designed to not interfere with regular traffic, mowing, or other activities at the facility. During the actual counting of feces, stakes and string will be used for precise transect determination.

From April to September, transects will be checked at regular intervals (on a weekly basis). Weekly monitoring should coincide with future surveys for direct comparison.

During each visit, stakes and string will be set up along the marked transect and all feces located within each transect will be counted, including feces located partially within transects. Fecal matter measuring greater than or equal to 1.3 centimeter (cm) will be counted (USDA 2008). After all feces are counted within the corresponding transect, the transect area will be raked clean to avoid recounting at later sessions.

All transects will be established using GPS (according to standards in the SOW) for relocation purposes and for inclusion in appropriate facility mapping in the Study Report. All data from the transects will be entered into the GIS database under the appropriate fields.

During days when transect data is collected, a facility-wide goose count will be preformed by ASGECI surveyors. This survey includes onsite geese, nests, egg numbers, juvenile numbers, and flyovers (during appropriate season). All activities will be photo documented. All behaviors will be recorded, including breeding, aggression, foraging, loafing, sleeping, etc. Surveyors will also document geese at various times, including the early morning and the evening, to document movements of geese throughout the day.

D. SUMMARY REPORT

After completion of the molting season for 2013 and ASGECI has completed one year's worth of hazing and data collection, ASGECI will prepare a summary report (as part of the final summary report) on the NGJTC goose population and effectiveness of hazing. This report will include the following:

- A description of methodologies and protocols used and adapted field techniques.
- Qualitative and quantitative data on Canada goose populations at the facility, including pre- and post-hazing and population control. This includes fecal densities at various locations and numbers of resident geese and nests observed.
- Information on migratory goose and brant populations observed.
- Data on the numbers of geese removed and changes in fecal densities.
- A summary of results and further recommendations to consider, such as possible changes to vegetation in key problem areas (i.e. use of warm season grasses or woody vegetation), culling, or additional harassment techniques.

E. SCHEDULE OF ACTIVITIES

Below is a preliminary schedule for July 16, 2012 through August 15, 2013.

Preliminary Schedule of Activities for 2012

Week of July 16, 2012: ASGECI will begin establishing field transects to monitor goose feces densities at various locations.

July 16-30, 2012: ASGECI will begin collecting weekly baseline data regarding resident goose populations, including fecal densities and counts of geese onsite (minimum two sessions).

July 20, 2012: ASGECI will attend a field meeting with Goose Chasers (Contractor) to establish conditions and locations of activities. The meeting will also finalize the schedule of initial visits.

July 30-August 15, 2012: Contractor will begin initial clearing techniques using dogs, as needed, on a daily basis. The frequency of hazing activities will be based on the presence of geese onsite.

July 30-August 15, 2012: ASGECI will continue monitoring of feces and resident geese onsite on a weekly basis.

Week of August 30, 2012: ASGECI will conduct a post-molting visit to assess the goose population and monitoring. ASGECI will arrange a conference call with the Contractor, NGJTC

facility manager, and NJDMAVA to discuss the success of the activities thus far and future control considerations.

August 15-November 30, 2012: ASGECI will conduct biweekly monitoring of goose populations, including any remaining geese (post-hazing) and other resident or transient geese counts and fecal counts on transects.

December 2012: ASGECI will prepare a Summary Report describing goose monitoring activities and controls implemented to date.

Preliminary Schedule of Activities for 2013

January-March 2013: Several visits will occur to document wintering populations of geese and conduct fecal counts on transects.

April–August 15, 2013: Egg addling and harassment techniques will be implemented as needed on resident goose populations. ASGECI will conduct weekly evaluation of goose feces densities during this period.

September 2013: ASCECI will prepare a Summary Report for the complete hazing season with one year's worth of data and control measures. The report will include a discussion on the first year's effectiveness of the program and future considerations.

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APPENDIX A

Sample Bird Survey Data Sheet

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields & Stockton Lake at NGJTC
Surveyor: K. Quaglia

Date: 6/8/12

Time: Arrive: 9:35 AM
Leave: 1:15 PM

Temperature: 69°F to 79.9°F

Conditions: Clear; winds from west at 6 mph (max gusts of 20 mph)

Rainfall Today (time/inches): none

Most Recent Rain Event: 6/7/12 - 0.08"

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

- Piping plover (Federally Threatened, State Endangered): From 11:40 am until 12:30 pm one piping plover (thick incomplete neckband) was observed on the NGJTC beach within the storm wrack line to the north of the Northern Protection Area (NPA). The plover then moved into the NPA. The plover did not perform a nest exchange while I was there; it was merely foraging and resting on the beach.
- Least Tern (State Endangered): At approximately 12:20 pm a least tern was observed flying from the Atlantic Ocean over the NGJTC property in the direction of Stockton Lake.
- Osprey (State Threatened-breeding): At 9:35 am an adult osprey was observed on the nest on the cell tower. A significant amount of movement could be seen down inside the nest. At 9:56 am an adult osprey was observed perched on an electric pole across from the campground eating a fish. At 1:00 pm one adult osprey and one chick were observed in the nest on the cell tower.

Potential Wildlife Threats Observed:

- A very large pit was dug by humans in the Southern Protection Area (SPA). Multiple human footprints were observed around the pit and throughout the front portion of the SPA.
- The two southern-most protection area poles of the SPA were down upon my

arrival to the site. It did not appear that the tide had been up far enough to wash them out. Therefore, it is believed that this was the result of human disturbance.

- Fox and dog tracks were observed throughout the beach and protection areas. Additionally, human tracks were observed entering and exiting both the SPA and the NPA.

Additional Wildlife Observed:

Beach:
Ghost crab, black-bellied plovers, American oystercatchers (State Special Concern), great black-backed gulls, killdeer, mourning doves, laughing gull, and rough-winged swallow.

Stockton Lake:
Fish crow, red-winged blackbird, and great black-backed gull.

Wetlands:
Fish crow, mallard ducks, killdeer, American robin, red-winged blackbird, semipalmated sandpipers (State Special Concern), snowy egret [State Special Concern (breeding)], and tree swallow.

Fields:
Mallard (with 4 ducklings), Canada geese, killdeer, mourning doves, Eastern cottontail rabbit, and house finch.

Dunes:
Brown thrasher [State Special Concern (breeding)], red-winged blackbird, American robin, catbird, house finch, and Northern cardinal.

Surrounding Building Areas:
Northern mockingbird, American robin, European starling, mourning dove, killdeer, fish crow, Canada geese, groundhog, house sparrow, and pigeon.

Additional Notes/Activities:

- No nesting least terns were observed on the NGJTC beaches. Prior site visits and observations from Pam of NJDEP ENSP noted that other least tern nests had been predated by fox. Additionally, Melissa Smith of AECOM also previously noted a significant amount of gull activity near the last remaining least tern nest within the NPA. It is likely that either fox or gull predation was the cause of the last least tern nest failure.
- No vehicle tracks were observed in front of the NPA. A lifeguard on an ATV was observed utilizing the alternate access route.
- The area in front of the SPA was raked (entire beach west to the SPA and north up to the Southern Beach Access entrance).

General Maintenance Tasks and Issues:

- I fixed the roping and two southern-most protection area poles of the SPA.
- I moved the "No Vehicle" sign that was previously installed that was located along the Northern Beach Access road farther out onto the beach.
- No overflowing garbage was observed around trash containers adjacent to the beach parking lots.

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APPENDIX B

Sample Rare Plant Survey Data Sheet

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: Kerri Quaglia

Date: 6/8/12

Time: Arrive: 9:35 AM
Leave: 1:15 PM

Temperature: 69°F to 79.9°F

Conditions: Clear; winds from west at 6 mph (max gusts of 20 mph)

Rainfall Today (time/inches): none

Most Recent Rain Event: 6/7/12 - 0.08"

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
A survey of the beach for seabeach amaranth (Federally Threatened) and other rare plants was not performed due to the presence of beach nesting birds.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need to occur to see if Asiatic Sand Sedge spreads this season.

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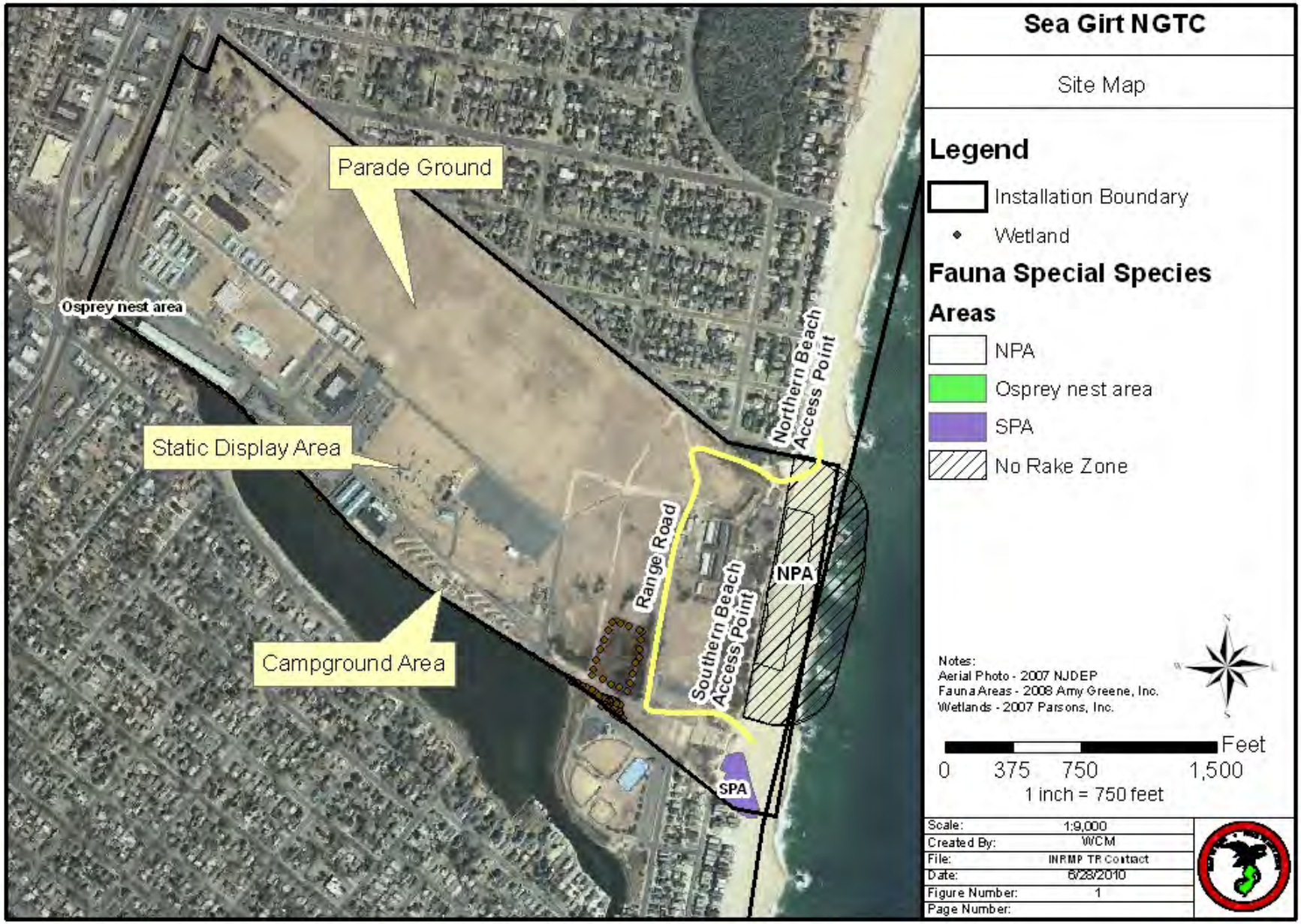
APPENDIX C

Site Location and Study Area Figures


Parade Ground
Osprey nest area
Static Display Area
Campground Area
Range Road
Northern Beach Access Point
Southern Beach Access Point
NPA
SPA
Sea Girt NGTC
Site Map
Legend
Installation Boundary
Wetland
Fauna Special Species Areas
NPA
Osprey nest area
SPA
No Rake Zone
Notes:
Aerial Photo - 2007 NJDEP
Fauna Areas - 2008 Amy Greene, Inc.
Wetlands - 2007 Parsons, Inc.
Feet
0 375 750 1,500
1 inch = 750 feet
Scale: 1:9,000
Created By: WCM
File: INRMP TR Contact
Date: 6/28/2010
Figure Number: 1
Page Number:

Legend

- Installation Boundary
- 300 ft Vehicle Buffer
- No Rake Zone
- Northern Protection Area
- Southern Protection Area
- Primary Dune
- Secondary Dune

Observed Rare Species

- Least Tern
- American Oystercatcher
- Piping Plovers (migratory)
- Peregrine Falcon
- Asiatic Sedge [Carex kobomugi Ohwi]

Note:
Observed species are recorded sightings by Amy S. Greene Environmental Consultants Inc. (ASGECI) during the 2011 monitoring season. Additional rare species that were regularly observed are not noted on this map due to the high frequency of observations, species include common tern, osprey, additional least terns, and sanderlings.

0 75 150 225 300 Feet

Sources:
[illegible]

2011 Study Area Map

Sea Girt National Guard Joint Training Center (NGJTC)
Sea Girt Borough
Monmouth County, New Jersey

ASGECI Project # 3307

AMY S. GREENE ENVIRONMENTAL CONSULTANTS

APPENDIX F

2012 SURVEY DATA SHEETS, NJDEP NATURAL HERITAGE FORMS & MAP AND PET POLICY LETTERS

Endangered Species Survey Data Sheet
Presence/absence surveys for piping plover
National Guard Joint Training Center
Sea Girt, NJ
ASGECI Project # 3307

NATIONAL GUARD TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at Training Center
Surveyor: H. Strano, J. LaStella (ASGECI), M. Smith (AECOM)

Date: 4/04/12

Time: Arrive: 9:00 am
Leave 3:00 pm

Temperature: 65-71º F

Conditions: Sunny

Rainfall Today (time/inches): 0”

Most Recent Rain Event: 4-1-12 .017”
Photos: yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Observed: No Piping Plovers or tracks observed. Ospreys were observed adding material to the nest on the cell tower at 9:00 AM. Three ospreys were observed hovering around the nest in the afternoon.

Potential Wildlife Threats Observed: Fox, cat and dog tracks were observed throughout beach area. Some limited human activity was observed on the beach. Two people were observed near the SPA with dogs in the afternoon and were asked to leave the beach – they complied. No overflowing trash observed.

Additional Wildlife Observed - Beach: Heavy N. gannet presence feeding offshore, herring gull, ring-billed gull, common loon, fish crow, northern robin, small falcon (likely Merlin) observed flying north over the beach, Killdeer nest observed in the SPA.

Stockton Lake, wetlands and fields: approximately 200 brant , great egret, killdeer, mallards, Canada goose, red wing blackbird, Northern mockingbird, song sparrow

Additional Notes/Activities: Beach is less vegetated in portions than previous seasons due to past storms. One appox. 20 gal bag of trash and other pieces of debris collected. Met the NJDEP crew at approximately 9:30 and installed the NPA fence. Installed the SPA fence around 11:00 AM. Installed “no pet” signs in the afternoon. Additional signs were ordered and will be onsite next week.

Endangered Species Survey Data Sheet
Presence/Absence surveys for
Seabeach amaranth
National Guard Training Center
Sea Girt, NJ
ASGECI Project # 3307

NATIONAL GUARD TRAINING CENTER SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at Training Center
Surveyor: H. Strano J. La Stella, M. Smith

Date: 4/04/12

Time: **(Plant Survey)** 11:30 AM -12:00 PM 1:30-2:45 PM

Temperature: 65-71º F

Conditions: Wind west 5-10 mph seas 2-4 ft calm

Rainfall Today (time/inches): 0

Most Recent Rain Event: 4-1-12 0.17"

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth: Surveyed SPA, SBA and portions of NPA for rare plants. No seabeach amaranth or rare plants were identified during this field visit. Sea rocket seedlings have emerged in large numbers. NPA has less vegetation and larger flat areas than previous recent seasons. Careful inspection of the dunes will need to occur to see if Asiatic Sand Sedge spreads this season – it was not observed during this survey.

Plant ID information (if applicable)
GPS code
Species
Size (diameter)
Associate Species
Observed Threats to Plant

Additional Notes/Activities: Some trash removed. Trash amounts were generally low on the beach during this visit.

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Photo A Killdeer nest identified in the rear portion of the SBA. We avoided searching this area after documentation.

Photo B View looking south from the NGJTC boundary of installed “no pet” signs.

Photo C View looking south from the middle of NPA. Storms have reduced vegetation amounts in this area.

Photo D View of SPA looking south. The frontal portions of the SPA have also lost American beach grass from recent storms.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Fields & Stockton Lake at NGTC
Surveyor: Jen LaStella & Kerri Quaglia

Date: 4/17/12

Time: Arrive: 10:00 AM
Leave 2:10 PM

Temperature: 74°F to 79°F

Conditions: Clear; winds from north-northwest at 14 mph (max gusts of 16 mph)

Rainfall Today (time/inches): 0.00"

Most Recent Rain Event: 4/14/12: 0.02"

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

No piping plovers (Federally Threatened, State Endangered) were observed during the field investigation. An osprey (State Threatened) was observed flying over Stockton Lake at 10:27 AM, and later hovering over Stockton Lake at 1:14 PM and 1:32 PM. An osprey was observed on the cell tower at 10:48 AM (see photo).

Potential Wildlife Threats Observed:

Fox tracks, digs, and scat were observed in the Northern Protection Area (NPA) and Southern Protection Area (SPA). Human tracks were observed entering and exiting the primary dune of the SPA.

Additional Wildlife Observed

Beach:

Northern gannet, barn swallow, tree swallow, herring gull, rough-winged swallow, ring-billed gull, and killdeer. A killdeer was observed on a nest within the SPA.

Stockton Lake:

Approximately 75 Atlantic brant, mallard, Canada goose, fish crow, red-winged blackbird, mourning dove, killdeer, double-crested cormorant, ring-billed gull, osprey, herring gull, laughing gull, house finch, great egret, and greater yellow legs.

Wetlands:

Red-winged blackbird, killdeer, and American crow.

Fields:
Northern cardinal, American robin, European starling, Northern mockingbird, American crow, song sparrow, killdeer, and house sparrow.

Dunes:
Turkey vulture, song sparrow, red-winged blackbird, Northern cardinal, American robin, Northern mockingbird, and merlin. The merlin was observed flying rapidly and low over the secondary dune of the SPA.

Additional Notes/Activities:

General Maintenance Tasks and Issues:
"Raise Your Rake"/"Lower Your Rake" signs were installed at north and south ends of the NPA.

One "No Pets Allowed" sign was missing from the southern boundary of the base, and one pole associated with the SPA fencing was down at the southern end as well. This was possibly vandalism. Installed additional Seabeach Amaranth signs on SPA fencing. ASGECI will investigate ways to better secure the signs. Fraying rope along the back portion of the SPA will be replaced during our next visit.

No overflowing garbage was observed around trash containers adjacent to the beach parking lots. Approximately 10 gallons of garbage were collected on the beach and in dune areas.

Other Surveys:
A survey of the beach for seabeach amaranth (Federally Threatened) and other rare plants was performed. Results of this survey can be found in the presence/absence survey for seabeach amaranth section of this data sheet.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

Date: 4/17/12

Time: Arrive: 10:00 AM
Leave 2:10 PM

Temperature: 74°F to 79°F

Conditions: Clear; winds from north-northwest at 14 mph (max gusts of 16 mph)

NATIONAL GUARD TRAINING CENTER SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGTC
Surveyor: Jen LaStella and Kerri Quaglia

Rainfall Today (time/inches): 0.00"

Most Recent Rain Event: 4/14/11 - 0.02"

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
Surveyed NPA, SPA, Southern Beach Area (SBA) and areas to the north of the NPA for rare plants. No seabeach amaranth or rare plants were identified during this field visit.

Plant ID information (if applicable)
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A
Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need to occur to see if Asiatic Sand Sedge spreads this season. Asiatic sand sedge was not observed during this survey. Trash on beach generally low.

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Photo A: View, facing south, of Atlantic brant preening and resting on a sand bar on the south side of Stockton Lake.

Photo B: View of an osprey on the cell tower nest. Only the tail feathers were visible at this time.

Photo C: View of missing "No Pets Allowed" sign (center) along the southern boundary of NGJTC. Sign was replaced during survey.

Photo D: View of fox tracks and dig within the SPA.

Endangered Species Survey Data Sheet
Presence/absence surveys for piping plover
National Guard Joint Training Center
Sea Girt, NJ
ASGECI Project # 3307

NATIONAL GUARD TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at Training Center
Surveyor: H. Strano, J. LaStella (ASGECI), M. Smith (AECOM)

Date: 5/04/12

Time: Arrive: 9:15 am
Leave 2:00 pm

Temperature: 60-70º F

Conditions: Foggy, Cloudy, some sun
Wind 5-15 mph E/SE Seas 4-5 feet

Rainfall Today (time/inches):

Most recent Rain Event:
Photos: yes

GIS/GPS Data Collected: No

Field Notes:

Rare, Endangered and Threatened Observed: No Piping Plovers or tracks observed. Ospreys were observed on the nest on the cell tower at 11:30 AM and observed gathering nest material at 1:25 PM. Pair of American oystercatchers observed on the beach at 12:30 PM for approximately 20 minutes before flying south.

Potential Wildlife Threats Observed: Large Dog tracks were observed in the back portions of the SPA and SBA.

Additional Wildlife Observed – Beach/dunes: yellow warbler, herring gull, laughing gull, double-crested cormorant, osprey, catbird ,robin, black and white warbler, brown thrasher. Deer tracks were observed on the beach.

Stockton Lake, wetlands and fields: brant, herring gull, laughing gull, Forster's tern, carrion crow, semipalmated plover, killdeer,

Additional Notes/Activities: Some trash collected on the beach.

Endangered Species Survey Data Sheet
Presence/Absence surveys for
Seabeach amaranth
National Guard Training Center
Sea Girt, NJ
ASGECI Project # 3307

NATIONAL GUARD TRAINING CENTER SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at Training Center
Surveyor: H. Strano J. La Stella, M. Smith

Date: 5/04/12

Time: **(Plant Survey)** 10:00 -10:30 AM 12:30 AM -1:30 PM

Temperature: 65-71º F

Conditions: Wind west 5-10 mph seas 2-4 ft calm

Rainfall Today (time/inches):

Most Recent Rain Event: 0.17"

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth: Surveyed SPA, SBA and portions of NPA for rare plants. No seabeach amaranth or rare plants were identified during this field visit.Beach grass is beginning to grow and establish but will remain at considerably less densities than from previous seasons. Asiatic Sand Sedge was not observed during this survey.

Plant ID information (if applicable)
GPS code
Species
Size (diameter)
Associate Species
Observed Threats to Plant

Additional Notes/Activities: Some trash removed. Trash amounts were generally low on the beach during this visit.

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Photo A Fox tracks in the SPA.

Photo B: Pair of American Oystercatchers in front of the NPA.

Photo C: View looking north at the NPA. Vegetation has bee reduced and the topography flattened by storm events.

Photo D: View looking south within the NPA. Densities of vegetation have established themselves but cover levels remain much lower than in previous seasons.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields & Stockton Lake at NGJTC
Surveyor: Jen LaStella & Kerri Quaglia

Date: 5/17/12

Time: Arrive: 9:00 AM
Leave: 3:30 PM

Temperature: 59°F to 70°F

Conditions: Clear; winds from north-northwest at 9 mph (max gusts of 16 mph)

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: 5/16/12 - 0.08”

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:
At least 34 least terns (State Endangered) were observed at the NGJTC. Least tern behaviors observed included courtship rituals (i.e. presentation of fish to mates), resting on the beach in front of the Northern Protection Area (NPA) and on the mudflats of Stockton Lake, foraging over the Atlantic Ocean and Stockton Lake, and resting within the NPA in close proximity to scrapes. A few scrapes that were observed on the beach within the NPA and in front of the Southern Protection Area (SPA) were deeper and rounder and more similar in appearance to piping plover scrapes; however, no piping plovers (Federally Threatened, State Endangered) were observed during the field investigation. It is likely that these scrapes were also least tern scrapes. An osprey (State Threatened) was observed perched on the cell tower at 3:22 PM.

Potential Wildlife Threats Observed:
Fox and dog tracks and evidence of digging was observed throughout the beach and protection areas. Additionally, human tracks were observed entering and exiting both the SPA and the NPA.

Additional Wildlife Observed:

Beach:
Laughing gull, purple sandpiper, greater black-backed gull, herring gull, rough-winged swallow, barn swallow, ring-billed gull, and double-crested cormorant. An American oystercatcher (State Special Concern) scrape was observed within the northern portion of the NPA (birds not observed).

Stockton Lake:
Fish crow, great egret, Atlantic brant, Canada goose, herring gull, laughing gull, green heron, red-winged blackbird, common grackle, yellow warbler, and mourning dove.

Wetlands:
Black-backed gull, laughing gull, red-winged blackbird, Canada goose (with goslings), mallard, fish crow, barn swallow, tree swallow, and American robin.

Fields:
American robin, European starling, red-winged blackbird, Canada goose (with goslings), song sparrow, house sparrow, fish crow, barn swallow, tree swallow, and Northern mockingbird.

Dunes:
Song sparrow, red-winged blackbird, yellow warbler, mourning dove, killdeer, tree swallow, Northern mockingbird, barn swallow, house finch, brown thrasher, Northern cardinal, prairie warbler, and common yellowthroat.

Additional Notes/Activities:

General Maintenance Tasks and Issues:
ASGECI installed “No Vehicle” signs at the southern and northern ends of the NGJTC property. ASGECI also installed a “No Vehicle” sign at the Northern Beach Access Point. Cones were set up by others at the beginning of the path that leads to the Northern Beach Access Point. Additionally, “No vehicle” signs and roping were installed by others near the path that leads to the Southern Beach Access Point.

No overflowing garbage was observed around trash containers adjacent to the beach parking lots. Approximately 40 gallons of garbage were collected on the beach.

Other Surveys:
A survey of the beach for seabeach amaranth (Federally Threatened) and other rare plants was not performed due to it being early in the season.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: Jen LaStella & Kerri Quaglia

Date: 5/17/12

Time: Arrive: 9:00 AM
Leave: 3:20 PM

Temperature: 59°F to 70°F

Conditions: Clear; winds from north-northwest at 9 mph (max gusts of 16 mph)

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: 5/16/12 - 0.08”

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
A survey for Seabeach amaranth was not conducted during this site visit due to it being early in the season.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need to occur to see if Asiatic Sand Sedge spreads this season.

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Photo A: View showing several least terns and common terns resting near the intertidal zone in front of the Northern Protection Area.

Photo B: View showing least tern scrapes found within the Northern Protection Area.

Photo C: View showing American oystercatcher scrape found within the Northern Protection Area.

Photo D: View north of signs located at the southern end of the NGJTC property. A "No Vehicle" sign was temporarily installed by ASGECI on the sign post located to the left in the picture.

Photo C: View east of sand path near Northern Beach Access Point. A "No Vehicle" sign was temporarily installed by ASGECI along this path.

Photo D: View northeast of path leading to Southern Beach Access Point. This area was roped off with "No Vehicle" signs prior to ASGECI's arrival.

Endangered Species Survey Data Sheet
Presence/absence surveys for piping plover
National Guard Joint Training Center
Sea Girt, NJ
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at Training Center
Surveyor: M.Smith (AECOM)

Date: 5/26/12

Time: Arrive: 1400
Leave 1600

Temperature: 85 degrees F

Conditions: Partly cloudy, winds from the south at 10mph

Rainfall Today (time/inches): None

Most Recent Rain Event: 4/21 – 1.37"; 4/22 – 0/10"

Photos: yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Observed:
A total of 4 least terns (State endangered) including 1 nest actively incubating. Nest located in the NPA east of the painted portion of the seawall. No active nests remain in the southern portion of the NPA.

One American oystercatcher (Special Concern) foraging east of the NPA across from blow-out area near painted portion of the seawall.

Two ospreys (State Threatened) observed perched on the cellular tower.

Potential Wildlife Threats Observed: Human tracks and what appeared to be remote control car tracks visible within the SPA. Extensive amount of gull tracks and some canine (fox and/or dog) and human tracks visible in NPA. Vehicle tracks in front of the NPA. Observed one ATV driving in front of the NPA rather than use the alternate vehicle route. 15 Great black-back gulls loafing east of the remaining least tern nest.

Additional Wildlife Observed - Beach: Great black-backed gull, red-winged blackbird, laughing gull, northern mockingbird.

Stockton Lake, wetlands and fields: Approximately 20 Canada geese (including two broods) foraging in area adjacent to campground. One pair of mallards with brood in wetland. Laughing gulls, red-winged blackbirds, and American robins also noted in wetland. Northern flicker perched on telephone line.

Additional Notes/Activities: No overflowing garbage, however several lids are missing to cover trash cans. Approximately 75 cars in beach parking area. NPA and SPA fencing in good condition. Four groups of fisherman were observed fishing in front of NPA; however, they did not appear to disturb the active nest. Spoke with lifeguard ATV operator who indicated that they were told they were authorized to drive in front of the NPA since no piping plovers nests were present onsite. M. Smith contacted H. Strano to confirm procedures communicated to Sea Girt Borough and verified that alternate vehicle route should be followed by all vehicles not actively responding to an emergency.

Other Surveys:

A survey of the beach for seabeach amaranth (Federally Threatened) and other rare plants was not performed. Focus was given to monitoring potential threats/disturbance to protected habitat.

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Photo A – View of foot prints within the SPA.

Photo B – View of remote controlled vehicle tracks within the SPA.

Photo C – View of gull tracks within the southern portion of the NPA.

Photo D – View of possible American oystercatcher scrape.

Photo E – View of American oystercatcher in front of the NPA.

Photo F – View of ATV driving in front of the NPA.

Endangered Species Survey Data Sheet
Presence/absence surveys for piping plover
National Guard Joint Training Center
Sea Girt, NJ
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at Training Center
Surveyor: M.Smith (AECOM)

Date: 5/27/12

Time: Arrive: 1130
Leave 1345

Temperature: 70 -75 degrees F

Conditions: Mostly cloudy, some light rain then clearing.

Rainfall Today (time/inches): 1300/ <0.01" (estimated)

Most Recent Rain Event: 4/21 – 1.37"; 4/22 – 0/10"

Photos: yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Observed:
Piping plover – 1 piping plover observed in the central portion of NPA near painted portion of seawall in central blow-out area of NPA. Individual observed coming from within the NPA and traveling to the wrack line and pools formed at the intertidal zone to forage. Observed foraging for approximately 20 minutes then lost sight.

Least tern – 4 individuals observed. 1 incubating nest near painted portion of the seawall in central blow-out area of NPA. Other 3 observed flying overhead and did not appear to be associated with a nest onsite.

American oystercatcher – 1 individual observed loafing and foraging east of NPA. Another oystercatcher flew to the other, territorial behavior observed, and then both flew off. One returned and continued foraging in same location.

One osprey (State Threatened) observed perched on the cellular tower.

Potential Wildlife Threats Observed: Observed several sets of vehicle tracks in front of NPA and observed lifeguard pick-up truck driving south towards NPA. Spoke with drivers and notified them that they were only to use the alternate vehicle route around range road. They said they would notify their staff immediately that they should only use the reroute. They turned around and proceeded to use the reroute.

Additional Wildlife Observed - Beach: Semipalmated plover, laughing gull, great black-backed gull, herring gull, red-winged blackbird.

Stockton Lake, wetlands and fields: Canada geese (~30 + 2 broods), laughing gulls, mallards (1 brood).

Additional Notes/Activities: Approximately 30 – 40 cars in beach parking on arrival. Trash cans at beach access were recently emptied; not a predator issue. One appox. 20 gal bag of trash collected. Re-installed two poles for SPA symbolic fencing. Notified lifeguard patrol that all vehicles are to use the vehicle reroute behind range road immediately. Any nesting bird triggers vehicle reroute, as was presented in the annual awareness brief.

Other Surveys:
A survey of the beach for seabeach amaranth (Federally Threatened) and other rare plants was not performed. Focus was given to monitoring potential threats/disturbance to protected habitat.

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Photo A – View of SPA showing several sets of foot prints within the symbolic fencing.

Photo B – View of vehicle tracks in front of NPA.

Photo C – View of gull and fox tracks in the southern portion of the NPA.

Photo D – View of American oystercatcher located in front of NPA.

Photo E – View looking south at vehicle tracks in front of NPA.

Photo F – View of No Vehicle sign adjacent to several sets of vehicle tracks leading in front of NPA. Vehicle tracks leading to the right show vehicles using the reroute.

Photo G – View of piping plover within the NPA.

Endangered Species Survey Data Sheet
Presence/absence surveys for piping plover
National Guard Joint Training Center
Sea Girt, NJ
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at Training Center
Surveyor: M.Smith (AECOM)

Date: 5/28/12

Time: Arrive: 1325
Leave 1505

Temperature: 85 degrees F

Conditions: Sunny, light wind.

Rainfall Today (time/inches): None

Most Recent Rain Event: 5/27 - <0.01"; 4/21 – 1.37"; 4/22 – 0/10"

Photos: yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Observed:
Least tern (State Endangered) – 2 individuals observed, of which 1 was incubating the nest located near the painted portion of the seawall in central blow-out area of NPA. Other observed flying over NPA.

American oystercatcher (Special Concern) – 1 individual observed loafing and foraging east of NPA. 2 individuals observed foraging and resting in freshwater wetland.

Glossy ibis (Special Concern) – 1 individual foraging in ponded area of freshwater wetland.

Osprey (State Threatened) – 1 observed flying south over the beach then landing on the coast guard radio tower. 1 observed on the cellular tower nest.

No piping plovers or evidence of piping plovers observed.

Potential Wildlife Threats Observed: Observed 2 new sets of vehicle tracks in front of NPA and observed lifeguard ATV driving in front of NPA. Spoke with driver who said that they received an email from General Pierson saying that once the access paths were opened then vehicles could drive in front of the NPA. Since opened they assumed they could access. He also mentioned that since they were only least terns, they thought since they don't feed at the water that vehicle restrictions were not being enforced. I notified them that they must use the alternate vehicle route around range road at this time due to the fact that nesting birds are onsite and per the awareness brief

any rare nesting bird onsite enacts the vehicle restrictions. He said they would comply and use alternate route.

Additional Wildlife Observed - Beach: Laughing gulls, herring gulls.

Stockton Lake, wetlands and fields: Canada geese (~20 + 2 broods), laughing gulls, mallards (1 brood), killdeer, red-winged blackbird, northern mockingbird, herring gull, American robin, common grackle, European starling, northern rough-winged swallow, and unidentified sandpiper.

Additional Notes/Activities: Approximately 75 - 100 cars in beach parking on arrival. Trash cans at beach access were not filled; not a predator issue. Met with Pam from NJDEP ENSP Beachnesting Bird Program. She was conducting a nest search in the NPA. She indicated that I could assist. She noted that least tern nests were predated by fox sometime before Friday. We observed several old scrapes encircled with fox tracks. We did not observe any American oystercatcher or piping plover nest scrapes. I observed a child enter the SPA twice to retrieve a ball. I requested that the game be moved away from the SPA and notified them that it was protected habitat and they should not enter. Symbolic fence in good condition and signs up.

Other Surveys:
A survey of the beach for seabeach amaranth (Federally Threatened) and other rare plants was not performed. Focus was given to monitoring potential threats/disturbance to protected habitat.

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Photo A – View of fox tracks in NPA.

Photo B – View of least tern nest scrape surrounded by fox tracks.

Photo C – View of fresh vehicle tracks in front of NPA.

Photo D – View of American oystercatcher east of NPA.

Photo E – View of crowd around SPA.

Photo F – View of crowd near NPA.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields & Stockton Lake at NGJTC
Surveyor: Kerri Quaglia

Date: 6/8/12

Time: Arrive: 9:35 AM
Leave: 1:15 PM

Temperature: 69°F to 79.9°F

Conditions: Clear; winds from west at 6 mph (max gusts of 20 mph)

Rainfall Today (time/inches): none

Most Recent Rain Event: 6/7/12 - 0.08"

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

- Piping plover (Federally Threatened, State Endangered): From 11:40 am until 12:30 pm one piping plover (thick incomplete neckband) was observed on the NGJTC beach within the storm wrack line to the north of the Northern Protection Area (NPA). The plover then moved into the NPA. The plover did not perform a nest exchange while I was there; it was merely foraging and resting on the beach.
- Least Tern (State Endangered): At approximately 12:20 pm a least tern was observed flying from the Atlantic Ocean over the NGJTC property in the direction of Stockton Lake.
- Osprey (State Threatened-breeding): At 9:35 am an adult osprey was observed on the nest on the cell tower. A significant amount of movement could be seen down inside the nest. At 9:56 am an adult osprey was observed perched on an electric pole across from the campground eating a fish. At 1:00 pm one adult osprey and one chick were observed in the nest on the cell tower.

Potential Wildlife Threats Observed:

- A very large pit was dug by humans in the Southern Protection Area (SPA). Multiple human footprints were observed around the pit and throughout the front portion of the SPA.
- The two southern-most protection area poles of the SPA were down upon my arrival to the site. It did not appear that the tide had been up far enough to wash them out. Therefore, it is believed that this was the result of human disturbance.
- Fox and dog tracks were observed throughout the beach and protection areas. Additionally, human tracks were observed entering and exiting both the SPA and the NPA.

Additional Wildlife Observed:

Beach:
Ghost crab, black-bellied plovers, American oystercatchers (State Special Concern), great black-backed gulls, killdeer, mourning doves, laughing gull, rough-winged swallow

Stockton Lake:
Fish crow, red-winged blackbird, great black-backed gull

Wetlands:
Fish crow, mallard ducks, killdeer, American robin, red-winged blackbird, semipalmated sandpipers (State Special Concern), snowy egret (State Special Concern - breeding), tree swallow

Fields:
Mallard (with 4 ducklings), Canada geese, killdeer, mourning doves, Eastern cottontail rabbit, house finch

Dunes:
Brown thrasher (State Special Concern - breeding), red-winged blackbird, American robin, catbird, house finch, Northern cardinal

Surrounding Building Areas:
Northern mockingbird, American robin, European starling, mourning dove, killdeer, fish crow, Canada geese, groundhog, house sparrow, pigeon

Additional Notes/Activities:

- No nesting least terns were observed on the NGJTC beaches. Prior site visits and observations from Pam of NJDEP ENSP noted that other least tern nests had been predated by fox. Additionally, Melissa Smith of AECOM also previously noted a significant amount of gull activity near the last remaining least tern nest within the NPA. It is likely that either fox or gull predation was the cause of the last least tern nest failure.
- No vehicle tracks were observed in front of the NPA. A lifeguard on an ATV was observed utilizing the alternate access route.
- The area in front of the SPA was raked (entire beach west to the SPA and north up to the Southern Beach Access entrance).

General Maintenance Tasks and Issues:

- I fixed the roping and two southern-most protection area poles of the SPA.
- I moved the “No Vehicle” sign that was previously installed that was located along the Northern Beach Access road farther out onto the beach.
- No overflowing garbage was observed around trash containers adjacent to the beach parking lots.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: Kerri Quaglia

Date: 6/8/12

Time: Arrive: 9:35 AM
Leave: 1:15 PM

Temperature: 69°F to 79.9°F

Conditions: Clear; winds from west at 6 mph (max gusts of 20 mph)

Rainfall Today (time/inches): none

Most Recent Rain Event: 6/7/12 - 0.08"

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
A survey of the beach for seabeach amaranth (Federally Threatened) and other rare plants was not performed due to the presence of beach nesting birds.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need to occur to see if Asiatic Sand Sedge spreads this season.

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Photo A: View of piping plover with thick incomplete neckband in the NPA.

Photo B: View of osprey perched on an electric pole (9:56 am) across from the campground.

Photo C: View of osprey nest on cell tower. At 1:00 pm one adult osprey and one chick were observed in the nest on the cell tower.

Photo D: View south of human footprints throughout the eastern portion of the SPA.

Photo E: View of large pit dug by humans within the SPA. Note all the human footprints surrounding the large pit.

Photo F: View south of the two southern-most protection area poles of the SPA that were down upon my arrival to the site.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields & Stockton Lake at NGJTC
Surveyor: H. Strano / J. LaStella

Trash Collected: One 20 gallon bag

Date: 6/20/12

Time: Arrive: 10:30 AM
Leave: 3:15 PM

Temperature: 83°F to 96°F

Conditions: Clear; winds in the afternoon from west at 7 mph (max gusts of 13 mph)

Rainfall Today (time/inches): none

Most Recent Rain Event: 6/19/12, 0.04"

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

- No piping plover (Federally Threatened, State Endangered) individuals or tracks were observed.
- No least terns (State Endangered) or other beach nesting birds were observed on the beach.
- Osprey (State Threatened-breeding): One adult osprey was observed circling the cell tower with a menhaden at 10:35 AM. One adult osprey was observed on the nest at 12:10 PM and two adults were later observed on the nest at 1:40 PM.

Potential Wildlife Threats Observed:

- The large shallow pit dug by humans that was previously observed in the Southern Protection Area (SPA) was still present.
- One "No Pet" sign was down at the southern boundary of the base.
- Fox and dog tracks, fox digs, and rabbit scat were observed in both protection areas. Additionally, human footprints were observed entering and exiting both the SPA and the Northern Protection Area (NPA).
- Evidence of vehicle use was observed in front of the NPA, an area where vehicles are currently prohibited (see Photo A).

- Moderate (AM) to heavy (PM) beach usage was observed in front of the SPA, which included walking, sunbathing, running, and swimming. Very light beach usage was observed in front of the NPA during the survey period due to limited access (active range). Activities in front of the NPA included walking, sunbathing, running, fishing. Jet skiers drove in from offshore and were momentarily observed jumping waves in close proximity to the beach in front of the NPA.

Additional Wildlife Observed:

Beach:
Greater black-backed gull, herring gull, ring-billed gull, laughing gull, barn swallow, and brown-headed cowbird.

Stockton Lake:
Fish crow, laughing gull, rough-winged swallow, snowy egret, great egret, and common tern.

Wetlands:
Canada geese (4 adults, 6 goslings), red-winged blackbird, killdeer, mallard (1 domesticated male, 1 female, 8 ducklings), fish crow, American robin, European starling.

Fields and Surrounding Building Areas:
Northern mockingbird, European starling, Canada geese (15-20 adults), fish crow, mourning dove, and killdeer.

Dunes:
Common yellowthroat, song sparrow, Northern mockingbird, red-winged blackbird, house finch, and house sparrow.

Additional Notes/Activities:

- The area in front of the SPA was raked. No raking occurred in any other areas.

General Maintenance Tasks and Issues:

- An interpretive sign regarding threatened and endangered species was installed at the southern end of the NPA. The sign was driven out with a maintenance tractor, which was escorted by an ASGECI biologist along the SBA. A sweep of the beach revealed no piping plovers or least terns were present prior to sign installation.
- A “No Vehicle” sign was moved from the southern base boundary to the southern end of the NPA.
- No overflowing garbage was observed around trash containers adjacent to the beach parking lots; however, only two of the eight garbage cans included lids. All garbage cans should include a lid to prevent foraging wildlife or garbage should be collected at the end of each day.
- One standard bag of trash was collected from the SBA, SPA, and beach areas. Access to the NPA was prohibited due to the recent presence of beach nesting birds.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: _H.Strano J.LaStella

Date: 6/20/12

Time: Surveys: 11:00-11:30 AM
1:00-1:30 PM

Temperature: 83°F to 96°F

Conditions: Clear; winds in the afternoon from west at 7 mph (max gusts of 13 mph)

Rainfall Today (time/inches): none

Most Recent Rain Event: 6/19/12

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
The Southern Protection Area (SPA) and Southern Beach Area (SBA) were surveyed for rare plants. No seabeach amaranth (Federally Threatened) or other rare plants were identified during this field visit. A survey of the beach for seabeach amaranth and other rare plants was not performed in the Northern Protection Area (NPA) due to the continued enforcement of beach nesting bird regulations.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need to occur to see if Asiatic Sand Sedge spreads this season. American beach grass is dense in the SPA. Large bare spots remain in the NPA following storms. Increased amounts (from previous seasons) of horseweed are growing in the SPA.

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Photo C: View of osprey nest on cell tower. At 1:00 pm one adult osprey and one chick were observed in the nest on the cell tower.

Photo D: View south of human footprints throughout the eastern portion of the SPA.

Photo E: View of large pit dug by humans within the SPA. Note all the human footprints surrounding the large pit.

Photo F: View south of the two southern-most protection area poles of the SPA that were down upon my arrival to the site.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields, Wetlands & Stockton Lake at NGJTC

Surveyor: H.Strano

Trash Collected: Not collected due to wind conditions

Date: July 20, 2012

Time: Arrive: 8;00 AM
Leave: 12:30 PM

Temperature: 75°F

Conditions: Cloudy,wind NE 15-20 mph gusts to 30 mph, Seas choppy to 7'; rain showers

Rainfall Today (time/inches): pm - approx 0.25"

Most Recent Rain Event: today

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

- No piping plover individuals or tracks were observed.
- Three ospreys were observed loafing/resting on the cell tower at 8;00AM. One was observed on osprey platform in the afternoon (12:15 PM). No other state or federal-listed E and T species observed.
- No seabeach amaranth or other listed plants were observed.

Potential Wildlife Threats Observed:

- Fox and dog tracks were identified in the NPA. Two posts were knocked down along the southern side and frontal portion of the NPA. These posts were reinstalled.
- Tide was high upon arrival and wash was nearly entering the eastern end of the NPA.
- Beach activity was limited due to conditions – only occasional lifeguards were present
- All signs remained in place
- No overflowing garbage was observed around trash containers adjacent to the beach parking lots

Additional Wildlife Observed:

Beach:

Several flocks shorebirds passing south – appeared to be yellowlegs sp.
Semipalmated plover, song sparrow, mallard, Greater black-backed gull, herring gull

Stockton Lake and wetlands:

Great egret, double-crested cormorant, mallards, Forster's tern, Killdeer, red-winged blackbird, mourning dove, and barn swallow.

Fields and Surrounding Building Areas:

European starling, killdeer, red-winged blackbird, mourning dove, barn swallow,

Dunes:

Northern mockingbird, song sparrow, mourning dove, Fowler's toad

Additional Notes/Activities: ASGECI met with goose control company (Geese Chasers) onsite. Observed approximately 112 resident geese.

General Maintenance Tasks and Issues:

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: _J.LaStella

Date: July 10, 2012

Time: Surveys: 9:15 AM to 1:15 PM

Temperature: 73°F to 83°F

Conditions: Cloudy in AM, P. Cloudy in PM; winds from east at 5 mph (max gusts of 7 mph)

Rainfall Today (time/inches): None

Most Recent Rain Event: 7/4/12 (0.12")

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
The Southern Protection Area (SPA), Northern Protection Area (NPA), and Southern Beach Area (SBA) were surveyed for rare plants. No seabeach amaranth (Federally Threatened) or other rare plants were identified during this field visit.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need continue to determine if Asiatic Sand Sedge emerges this season.

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Photo A: View of Canada geese observed in between NGJTC's maintenance buildings.

Photo B: View of an adult osprey eating a fish on a utility pole across from the campground at 9:56 AM.

Photo C: View of an adult osprey (left) and a juvenile (right) in the nest on the cell tower at 11:56 AM.

Photo D: View facing south of the foredune of the NPA.

Photo E: View, facing north from the southern boundary of NGJTC, of the SPA.

Photo F: View, facing south from the NPA, of several youth groups that were gathered in front of the SBA during the survey period.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields, Wetlands & Stockton Lake at NGJTC

Surveyor: H. Strano

Trash Collected: Not collected due to wind conditions

Date: July 20, 2012

Time: Arrive: 8;00 AM
Leave: 12:30 PM

Temperature: 75°F

Conditions: Cloudy, wind NE 15-20 mph gusts to 30 mph, Seas choppy to 7'; rain showers

Rainfall Today (time/inches): pm - approx 0.25"

Most Recent Rain Event: today

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

- No piping plover individuals or tracks were observed.
- Three ospreys were observed loafing/resting on the cell tower at 8:00 AM. One was observed on osprey platform in the afternoon (12:15 PM). No other state or federal-listed E and T species were observed.
- No seabeach amaranth or other listed plants were observed.

Potential Wildlife Threats Observed:

- Fox and dog tracks were identified in the NPA. Two posts were knocked down along the southern side and frontal portion of the NPA. These barrier posts were reinstalled.
- Tide was high upon arrival and wash was nearly entering the eastern end of the NPA.
- Beach activity was limited due to storm conditions – only occasional lifeguards were present
- All signs remain in place
- No overflowing garbage was observed around trash containers adjacent to the beach parking lots
- Loon remains identified in the NPA appeared to be scavenged

Additional Wildlife Observed:

Beach:

Several flocks shorebirds were passing south – appeared to be yellowlegs *sp*. Also observed: semipalmated plover, song sparrow, mallard, Greater black-backed gull, herring gull

Stockton Lake and wetlands:
Great egret, double-crested cormorant, mallards, Forster's tern, killdeer, red-winged blackbird, mourning dove, barn swallow.

Fields and Surrounding Building Areas:
European starling, killdeer, red-winged blackbird, mourning dove, barn swallow,

Dunes:
Northern mockingbird, song sparrow, mourning dove, Fowler's toad

Additional Notes/Activities: ASGECI met with the goose control company (Geese Chasers) onsite to discuss methods and schedule for controlling resident geese. We observed approximately 112 resident geese in fields and building areas during the visit.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: H.Strano

Date: July 10, 2012

Time: Surveys: NPA 8 AM to 8:30 AM, SPA/SBA, remaining portion of NPA 11:30-12:10 PM

Temperature: 75-80°F

Conditions: Rain/Clouds, Strong NE winds and high seas

Rainfall Today (time/inches): mainly PM –approximately 0.25"

Most Recent Rain Event: Today

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
The Southern Protection Area (SPA), Northern Protection Area (NPA), and Southern Beach Area (SBA) were surveyed for rare plants. No seabeach amaranth or other rare plants were identified during this field visit.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
No Asiatic sand sedge was observed. American beachgrass is recolonizing storm surge areas, but remains less dense than previous seasons. Some bayberry shrubs in the western portion of the NPA appeared to have died as a result of past storm surge. Careful inspection of the dunes will continue to determine if Asiatic Sand Sedge is present.

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Photo A: View looking north along central portion of NPA. Much of frontal portion of this area is dominated by seaside goldenrod and sea rocket.

Photo B View of loon wing in the NPA. The remains appeared to be scavenged.

Photo C: View of osprey resting on the onsite platform.

Photo D: View looking north at the NPA. Eastern portions of the NPA are flat and colonized with sea rocket at this time.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields & Stockton Lake at NGJTC
Surveyor: Kerri Quaglia & Bill Macholdt

Date: 8/16/12

Time: Arrive: 9:25 AM
Leave: 3:00 PM

Temperature: 73°F to 84°F

Conditions: Clear; winds from north-northwest at 7 mph (max gusts of 17 mph)

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: 8/15/12 - 0.09”

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

- Osprey [State Threatened (breeding)]: At 11:42 AM, an adult osprey was observed flying over the fields with a fish. At 2:36 PM, an adult osprey was observed perched on the tower calling. Chicks were not observed.

Potential Wildlife Threats Observed:

- There was a significant amount of fox activity within the Northern Protection Area (NPA) (e.g. digging, tracks and scat).
- In addition to fox tracks, there appeared to be dog tracks within the NPA.

Additional Wildlife Observed:

Beach:
Barn swallow, great black-backed gull, semipalmated sandpiper, ring-billed gull

Stockton Lake:
Great black-backed gull, herring gull

Wetlands:
Least sandpiper, great black-backed gull, Canada goose, herring gull, lesser yellowlegs, mallard, laughing gull

Fields/Facility:
Canada goose, great blue heron, great black-backed gull, cottontail rabbit, groundhog, fish crow, pigeon, mourning dove, red-tailed hawk

Dunes:
Mourning doves, barn swallows, gray catbird

Additional Notes/Activities:

- Moderate beach visitor activity was observed during the survey period.

General Maintenance Tasks and Issues:

- We fixed a portion of the NPA fencing that was down. Additionally the NJDEP ENSP seasonal (Pam) was fixing signage and string lines of the NPA.
- We replaced a storm damaged "Raise Your Rake" sign at the northern end of the NPA.
- No overflowing garbage was observed around trash containers adjacent to the beach parking lots.

Other Surveys:

- The Southern Protection Area (SPA), NPA and Southern Beach Area (SBA) were surveyed for rare plants. No seabeach amaranth or other rare plants were identified during this field visit.
- A goose fecal count survey and goose population survey was conducted during this site visit. During these surveys, 208 geese were observed within the fields throughout the facility.
- An interagency survey for seabeach amaranth was conducted on August 2, 2012 by Harry Strano of ASGECI, Bill McBride of NJDMAVA and Melissa Smith of AECOM. No seabeach amaranth or other rare plants were encountered during the survey.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: Kerri Quaglia & Bill Macholdt

Date: 8/16/12

Time: Arrive: 9:25 AM
Leave: 3:00 PM

Temperature: 73°F to 84°F

Conditions: Clear; winds from north-northwest at 7 mph (max gusts of 17 mph)

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: 8/15/12 - 0.09”

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
The SPA, NPA, and SBA were surveyed for rare plants. No seabeach amaranth or other rare plants were identified during this field visit.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need to occur to see if Asiatic Sand Sedge spreads this season.

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Photo A: View of adult osprey flying over the fields with a fish (11:42 AM).

Photo B: View showing great blue herons in the field to the north of the fenced wetland.

Photo C: View of tracks in front of the SBA and NPA.

Photo D: View of red-tailed hawk sitting on tower near buildings and croquet field.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields & Stockton Lake at NGJTC
Surveyor: Kerri Quaglia & Bill Macholdt

Date: 8/16/12

Time: Arrive: 9:25 AM
Leave: 3:00 PM

Temperature: 73°F to 84°F

Conditions: Clear; winds from north-northwest at 7 mph (max gusts of 17 mph)

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: 8/15/12 - 0.09”

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

- Osprey [State Threatened (breeding)]: At 11:42 AM, an adult osprey was observed flying over the fields with a fish. At 2:36 PM, an adult osprey was observed perched on the tower calling. Chicks were not observed.

Potential Wildlife Threats Observed:

- There was a significant amount of fox activity within the Northern Protection Area (NPA) (e.g. digging, tracks and scat).
- In addition to fox tracks, there appeared to be dog tracks within the NPA.

Additional Wildlife Observed:

Beach:
Barn swallow, great black-backed gull, semipalmated sandpiper, ring-billed gull

Stockton Lake:
Great black-backed gull, herring gull

Wetlands:
Least sandpiper, great black-backed gull, Canada goose, herring gull, lesser yellowlegs, mallard, laughing gull

Fields/Facility:
Canada goose, great blue heron, great black-backed gull, cottontail rabbit, groundhog, fish crow, pigeon, mourning dove, red-tailed hawk

Dunes:
Mourning doves, barn swallows, gray catbird

Additional Notes/Activities:

- Moderate beach visitor activity was observed during the survey period.

General Maintenance Tasks and Issues:

- We fixed a portion of the NPA fencing that was down. Additionally the NJDEP ENSP seasonal (Pam) was fixing signage and string lines of the NPA.
- We replaced a storm damaged “Raise Your Rake” sign at the northern end of the NPA.
- No overflowing garbage was observed around trash containers adjacent to the beach parking lots.

Other Surveys:

- The Southern Protection Area (SPA), NPA and Southern Beach Area (SBA) were surveyed for rare plants. No seabeach amaranth or other rare plants were identified during this field visit.
- A goose fecal count survey and goose population survey was conducted during this site visit. During these surveys, 208 geese were observed within the fields throughout the facility.
- An interagency survey for seabeach amaranth was conducted on August 2, 2012 by Harry Strano of ASGECI, Bill McBride of NJDMAVA and Melissa Smith of AECOM. No seabeach amaranth or other rare plants were encountered during the survey.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: Kerri Quaglia & Bill Macholdt

Date: 8/16/12

Time: Arrive: 9:25 AM
Leave: 3:00 PM

Temperature: 73°F to 84°F

Conditions: Clear; winds from north-northwest at 7 mph (max gusts of 17 mph)

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: 8/15/12 - 0.09”

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
The SPA, NPA, and SBA were surveyed for rare plants. No seabeach amaranth or other rare plants were identified during this field visit.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need to occur to see if Asiatic Sand Sedge spreads this season.

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Photo A: View of adult osprey flying over the fields with a fish (11:42 AM).

Photo B: View showing great blue herons in the field to the north of the fenced wetland.

Photo C: View of tracks in front of the SBA and NPA.

Photo D: View of red-tailed hawk sitting on tower near buildings and croquet field.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields & Stockton Lake at NGJTC
Surveyor: Jennifer LaStella

Date: 8/30/12

Time: Arrive: 10:20 AM
Leave: 2:20 PM

Temperature: 74°F to 82°F

Conditions: Clear; winds from west-northwest at 5-9 mph (max gusts of 14 mph)

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: 8/28/12 - 0.06”

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

- Osprey [State Threatened (breeding)]: At approximately 11:45 AM, an adult osprey was observed flying over the beach with a fish. At 3:00 PM, an adult osprey was observed perched on the cell tower. Juveniles were not observed.

Potential Wildlife Threats Observed:

- There was evidence of fox activity (e.g. digging, tracks, and scat) within the Northern Protection Area (NPA) and Southern Protection Area (SPA).
- The SPA fence was down upon arrival and human footprints were observed entering the SPA. In addition, evidence of vegetation trampling and uprooted sea rocket was noted inside and immediately outside the SPA.

Additional Wildlife Observed:

Beach:
Herring gull, greater black-backed gull, laughing gull, red-tailed hawk, and osprey.

Stockton Lake:
Herring gull, greater black-backed gull, ring-billed gull, laughing gull, great egret, double-crested cormorant, and kingfisher.

Wetlands:
Red-winged blackbird, Northern mockingbird, and herring gull.

Dunes
Mourning dove and Northern mockingbird.

Fields/Facility
Turkey vulture, American robin, Canada goose, groundhog, fish crow, mourning dove, Eastern goldfinch, Northern mockingbird, and barn swallow.

Additional Notes/Activities:

- The NPA fence was removed (assumed by NJDEP ENSP).
- A significant amount of rabbit feces was observed throughout the SPA.
- Moderate to heavy beach visitor activity was observed throughout the survey period.
- Collected approximately 20 gallons of trash from the NPA, SPA, and Southern Beach Area (SBA).

General Maintenance Tasks and Issues:

- The portions of the SPA fence that were down were reinstalled and secured.
- No overflowing garbage was observed around trash containers adjacent to the beach parking lots.

Other Surveys:

- The NPA, SBA, and SPA were surveyed for rare plants. No seabeach amaranth or other rare plants were identified during this field visit.
- A Canada goose fecal count survey and goose population survey was conducted during this site visit. During these surveys, several flocks of geese were observed moving between Stockton Lake, maintained lawn areas near the museum, and fields. A maximum of 83 geese were observed on Stockton Lake at 12 PM; however, it appeared that the number of geese increased to over 100 during the afternoon hours. Flocks were also observed leaving and returning to the base in the morning. **Note:** Geese Chasers began hazing the base's resident geese on Monday, August 27, 2012 and returned thereafter on a daily basis (morning hours).
- AECOM is in the process of preparing for the upcoming predator survey by establishing protocols and securing necessary permits and materials.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: Jennifer LaStella

Date: 8/30/12

Time: Arrive: 10:20 AM
Leave: 2:20 PM

Temperature: 74°F to 82°F

Conditions: Clear; winds from west-northwest at 5-9 mph (max gusts of 14 mph)

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: 8/28/12 - 0.06”

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
The SPA, NPA, and SBA were surveyed for rare plants. No seabeach amaranth or other rare plants were identified during this field visit.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need to occur to see if Asiatic Sand Sedge spreads this season.

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Photo A: View of Canada geese grazing in the fields west of the shooting range at 1:15 PM.

Photo B: View of the northern portion of the SBA (foreground) and southern half of the NPA (background).

Photo C: View of human footprints in the SPA.

Photo D: View of uprooted sea rocket, which was observed within the central and southern portions of the SPA.

Endangered Species Survey Data Sheet

Presence/Absence Surveys for Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields & Stockton Lake at NGJTC
Surveyor: Harry Strano

Field Notes:
Date: 10/8/12

Time: Arrive: 10:20 AM
Leave: 2:20 PM

Temperature: 55°F to 60°F

Conditions: Cloudy light variable wind

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: today ”

Photos: Yes

GIS/GPS Data Collected: No

Endangered and Threatened Species Observed:

- Osprey [State Threatened (breeding)]: At approximately 11:45 AM, an adult osprey was observed flying over the beach with a fish. At 3:00 PM, an adult osprey was observed perched on the cell tower. Juveniles were not observed.

Potential Wildlife Threats Observed:

- There was evidence of fox activity (e.g. digging, tracks, and scat) within the Northern Protection Area (NPA)
- Some dog tracks observed

Additional Wildlife Observed:

Beach: Caspian terns, herring gull ring-billed, tree swallow (large migration of tree swallows present)

Stockton Lake:
Herring gull, ring-billed gull, great egret,

Wetlands:
herring gull, Canada goose,

Dunes
Palm warbler, tree swallow, Carolina wren, goldfinch, (large migrations of tree swallows and yellow-rumped warblers in the dunes)

Fields/Facility
Killdeer, red-bellied woodpecker,

General Maintenance Tasks and Issues:

- No overflowing garbage was observed around trash containers adjacent to the beach parking lots

Other Surveys:

- The NPA, SBA, and SPA were surveyed for rare plants. No seabeach amaranth or other rare plants were identified during this field visit. The vegetation cover survey has been completed. Observations indication all cover numbers will be reduced this season due to severe storms from the previous season.

- A Canada goose fecal count survey and goose population survey was conducted during this site visit. Goose activity was limited onsite. Geese Chasers was present and chased off 10 geese via dogs.

- AECOM is continuing predator survey activities

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: Harry Strano

Date: 8/30/12

Time: Arrive: 10:20 AM
Leave: 2:20 PM

Temperature: 74°F to 82°F

Conditions: Clear; winds from west-northwest at 5-9 mph (max gusts of 1

Rainfall Today (time/inches): 0.00”

Most Recent Rain Event: 8/28/12 - 0.06”

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:
The SPA, NPA, and SBA were surveyed for rare plants. No seabeach amaranth or other rare plants were identified during this field visit.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
No asiatic sand sedge observed, Conducted Goose Survey

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Photo A: View of Canada geese grazing in the fields west of the shooting range at 1:15 PM.

Photo B: View of the northern portion of the SBA (foreground) and southern half of the NPA (background).

Photo C: View of human footprints in the SPA.

Photo D: View of uprooted sea rocket, which was observed within the central and southern portions of the SPA.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Piping Plover
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach, Dune, Fields & Stockton Lake at NGJTC
Surveyor: Kerri Quaglia & Max DeVane

Date: 11/12/12

Time: Arrive: 9:45 AM
Leave: 1:50 PM

Temperature: 58°F to 67°F

Conditions: Mostly sunny; winds from south at 5 - 15 mph

Rainfall Today (time/inches): 0.06"-12 AM

Most Recent Rain Event: Today

Photos: Yes

GIS/GPS Data Collected: No

Field Notes:

Endangered and Threatened Species Observed:

- No Endangered or Threatened species were observed during the field visit.

Potential Wildlife Threats Observed:

- There were a significant amount of fox tracks observed within the protection areas and the secondary dune.
- In addition to fox tracks, there appeared to be dog tracks on the beach.

Additional Wildlife Observed:

Beach/Ocean:
Great black-backed gull, purple sandpiper, red-throated loon, ring-billed gull

Stockton Lake:
Great black-backed gull, herring gull, Canada goose, great blue heron, bufflehead, ruddy duck, ring-billed gull

Wetlands:
Canada goose, herring gull, mallard, American wigeon

Fields/Facility:
Canada goose, European starling, fish crow, horned lark, white-throated sparrow, mourning dove

Dunes:
Cooper's hawk

Additional Notes/Activities:

- Impacts to the NGJTC facility from Hurricane Sandy on October 29, 2012 were fairly significant. These impacts include:
  - Significant erosion within the Southern Protection Area, Southern Beach Area and Northern Protection Area (see photos). Old wooden boards and bulkheads were exposed within the protection areas. Most of the vegetation within the Northern Protection Area and Southern Beach Area was washed out. Within the Southern Protection Area, some remnants of American beachgrass, seaside goldenrod and yucca remain.
  - The boardwalk adjacent to the beach parking lot was heavily damaged.
  - Large amounts of sand were pushed back into the two beach access roads and into the Secondary Dune Community.
  - Large amounts of wooden and plastic debris were deposited within the Northern and Southern Protection Areas (see photo).
  - Evidence of significant flooding was observed throughout the facility property.
  - The osprey platform that was installed by ASGECI was snapped at the base as a result of Hurricane Sandy on October 29, 2012. This will need to be repaired (see photo).
  - The osprey nest on the cell tower appeared to be almost completely gone with only a few sticks remaining on the very top portion of the tower. It appeared that some of the nest may have fallen on the western corner of the triangular platform of the cell tower (see photo).

General Maintenance Tasks and Issues:

- ASGECI cleaned up debris on the beach consisting of 3, 55-gallon trash bags of material in addition to larger debris (e.g. plastic, wood, etc.)

Other Surveys:

- No Seabeach amaranth surveys were conducted due to significant erosion as a result of Hurricane Sandy on October 29, 2012.

Endangered Species Survey Data Sheet
Presence/Absence Surveys for
Seabeach Amaranth
National Guard Joint Training Center
Sea Girt, New Jersey
ASGECI Project # 3307

NATIONAL GUARD JOINT TRAINING CENTER
SEA GIRT, MONMOUTH COUNTY, NEW JERSEY

Location: Beach at NGJTC
Surveyor: Kerri Quaglia & Max DeVane

Date: 11/12/12

Time: Arrive: 9:45 AM
Leave: 1:50 PM

Temperature: 58°F to 67°F

Conditions: Mostly sunny; winds from south at 5 - 15 mph

Rainfall Today (time/inches): 0.06"-12 AM

Most Recent Rain Event: Today

GIS/GP Data Collected: No

Field Notes:

Seabeach Amaranth:

- No Seabeach amaranth surveys were conducted due to significant erosion as a result of Hurricane Sandy on October 29, 2012.

Plant ID information (if applicable):
GPS code: N/A
Species: N/A
Size (diameter): N/A Associate Species: N/A Observed Threats to Plant : N/A

Additional Notes/Activities:
Careful inspection of the dunes will need to occur to see if the Asiatic Sand Sedge survived Hurricane Sandy in the upcoming season.

Amy S. Greene Environmental Consultants, Inc.
Walter E. Foran Blvd., Suite 209
Flemington, NJ 08822
Phone: 908.788.9676
FAX: 908.788.6788
Email: mail@amygreene.com

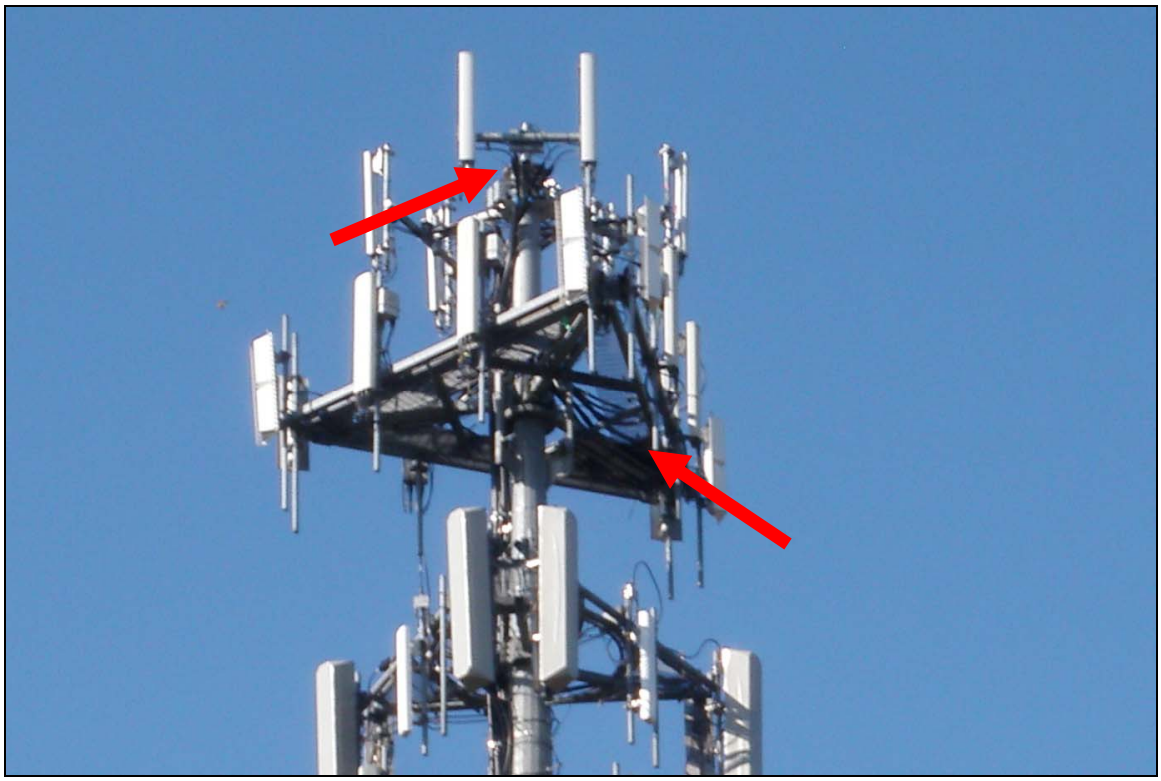

Photo A: Photo of missing osprey nest on the cell tower. Some nest material appeared to have been deposited on the western corner of the triangular platform.

Photo B: View of osprey platform that was installed by ASGECI shown snapped at the base as a result of Hurricane Sandy on October 29, 2012.

Photo C: View northeast of the corner of the Southern Beach Area. Note the significant amount of erosion as a result of Hurricane Sandy.

Photo D: View southwest of the Northern Protection Area. Note significant erosion as a result of Hurricane Sandy on October 29, 2012.

Photo E: View south of Southern Protection Area showing impacts from Hurricane Sandy.

Photo F: Photo showing large wooden debris that was deposited within the Southern Protection Area during Hurricane Sandy on October 29, 2012.

STATE OF NEW JERSEY
NATIONAL GUARD TRAINING CENTER
Post Office Box 251
Sea Girt, New Jersey 08750

An Open Letter to the Pet Owners of Manasquan:

We are writing to inform you of the "no pet" policy currently in place at the National Guard Joint Training Center (NGJTC) in Sea Girt, New Jersey. Dog walking or pets of any kind are prohibited from the entire facility, including the facility beach area. Dog walking on the NGJTC facility beach has been a particular problem in years past.

Enforcement of the NGJTC "no pet" policy within the beach area is essential due to the presence of sensitive wildlife habitat and Federally-threatened species onsite. Protected species include seabeach amaranth, a Federally-threatened plant species and the Federally-threatened piping plover, a ground-nesting bird which has nested onsite in recent years. In addition, the NGJTC hosts a number of State-listed plant and animal species. These sensitive species and their habitats can be impacted by the presence of pets or feral animals on the NGJTC beach or grounds. As part of Army Regulation AR 200-1, the NGJTC must protect these species to prevent a violation of the Federal and State Endangered Species Acts and to complete its military mission at the NGJTC.

"No pet" signage is posted each season at the northern and southern NGJTC beach property boundaries and the Sea Girt Lifeguards working the beach are aware of the policy. Individuals observed walking dogs or carrying pets within the facility beach will politely be asked to exit the facility grounds. Because of the seriousness of the issue and its potential to interfere with day-to-day training mission at the Center, the NGJTC staff will take the names of individuals who consistently violate this policy. These individuals will be reported to both the Sea Girt and Manasquan Police Departments. Observation of any feral dogs or cats on the beach will be referred to Monmouth County Animal Control.

The NGJTC will make every effort to enforce this policy in an appropriate way. We realize that as a pet owner you cherish animal life, and we greatly appreciate your cooperation in this matter. If you have any questions about the NGJTC pet policy or its enforcement, please contact the NGJTC at (732) 974-5951.

Thank you for your time.

Sincerely,

JEFFERY L. PIERSON
Brig. Gen. (Ret) USA
Director

cf: CFMO-EMB (file)

Monmouth County Animal Control

Monmouth County Health Department
3435 Highway #9
Freehold, NJ 07728
RE: No Pet Policy at the Sea Girt National Guard Joint Training Center

To Whom It May Concern:

We are writing in reference to the "no pet" policy currently in place at the National Guard Joint Training Center (NGJTC) in Sea Girt, NJ. Dog walking or pets of any kind are prohibited from the entire facility, including the facility beach area. Dog walking on the NGJTC facility beach has been a particular problem in years past.

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The NJ National Guard will make every effort to work with surrounding communities and enforce this policy in an appropriate way. We greatly appreciate your cooperation in this matter. If you would like to meet with us to discuss possible cooperative efforts to increase community awareness or have any questions about the NGJTC pet policy or its enforcement, please contact the Facility at (732) 974 – 5951.

Thank you for your time.

Sincerely,

JEFFREY L. PIERSON
Brig. Gen. (Ret) USA
Director
cf: (file); ASGECI (Mr. Harry Strano)
Manasquan Police Department; Sea Girt Police Department

Chief Robert P. Conway
Sea Girt Police Department
4th Avenue and Baltimore Boulevard
Borough of Sea Girt, New Jersey 08750
Re: No Pet Policy at the Sea Girt National Guard Joint Training Center

Dear Chief Conway:

We are writing in reference to the "no pet" policy currently in place at the National Guard Joint Training Center (NGJTC) in Sea Girt, NJ. Dog walking or pets of any kind are prohibited from the entire facility, including the facility beach area. Dog walking on the NGJTC facility beach has been a particular problem in years past.

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JEFFREY L. PIERSON
Brig. Gen. (Ret) USA
Director

cf: CFMO-EMB (file); ASGECI (Mr. Harry Strano)
Manasquan Police Department; Monmouth County Animal Control

Chief Daniel Scimeca
Manasquan Police Department
201 East Main Street
Manasquan, NJ 08736
Re: No Pet Policy at the Sea Girt National Guard Joint Training Center

Dear Chief Scimeca:

We are writing in reference to the "no pet" policy currently in place at the National Guard Joint Training Center (NGJTC) in Sea Girt, NJ. Dog walking or pets of any kind are prohibited from the entire facility, including the facility beach area. Dog walking on the NGJTC facility beach has been a particular problem in years past.

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Brig. Gen. (Ret) USA
Director

cf: CFMO-EMB (file); ASGECI (Mr. Harry Strano)
Sea Girt Police Department; Monmouth County Animal Control

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JEFFERY L. PIERSON
Brig. Gen. (Ret) USA
Director

cf: CFMO-EMB (file)

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JEFFERY L. PIERSON
Brig. Gen. (Ret) USA
Director

cf: CFMO-EMB (file)

APPENDIX G

2012 VEGETATION SURVEY REPORT

2012

VEGETATION SURVEY REPORT

For

National Guard Joint Training Center (NGJTC)

Sea Girt Borough
Monmouth County, New Jersey
November 2013

PREPARED FOR:
NJ Department of Military and Veteran's Affairs
CFMO-EMB
101 Eggerts Crossing Road
Lawrenceville, NJ 08648
Attn: William McBride

PREPARED BY:
Amy S. Greene Environmental Consultants, Inc
4 Walter E. Foran Boulevard, Suite 209
Flemington, NJ 08828
Attn: Harry Strano
ASGECI Project # 3307

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Vegetative Assessment and Topographic Survey

I. Introduction:

A. Goals of the Survey

Proper beach dune and vegetation management is essential to provide suitable habitat for threatened and endangered species that depend on primary dune and intertidal habitats. To help determine trends in vegetation community structure in relation to habitat suitability for rare species at Sea Girt National Guard Joint Training Center (NGJTC), ASGECI conducted its fourth season of detailed vegetation and topographical analysis of the beach communities during September of 2012. Previous vegetation surveys occurred between 2008 and 2010. The vegetation survey was not conducted in 2011 due to limited funding. The primary goals of this survey are as follows:

1. Use multiple (qualitative and quantitative) sampling methodologies to assess the condition of the American beachgrass (*Ammophila breviligulata*) community (Study Area) at the NGJTC. Analysis of plant densities, cover percentages, invasive species, species diversity, and population health is included.

2. Provide a clear study design that can be repeated. This will allow for the development of a data set that will reveal longer-term ecological trends onsite.

3. Evaluate underlying biotic and abiotic site conditions including topography, erosion potential, substrate condition, storms, tides, trash, invasive species, disease, herbivory and other disturbances that may impact the vegetation community.

4. Provide some preliminary recommendations and considerations for habitat improvement based on the vegetation study data and supporting sources. The recommendations would focus on maximizing the habitat quality for two Federally-threatened species, Seabeach amaranth (*Amaranthus pumilus*) and Piping Plover (*Charadrius melodus*). The results section of the report provides direction on specific NGJTC beach locations to target for vegetation related management strategies.

B. Key Species Management

The USFWS Atlantic Coast Piping Plover Recovery Plan (1996) encourages land managers to remove or reduce dense vegetation. The removal or thinning of vegetation reduces obstructions to piping plover nesting, foraging, and chick movement. The Recovery Plan also discourages the planting of vegetation for beach stabilization in potential or existing plover nesting habitat. Piping plovers have been documented to abandon nest sites on Long Island, New York due to vegetation encroachment from beachgrass stabilization projects (Wilcox, 1959). According to USFWS recommendations, vegetation at nest sites should be low and sparse (Schwalbach, 1988) or distributed in clumps (Cairns 1982; Prindiville-Gaines and Ryan 1988) to provide large areas of non-vegetated habitat. Piping plovers in Nova Scotia were found to nest on

narrow beaches, where nests were located under clumps of beachgrass which may allow the birds to avoid storm tides (Cairns, 1982). The clumped grass arrangement may also provide protection from predators (Fraser, 2006). *A. breviligulata* (AB) and related species are aggressive growing species that, once established, may quickly dominate a sandy beach and outcompete sympatric plant species.

The USFWS, in its *Recovery Plan for Seabeach Amaranth* (1996), indicates that seabeach amaranth is intolerant of competition from other plants and therefore is absent from well-vegetated sites. The Plan specifically identifies a negative association with members of the (*Ammophila*) beachgrass genus.

Seabeach amaranth shares similar habitat with beach-nesting birds and is often found in areas managed for piping plovers. Based on the plant's preference of sites with low vegetation densities, USFWS has determined that any vegetative management actions taken for the piping plover will likely benefit seabeach amaranth as well. Based on this information, selective vegetation reduction management at Sea Girt NGJTC should result in an improved transitional habitat for both key species. In addition, by improving the habitat of the existing nesting area (NPA), the plovers will nest away from the bathing beach in the Southern Protection Area and Southern Beach Area which will reduce any beachgoer's impacts to them. However, any vegetative management activities will be determined based on funding availability and its impact to the facility's mission.

C. Recent Storm Damage

The occurrence of Hurricane Irene on August 31, 2011 resulted in significant differences in cover and topography between the 2012 study and the previous 2010 study. These differences are illustrated in the appropriate sections of this report. Following the data collection period in September of 2012, the NGJTC was impacted by Hurricane Sandy. The hurricane was a Category 1 storm whose central path directly crossed the New Jersey shoreline just south of the facility in the Atlantic City Area on October 29, 2012. The storm resulted in unprecedented damage to the shoreline and communities surrounding the NGJTC. Within the study area (see Section II below), nearly all above ground vegetation was destroyed and the topography of the Study Area has significantly changed. Because the event occurred approximately one month after the completion of data collection for this report, the quantifiable impacts to topography and vegetation resulting from this hurricane are not yet determined.

Preliminary observations of the beach conducted in January of 2013 indicated a significant leveling of topography and an overall drop of elevation. All variation of dune peaks and troughs within the study area has been replaced with a gradual and level slope to the ocean, particularly throughout the NPA. In early 2013, the observation of exposed erect bulkhead materials and jetties in both the NPA and SPA illustrated the general drop of topography by anywhere from four to as much as 10 feet AMSL (on top of former dune peaks). It does however appear that some of this elevation has recovered over the first half of 2013.

The current vegetation cover in the entire study area appears to be below 5%. Observations within the study area show that very little of the root systems remain

present or potentially viable. It is certain that the cover and density of vegetation in 2013 and possibly for several years to come as the community reestablishes itself will be significantly less than levels ascertained from this report.

Although the quantifiable vegetation and topographic impacts caused by Sandy are yet to be analyzed, these impacts have been considered in portions of the 2012 Vegetation Survey report discussion and on habitat potential and recommendations (see Sections IV and V). These impacts will be further investigated and quantified during the Vegetation Survey planned for the Fall of 2013.

II. Study Area and Sampling Methodology:

A. Study Area Definition

The NGJTC Beach Study Area is an approximate 17,561 sq meter (4.3 acres) AB community divided into three specific subsections: the Northern Protection Area (NPA), Southern Protection Area (SPA) and the non-protected (non-fenced) Southern Beach Area (SBA). Perimeters of the Study Area were generally defined in 2008 as the area between the secondary shrub dominant community (or cement bulkhead wall in the NPA) to the frontal vegetation limit of the foredune along the Study Area's eastern boundary. The SBA is adjacent and immediately to the south of the NPA. The SBA vegetation community is contiguous with the NPA. The NPA/SBA areas are separated from the SPA by a narrow approximate 100 ft (30 m) sand area that provides the entrance to the beach from the NGJTC parking lot. Although there have been some minor differences in community composition between the three areas, the decision to divide the Study Area into subsections (which could be analyzed independently) was primarily influenced by potential management differences and limitations between the three areas.

The general limit of the Study Area for the NPA and the SPA subsections was defined primarily by the symbolic fencing in place during the study (see Appendix A, Figures 1-3), which represents the areas of potential management onsite. Some individual plants or small patches of vegetation adjacent to, but outside of the protection areas were not captured within the survey data. Portions of the vegetation that were not included in the Study Area were minimal and would not be expected to significantly change data results. The Study Area represents nearly the entire AB community onsite including all habitat areas where seabeach amaranth and piping plovers have previously occurred and where management for these species could be performed.

The NPA and SPA are surrounded by seasonal (March-December) fencing. The NPA is designed to provide protection to sensitive plant and animal species that may occur within that area while the SPA is established to provide protection to sensitive plant species that may occur within that area. The SBA is a section of the beachgrass community that lacks symbolic fencing. This area is still afforded general protections and any seabeach amaranth plants found within the SBA are fenced individually. During the study, these three Study Area subsections comprised the vast majority of the pioneer American beachgrass (AB) community onsite. Each of these areas contains a community comprised of a near monoculture of AB. Some western portions of the Study Area

subsections contained higher percentages of additional grass species (such as *Spartina patens*), forbs and shrubs to varying degrees.

GPS coordinates were taken for the boundaries of the Study Area. Boundaries of the Study Area change periodically due to storm influences and protection needs. The changing of these boundaries does not affect the results of the vegetation surveys as the sampling transects that are utilized from season to season remain the same (see Section II - D).

B. Data Collection Standards

To minimize individual surveyor bias and consistency in data collection; all surveys were led by one of three primary ASGECI scientists who have collected data during previous seasons. Two additional field surveyors were used on several occasions, primarily as recorders with some limited assistance in cover class estimation.

Methodologies and procedures used were the same as those followed during 2008 through 2010 survey seasons. All methodologies were established and clearly communicated and understood by all surveyors before data collection. Additional time was allotted to reestablish surveyors with the methodologies. As with previous seasons, some procedural details were determined in the field based on existing site conditions. Once established and incorporated into the survey methodology, the procedure was continued through the duration of the data collection. To avoid error from variation in sampling and inconsistencies in estimation, clear ground rules pertaining to border decisions, etc., were established to remove some of the variability in sampling methodology.

In addition to the attribute data (see Section III) collected onsite; surveyors collected general data at the start and finish of each survey session. Standardized survey forms for quadrat cover, density, and point intercept hits were utilized. Surveyors consistently attempted to minimize trampling and other impacts to the vegetation community. No plants were clipped, pulled, or otherwise removed for any purpose, including biomass determinations.

The following equipment was utilized during the vegetation surveys:

- Digital Camera
- Trimble GPS Unit
- Kestrel 3000 Weather Meter
- Compass
- 3 165 metric/foot tape reels
- Quadrat (see Section II - E)
- 4’ x ¼” steel point intercept rod
- Field Log
- Survey forms / clipboard
- Indelible Ink Pen / Lead Pencil
- Pocket calculators
- Pocket Lens

- Metal (re-bar) transect stakes
- Blue and orange pin flags
- Duct and electrical tape
- Electronic range finder

C. Field Conditions

ASGECI completed survey sampling onsite on approximately 10 full days between September 7 and September 28, 2012. As with previous seasons, this period (late August through mid-October) of the year was chosen specifically because beach nesting birds are not present onsite and key vegetation (primarily AB and seaside goldenrod) is at maximum growth. Data collection after the third week in October is not recommended due to sufficient dieback (Gerry Moore, Formerly Brooklyn Botanical Garden, Personal Communication, 2008). During the season, some plant dieback occurred during the latter portions of the survey period; however, plant structures remained intact and available to be counted in quadrat/point intercept, cover class, and density.

Significant interference from wind or storm conditions during the survey period did not occur during 2012 survey period. Wind gusts were predominantly northerly or westerly and typically under 15 mph. As with the 2010 survey, sand deposition ranged from a couple of inches to nearly two feet in some locations. Surveyors in several instances freed plant (grass) leaves that were pinned downward by sand during the storm and cleared some plant bases for the purposes of counting stems during density counts.

The presence of herbaceous vegetation, a lack of obstacles, and only light wind during data collection allowed surveyors to generally keep the transect measuring tape close to the ground and straight. The tape was attached to the metal stakes by slipping the tape's metal hook end over the metal stake (rebar). The tape was kept taut between stakes to avoid wind displacement. Hurricane Irene significantly reduced vegetation levels from the previous season which facilitated the speed of data collection during the 2012 survey.

D. Transect Setting

Stratification of the Study Area was the same as previous seasons and was created via lateral transects 25 feet apart to capture vegetation variation that exists within the community at various gradients between the beachgrass dominated edge (eastern end) and secondary portions of the Study Area subsections (western end) (see Appendix A, Figures 1-3).

The transects and transect subsections were reestablished at the same location as previous surveys and marked in the field with rebar. Rebar transect markers were 4 ft x ½ inch steel set approximately 2 ft. below ground and 2 ft above ground. Flags were attached to the rebar to facilitate viewing. Rebar is used because of its stability in the sand, durability and ease of installation.

For comparative purposes and as specified in the SOW, the 2012 transect lines (and sub transect points) followed previous survey seasons. When required, GPS coordinates of the transect markers have been used to determine former transect positions. Electronic

range finders and tape measures are used to facilitate the transect set up and ground truth GPS locations. All flagging, stakes, and other survey materials were removed from the site and mostly recycled after the point intercept and quadrat sampling were completed.

Transect lengths ranged from 100 to 600 feet (30.5 to 182.88 M). For the purposes of data collection, most transect lengths were divided into transect subsections (i.e. Northern Transect A (NTA) may be divided into NTA1-NTA2, NTA2-NTA3, etc.). The transect subsection data analysis allows for a more detailed examination of community conditions within the Study Area, which may contain uneven distribution in vegetation density and cover (see Section III).

Cover estimation and density data collected during surveys were derived from sample points or $1m^2$ quadrats along the established transects. This transect design, combined with the various set distance for collection points, resulted in a semi-random design that provided data sets representative of the entire NGJTC beachgrass community.

E. Quadrat Design

The 2012 collection methodologies remained consistent with the previous three data collection seasons. The distance for the first transect starting point for each Study Area Subsection (NPA, SPA, SBA) is randomly chosen and therefore varies each season. The outside edge of the quadrat frame was placed parallel and adjacent to the transect line.

The transect frame size had an inside measurement of $1m^2$. The $1m^2$ size determination was determined by reviewing similar transect methodologies in grass dominated communities with relatively low species diversity (Gauch, 1982; Tiner, 1999). The frequency of sample units along the transect lines (distance between quadrants) was 65 feet (19.812 m) apart (centerpoint to centerpoint). The length between samples was determined by dividing the number of total desired samples into the length of all combined transects (approximately 7280 ft or 2219 M) to allow from a semi-random yet even distribution of samples.

Samples each season may vary by several quadrats depending on the randomized starting point. In 2010 a total of 113 quadrat samples were taken. A total of 111 quadrat samples were taken among the three subsections of the Study Area in 2012: 63 in the NPA; 18 in the SBA; and 30 in the SPA. The 111 m^2 quadrat sample represents an approximately 0.63% of the 17,562 m^2 (4.34 ac) Study Area. This sample size allowed for density and cover data collection with standard errors low enough for practical applications.

Within each Study Area subsection, the initial quadrat was placed at a randomly assigned distance under 65 feet from the beginning of the first transect. As with previous seasons, all other quadrats were evenly distributed 65 feet apart. An east or west (of transect) designation for the starting quadrat was randomly assigned and alternated with each quadrat along the transects. This allowed for an even distribution of sampling. When the last quadrat approached the end (within 65 feet) of a given transect, the remaining transect length was measured and subtracted from the 65-foot starting distance of the next transect. For example if NQ 10 finished 10 feet from the end of Transect NTA, the next quadrat (NQ11) was placed 55 feet in from the starting point of Transect NTB. This

process allowed surveyors to accurately and efficiently sample the entire plant community while still maintaining a significant degree of randomization in the sampling.

The quadrat frame was constructed of ¾ inch PVC plastic for its light weight and durability. The corners were constructed of 3-way PVC joints designed to join the frame sides, and provide a support for four 2' x 5/8" wooden legs. The PVC frame edges were divided into ten decimeter sections marked with alternating black and white bands. Finally, two pink nylon strings ran between the centerpoints of each frame side and divided the quadrat into four smaller squares. This quadrat design (see Illustration 1) greatly facilitates the cover evaluation process and reduces subjectivity in estimation.

F. Study Metrics

1. **Cover:** Cover data is expressed as a percentage value based on sampling in quadrats utilizing the Daubenmire Methodology as outlined in the US Fish and Wildlife Service's Fire Effects Monitoring Reference Guide (2003). The Daubenmire cover classes are shown in Table 1.

Table 1: Daubenmire Cover Classes

Cover Class	Range of Coverage	Midpoint
1	1-5%	2.5%
2	5-25%	15.0%
3	25-50%	37.5%
4	50-75%	62.5%
5	75-95%	85.0%
6	95-100%	97.5%

Illustration 1:

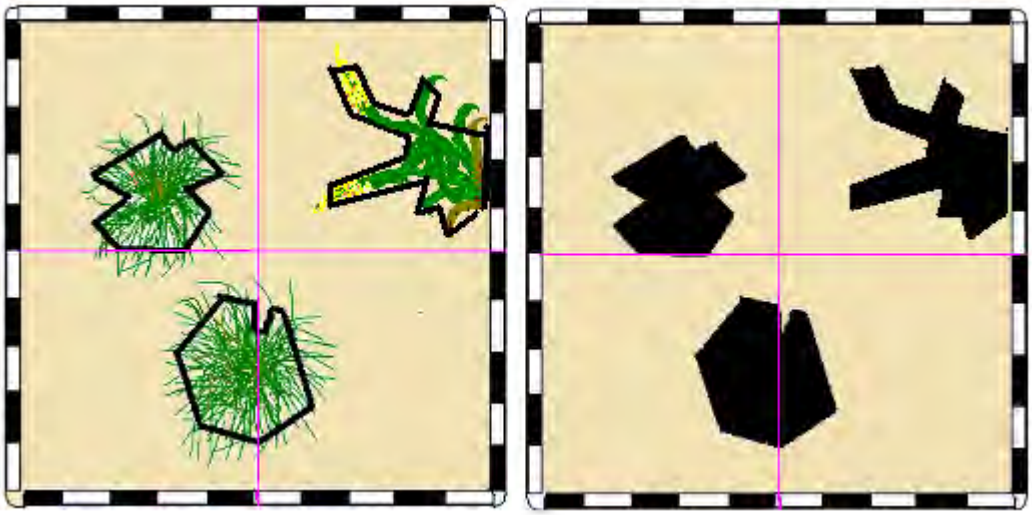


Illustration 1 shows the cover class estimation method for determining percentages. Illustration 1 shows cover class 2 for AB as the coverage is in this illustration estimated at approximately 15% and a cover class 2 for *Solidago sempervirens,* which is estimated at approximately 6%. Once a vegetation polygon is envisioned, the surveyors use the black and white decimeter markings on the frame to approximate the amount of decimeter squares that would fill each polygon. Each square decimeter represents 1% of the sample. The pink string lines bisecting the frame facilitate the estimation process by allowing the surveyor to analyze each quarter of the quadrat individually.

To determine cover class, both participating surveyors looked directly down on the frame (placed approximately 18" from the ground) from the standing position and silently estimated cover percentage to the nearest one percent (i.e. 67%). Canopies extending inside the quadrat, but rooted outside of the frame are counted in the total percentage. The presence of bare ground within the quadrat will indicate a value less than 100% vegetation cover. Species cover percentages were evaluated independently in the NGJTC study. As each species is examined individually in situations where each species overlap, estimates may exceed 100% for combined species cover.

Upon completing their percentage estimates, surveyors shared their percentage results. Surveyors' estimation differences for each sample have generally been 5% or less. Conflicting results typically occurred on the cover class border i.e. (25% to 27%) or a clearly identified counting/sum error by one surveyor. Results conflicts were typically resolved by jointly repeating the estimation process and discussing findings as required.

2. **Basal Cover and Canopy Cover (Point Intercept):** Basal cover is determined by utilizing the point intercept methodology as defined by USDA (Caratti, 2006) and others. Point intercept methodology is particularly useful in grassland environments such as dunes. Individual points were taken by a single surveyor for the entire project (to reduce potential for sampling error). A second surveyor recorded points. The surveyor utilized a 4 foot x ¼ inch steel rod perpendicular to (at a 90 degree angle) the transect line. A frame of 10 points utilized at each quadrat was originally considered but changed to a simpler design that would

efficiently cover a greater portion of the Study Area. Single points were taken every 0.5 M along all transects resulting in 4,450 single samples or (hits) taken within the Study Area in 2012. Slight differences in the number of hits occur each season may be due to tape stretching, slight variation in stake position or similar error.

During the 2008 survey season, hits were only recorded when there was a basal hit (plant stem base, bare ground, rock, etc). This method of point intercept analysis analyzed the frequency of stem clusters (basal cover) onsite and therefore was utilized differently from quadrat cover class estimations which evaluated canopy cover. Subsequent surveys included recording of all hits, including plant leaf hits (Canopy Cover). Leaf hit data was utilized as an additional estimate of canopy cover to provide a more direct comparison to the cover class estimation methodology (see Section III - C). As with basal estimation, the canopy estimation methodology was defined by USDA (Caratti, 2006).

Positive stem hits were determined if the rod point fell within a tight cluster of stems or immediately adjacent to (< 1 cm) the stem (or grass tiller). Leaf hit canopy cover was evaluated by recording when one or more leaves (forbs or grass blades) would make contact with the shaft of the rod. Wind was carefully considered during the estimation and surveyors avoided taking point intercept in conditions where winds consistently exceeded 10 mph. On some less obvious samples, the surveyor would wait between gusts or make estimates on how the leaves fall under typical conditions.

When it occurred, all leaf contact was recorded as a single "leaf" hit per species per point sampled. Leaf hits were not mutually exclusive from basal hits; that is a single sample could have both a leaf hit and a basal hit if the rod shaft touches leaves and makes contact with a stem base. Other general basal categories include "bare ground" (sand), rock (jetty), and wooden bulkhead.

3. **Density:** For AB and other graminoid species, individual "plants" were defined by individual stems or tillers and density correlates with the tillers within each 1 m^2 quadrat. For AB and other grasses/sedges, this was defined as each individual stem base as opposed to each individual plant. Each graminoid stem within a cluster was counted individually. This counting method allowed for a rapid density assessment while avoiding error or complications that may arise from attempting to estimate rhizome connectivity and individual "plants."

   During density counts, surveyors carefully sorted through each stem to avoid count overlap. For forbs such as *Solidago sempervirens* and *Cakile edentula*, a single stem that branched above the sand at the time of growth was counted as one stem. This was determined by close observation of the stem bases. Two individual stems that appeared to grow separate at the sand surface were counted as two individual stems. Intact stems containing dead material were counted within the stem count. Typically these intact stems appeared to be from the current season growth.

Boundary decisions for density were accomplished by looking directly down on the quadrat frame from a standing position and determining if the grass stem base is obscured by the frame (out) or is visible along the inside edge (in). Before surveying each season, the surveyors reviewed methodologies and practiced boundary decision protocols.

4. **Frequency:** The frequency of species occurrence at the NGJTC is a rapid method of determining the probability of occurrence of any given species and is represented as a percentage of the total sample. For frequency, the presence of a species within a quadrat (derived from stem density data) was recorded as one single occurrence and does not take into account the total density of the species within each single sample. The total number of quadrats containing the species was then compared as a ratio to the total number of sample quadrats.

5. **Species Composition:** Species composition, or the percent contribution of each vegetation species to the vegetation community, may be analyzed using several different measures including cover, density, or biomass. Dry weight above ground and/or root biomass contribution is a very effective way to measure species composition; however, onsite restrictions do not permit the cutting or removal of dune vegetation. As a result, biomass was not sampled using dry weight samples but estimated using non-invasive methods (see Section II - F6) and was not utilized for species composition analysis. The percentage contribution of each species to the NGJTC Study Area was calculated by using both cover class estimation and point intercept data. The various methodologies, Daubenmire Cover Estimation and Canopy (leaf) Point Intercept tend to illustrate similar species composition between the five most dominant species (see Section IV - E).

6. **Biomass:** ASGECI utilized indirect methods to estimate plant community biomass (g/m) to assure that plants are not impacted during sampling. Biomass estimates are above ground estimates (forage mass) near the time of maximum production and did not involve dry weight methodology. Vertical (plant) cover height utilizing visual obstruction and a pole measuring device developed by Robel *et al.* (1970) was initially considered to determine biomass. This method measures biomass by determining the maximum height at which vegetation density obstructs the view of the pole at a four foot distance. Based upon a discussion with consulting botanist Gerry Moore (personal communication, 2008) it was determined that this method could only provide a very broad estimation. ASGECI determined that an estimate using a combination stem density counts onsite and shoot biomass data from other AB studies (Seliskar, 2003) would be the most efficient and effective non-intrusive method of estimating AB biomass.

7. **Soil Conditions:** In past seasons, six semi-random selections of soil samples within the three Study Area subsections were collected to determine the following parameters: pH, organic matter content, soluble salt level, and grain size (USDA sieve test). USDA sieve analysis (diameter) results are divided into five sub-categories: very fine sand (0.05 mm – 0.10 mm), fine sand (0.10 mm – 0.25 mm), medium sand (0.25 mm – 0.5 mm), coarse sand (0.5 mm – 1 mm), and very

coarse sand (1 mm – 2 mm). . The soil characteristics of the study area and immediately adjacent areas tend to be sand fairly uniform characteristics. The occurrence of Hurricane Sandy just before samples were to be collected resulted us in suspending collection in 2012. The data has generally revealed very minor spatial and seasonal variation in Study Area soil samples. Samples will be collected as part of the 2013 Vegetation Study to help determine the storm's impact on substrate conditions.

8. **Topography and Erosion Potential:** A topographic survey of the Study Area was conducted in October of 2012. It was previously conducted on November 30, 2010, and October of 2008 and 2009. The topographic survey displays site characteristics including 1-foot elevation contours, vegetation limits, jetties, bulkheads and protection area boundaries (see Appendix H of Summary Report). Tide data included mean water line from NOAA data and a tide line taken at the time of the survey. Surveyors qualitatively documented erosion and deposition impacts at sample locations during data collection.

   Data from the topographic survey seasons are compared to provide an overall summary of topographic changes between the survey seasons (See Section IV - O). These erosion/deposition conditions are further considered in the management recommendations section of the report.

III. Results:

Major findings for each parameter studied are summarized below. Additional raw data, including various representations by Study Area, transect, transect subsection and quadrat, and additional species information is provided in the attached Excel files on the CD included in the back pocket of this report.

The beachgrass community of the NGJTC consists of a primary foredune (roughly Transects A and B within the protection areas) and a dune trough (roughly Transects C and D in protection areas) with the latter having a greater amount of forb (primarily *Solidago sempervirens*) species and slightly greater species diversity than the rest of the Study Area. Because there are often subtle gradients between grass and grass/forb dominant areas of the community, some vegetation conditions are evaluated by transect or transect subsection. Major findings for each parameter studied are summarized below.

A. Cover Estimation (Daubenmire)

The mean percent of AB cover for the **SPA** is 30.33 ± 9.05 (95% confidence interval) with a 24.79% standard deviation (SD) from the mean. The 2008 result for the SPA was 38.18 ± 10.46. The coefficient of variation for cover (Cc – SD/mean) among the sample is 81.73%, which indicates a fairly uneven cover distribution. This cover variation is up approximately 7% from a 75.06% Cc in the 2008 SPA data.

The mean percent of AB cover for the **SBA** is 33.25 ± 12.47 (95% confidence interval) with a 26.44% standard deviation. A percent cover result of 52.94 ± 14.28 was identified in 2008. The coefficient of variation for cover among the sample in 2012 is 79.53%,

which indicates a fairly uneven cover distribution of AB within the SBA. This number is higher than the 57.18% Cc determination in 2008.

The mean AB cover percentage for the **NPA** is 7.01 ± 4.00 (95% confidence interval) with a 15.88% standard deviation. These results vary from the 2008 data of 41.91 ± 7.58. Similarly the coefficient of variation for cover among the sample is 226.60%, up significantly from 72.36% Cc in 2008.

The overall mean cover percentage for the **Study Area** was determined to be 17.57 ± 4.50 (95% confidence interval) with a 23.68% standard deviation from the mean. These results are much lower than the 2008 results of 42.60 ± 5.66. The coefficient of variation for cover (Cc) among the sample is 134.80% which indicates a high variability level of AB cover distribution among the entire Study Area. The cover variation is up nearly 65% from the cover variation of 70.26% determined from the 2008 data. Table 2 shows a comparison of the Mean cover percentages of AB for each transect subsection, study area section and for the entire study area for 2008, 2009, 2010 and 2012 and the difference from 2008 to 2012. Table 3 shows the statistical analysis for the cover results from 2008 through 2012.

Table 2: Mean AB Cover of Each Transect Subsection

Study Area Section	Transect subsection	2008	2009	2010	2012	2008 to 2012 Difference*
NPA						
	NTA1-NTA2	1.25	39.00	18.75	0.83	-0.42
	NTA2-NTA3	26.50	46.00	0.83	2.50	-24.00
	NTA3-NTA4	38.50	62.50	0.00	0.00	-38.50
	NTA4-NTA5	31.17	65.83	0.00	0.00	-31.17
	NTA5-NTA6	85.00	73.75	0.00	0.00	-85.00
	NTB1-NTB2	70.00	61.25	62.50	7.75	-62.25
	NTB2-NTB3	62.50	18.50	41.67	26.83	-35.67
	NTB3-NTB4	69.17	62.50	46.00	37.50	-31.67
	NTB4-NTB5	61.25	45.83	18.75	0.00	-61.25
	NTB5-NTB6	41.67	54.17	21.88	0.00	-41.67
	NTC1-NTC2	77.50	85.00	85.00	7.75	-69.75
	NTC2-NTC3	62.50	26.00	46.00	0.83	-61.67
	NTC3-NTC4	46.83	15.50	39.00	61.25	14.42
	NTC4-NTC5	50.00	46.00	53.33	0.00	-50.00
	NTC5-NTC6	55.63	26.83	38.50	0.83	-54.80
	NTD1-NTD2	85.00	50.25	67.50	7.75	-77.25
	NTD2-NTD3	18.75	61.83	10.33	0.00	-18.75
	NTD3-NTD4	12.50	0.00	0.00	0.00	-12.50
	NTD4-NTD5	18.75	6.00	5.17	0.00	-18.75
	NTD5-NTD6	50.75	49.17	61.67	8.38	-42.37
	NTE1-NTE2	9.00	73.75	62.50	0.00	-9.00
	NTE2-NTE3	12.50	5.17	0.00	0.00	-12.50
	NTE3-NTE4	1.25	26.50	7.75	0.00	-1.25
	NTE4-NTE5	10.33	21.67	12.50	13.33	3.00
	NTE5-NTE6	46.00	60.83	33.33	10.33	-35.67
Average		41.76	42.21	29.05	7.01	-34.75

Table 2 Cont'd: Mean AB Cover of Each Transect Subsection						
Study Area Section	**Transect subsection**	**2008**	**2009**	**2010**	**2012**	**2008 to 2012 Difference***
SBA						
	SBTA1-SBTA2	50.00	50.25	50.25	7.75	-42.25
	SBTA2-SBTA3	54.17	70.00	61.67	1.67	-52.50
	SBTB1-SBTB2	26.50	70.00	85.00	61.67	35.17
	SBTB2-SBTB3	53.33	54.17	77.50	45.83	-7.50
	SBTC1-SBTC2	85.00	91.25	85.00	50.00	-35.00
	SBTC2-SBTC3	61.67	70.00	77.50	45.83	-15.84
	SBTD1-SBTD2	18.75	61.25	61.25	9.00	-9.75
Average		52.94	66.56	72.11	33.25	-19.69
SPA						
	STA1-STA2	32.50	26.50	46.00	39.00	6.50
	STA2-STA3	38.50	53.33	73.75	46.83	8.33
	STB1-STB2	73.75	73.75	70.00	7.75	-66.00
	STB2-STB3	54.33	61.88	81.67	46.00	-8.33
	STC1-STC2	37.50	15.50	39.00	39.00	1.50
	STC2-STC3	53.33	77.50	70.00	18.50	-34.83
	STD1-STD2	50.25	73.75	62.50	39.00	-11.25
	STD2-STD3	34.17	61.25	65.83	50.00	15.83
	STE1-STE2	26.50	38.50	39.00	22.83	-3.67
	STE2-STE3	62.50	73.75	50.00	50.00	-12.50
	STF1-STF2	2.50	1.25	26.50	1.25	-1.25
	STF2-STF3	15.50	62.50	15.50	2.50	-13.00
	STG1-STG2	6.00	32.50	34.17	17.67	11.67
Average		38.18	51.52	54.84	30.33	-7.85
Study Area		**42.60**	**48.64**	**42.98**	**17.57**	**-25.03**

*Red indicates a drop in overall cover for that subsection or average

Table 3: Statistical Analysis of AB Cover 2008-2012					
Location	**Statistical Parameter**	**2008**	**2009**	**2010**	**2012**
NPA					
	Standard Deviation	30.33	32.39	31.51	15.88
	Coefficient of Variation	72.36%	76.72%	108.48%	226.60%
SBA					
	Standard Deviation	30.27	20.90	21.52	26.44
	Coefficient of Variation	57.18%	31.40%	29.84%	79.53%
SPA					
	Standard Deviation	28.66	28.29	26.41	24.79
	Coefficient of Variation	75.06%	54.91%	48.17%	81.73%
Study Area					
	Standard Deviation	29.93	30.79	33.19	23.68
	Coefficient of Variation	70.26%	63.30%	77.23%	134.80%

* The confidence interval for each sample event is 95%.

B. Basal Cover (Basal Point Intercept)

Basal vegetation cover is a measure of the amount of cover provided by stem or tiller of a plant and does not account for canopy cover. In 2012, basal vegetation hits were down within all portions of the Study Area. Thirty-eight hits out of the 2,581 points sampled in the NPA in 2012 resulted in basal vegetation hits, representing approximately 1.5% of the sample. This number is down 10% since 2008. Nearly 99% of the points sampled in 2012 resulted in "bare ground" (sand) hits.

In 2012, twenty-one of the 699 points sampled in the SBA resulted in basal vegetation hits. This represents 3% of the points sampled. This number is down nearly 19% from 2008. The number of bare ground hits has risen approximately 19%, from approximately 78% in 2008 to 97% in 2012.

The SPA had 8.52% basal vegetation cover in 2012, down from 25.75% in 2008. Approximately 90% of the points sampled resulted in bare ground hits during the 2012 survey, which is up from the 72.75% in 2008. Rock and bulkhead hits within the SPA remained relatively similar to those numbers identified during previous survey years. Rock hits accounted for 1.2% of the basal cover with bulkhead hits comprising 0.09% basal cover in 2012.

One hundred and fifty eight of the total 4,442 Study Area point intercept samples resulted in a basal vegetation hit representing approximately 4% of the total sample. Fifteen hits were dead vegetation, in which it was determined that all aboveground parts of the plant were dead; however, the structure was still intact. A total of 4,270 or 96.13% of the samples were recorded as bare ground with 14 rock hits along the SPA jetty. In 2008, 768 of the total 4,477 Study Area point intercept samples resulted in a basal vegetation hit representing 17.15% of the total sample.

Table 4 summarizes the point intercept hits within each study area section and within the entire Study Area from 2008 to 2012.

Table 4: Basal Point Intercept Data for the Study Area Subsections					
NPA	**Percent Basal Cover 2008**	**Percent Basal Cover 2009**	**Percent Basal Cover 2010**	**Percent Basal Cover 2012**	**2008 to 2012 Difference***
Living Vegetation	10.49%	5.36%	2.09%	1.36%	-9.13%
Dead Vegetation	1.26%	0.87%	0.43%	0.12%	-1.14%
Overall Vegetation	11.75%	6.23%	2.53%	1.47%	-10.28%
Bare Ground (sand)	88.25%	93.81%	96.92%	98.53%	10.28%
Debris	0.00%	0.00%	0.24%	0.00%	0.00%
Rock	0.00%	0.00%	0.00%	0.00%	0.00%
Bulkhead	0.00%	0.00%	0.32%	0.00%	0.00%
SBA	**Percent Basal Cover 2008**	**Percent Basal Cover 2009**	**Percent Basal Cover 2010**	**Percent Basal Cover 2012**	**2008 to 2012 Difference**
Living Vegetation	19.95%	7.64%	3.85%	2.43%	-17.52%
Dead Vegetation	1.91%	0.28%	0.27%	0.57%	-1.34%
Overall Vegetation	21.86%	7.92%	4.12%	3.00%	-18.86%
Debris	0.00%	0.00%	0.00%	0.00%	0.00%
Bare Ground (sand)	78.14%	92.08%	95.88%	97.00%	18.86%
Rock	0.00%	0.00%	0.00%	0.00%	0.00%
Bulkhead	0.00%	0.00%	0.00%	0.00%	0.00%
SPA	**Percent Basal Cover 2008**	**Percent Basal Cover 2009**	**Percent Basal Cover 2010**	**Percent Basal Cover 2012**	**2008 to 2012 Difference**
Living Vegetation	23.50%	11.32%	6.01%	7.83%	-15.67%
Dead Vegetation	2.25%	0.41%	0.08%	0.69%	-1.56%
Overall Vegetation	25.75%	11.73%	6.09%	8.52%	-17.23%
Debris	0.00%	0.00%	0.33%	0.00%	0.00%
Bare Ground (sand)	72.75%	87.37%	90.33%	90.28%	17.53%
Rock	1.42%	0.90%	1.58%	1.20%	-0.22%
Bulkhead	0.08%	0.00%	0.00%	0.09%	0.01%
Study Area	**Percent Basal Cover 2008**	**Percent Basal Cover 2009**	**Percent Basal Cover 2010**	**Percent Basal Cover 2012**	**2008 to 2012 Difference**
Living Vegetation	15.52%	7.35%	3.43%	3.22%	-12.30%
Dead Vegetation	1.63%	0.65%	0.31%	0.34%	-1.29%
Overall Vegetation	17.15%	8.00%	3.74%	3.56%	-13.59%
Debris	0.00%	0.00%	0.22%	0.00%	0.00%
Bare Ground (sand)	82.44%	91.78%	94.98%	96.13%	13.69%
Rock	0.38%	0.25%	0.43%	0.32%	-0.06%
Bulkhead	0.02%	0.00%	0.18%	0.02%	0.00%

***Red indicates a reduction in basal cover between 2008 and 2012**

C. Canopy Cover (Leaf Point Intercept)

In 2012, data on leaf touches was recorded for the purpose of direct comparison with Daubenmire cover class estimation. The results of leaf cover hits for AB are included in Table 5.

Two hundred seventy-one hits out of 2,581 points sampled in the NPA in 2012 resulted in AB leaf hits. This represents 10.50% of the points sampled. This percentage is down from the 42.71% in 2009.

Two hundred seventy-nine of the 699 points sampled in the SBA in 2012 resulted in AB leaf hits. This accounts for approximately 40% of the points sampled. This number is also down from the 54.60% in 2009.

Four hundred eighty-five of the 1,162 point sampled in the SPA in 2012 resulted in AB leaf hits. This represents approximately 42% of the points sampled. This number is down from the approximate 61% in 2009.

The overall Study Area data for 2012 showed 1,494 leaf vegetation hits out of the 4,442 points sampled or approximately 34% onsite vegetation canopy coverage. Of the 1,494 vegetation leaf hits, 1,035 or 69% are AB. The leaf cover point intercept methodology revealed a 23.30% AB leaf cover for the entire Study Area. This number is down from 49.44% in 2009.

Table 5: Study Area Canopy Cover Results for AB Utilizing Point Intercept

Study Area Section	Transect Subsection	2009 Canopy Cover Percent	2010 Canopy Cover Percent	2012 Canopy Cover Percent
NPA				
	NTA1-NTA2	41.11	5.43	0.00
	NTA2-NTA3	49.50	3.96	2.06
	NTA3-NTA4	46.00	0.00	0.00
	NTA4-NTA5	51.49	0.00	0.00
	NTA5-NTA6	75.71	0.00	0.00
	NTB1-NTB2	73.33	47.83	30.69
	NTB2-NTB3	64.36	56.44	15.46
	NTB3-NTB4	69.70	34.69	30.85
	NTB4-NTB5	47.52	26.47	0.00
	NTB5-NTB6	41.35	32.28	0.00
	NTC1-NTC2	76.14	73.91	19.39
	NTC2-NTC3	40.20	50.50	2.04
	NTC3-NTC4	30.61	29.29	33.33
	NTC4-NTC5	46.53	28.00	9.18
	NTC5-NTC6	36.92	50.39	11.11
	NTD1-NTD2	67.82	73.63	34.41
	NTD2-NTD3	31.68	37.62	7.07
	NTD3-NTD4	8.08	4.08	2.02
	NTD4-NTD5	5.05	6.12	4.08
	NTD5-NTD6	52.31	64.18	17.83
	NTE1-NTE2	48.31	51.65	5.32
	NTE2-NTE3	7.92	5.56	8.42
	NTE3-NTE4	9.09	10.20	1.94
	NTE4-NTE5	16.16	22.11	7.37
	NTE5-NTE6	48.06	36.03	21.21
Average		42.71	31.02	10.50

Table 5 (Cont'd): Study Area Canopy Cover Results for AB Utilizing Point Intercept				
Study Area Section	**Transect Subsection**	**2009 Canopy Cover Percent**	**2010 Canopy Cover Percent**	**2012 Canopy Cover Percent**
SBA				
	SBTA1-SBTA2	64.29	57.95	46.67
	SBTA2-SBTA3	45.54	52.63	43.33
	SBTB1-SBTB2	11.22	71.13	66.00
	SBTB2-SBTB3	55.46	58.47	39.67
	SBTC1-SBTC2	64.71	79.13	45.10
	SBTC2-SBTC3	59.80	72.82	31.07
	SBTD1-SBTD2	26.67	36.56	6.45
Average		54.60	61.68	39.91
SPA				
	STA1-STA2	53.85	42.86	30.00
	STA2-STA3	70.37	67.59	46.08
	STB1-STB2	72.83	71.74	36.96
	STB2-STB3	80.30	75.59	37.29
	STC1-STC2	63.74	52.75	37.36
	STC2-STC3	75.21	73.87	64.71
	STD1-STD2	55.79	50.00	42.70
	STD2-STD3	63.44	53.76	64.37
	STE1-STE2	54.35	55.17	39.53
	STE2-STE3	76.00	56.25	51.35
	STF1-STF2	8.33	11.11	8.33
	STF2-STF3	50.00	30.00	30.51
	STG1-STG2	37.37	47.42	43.00
Average		60.46	55.38	41.74
Study Area		**49.44**	**42.57**	**23.30**

D. Biomass

ASGECI has utilized a combination of onsite density data, and evaluation of the AB density/dry weight shoot biomass correlation in similar studies (Seliskar, 2003) to determine onsite biomass. An approximate mean AB biomass of 73.92 g/m^2 was calculated for the NGJTC Study Area using non invasive methods. This estimate was derived from an estimated biomass of 1.09 g/tiller (averaged from ungrazed dune flats and knolls in coastal Maryland). Based on this g/tiller estimation, the total onsite shoot biomass of the NGJTC Study Area (approximately 504,527 tillers) was approximately 549,935 g in 2012, which is a 426,281 g decrease from 976,216 g in 2008.

E. Density

While AB is consistently dominant, the remaining prevalent species, in terms of stem density, have varied seasonally between 2008 and 2012. Tables 6-8 list the mean densities by transect subsection, by study area section, and by total Study Area for the three species of primary concern for habitat management, AB, *Cakile edentula* and *Solidago sempervirens*. Values from 2008 - 2012 are also included as well as the difference from 2008 to 2012 to allow for easier analysis. The analysis by transect subsection allows for determining which specific portions of the Study Area may have the highest density and considered for management. Certain species, such as *Spartina patens* (14.59 s/m^2 in 2012) and *Conyza canadensis* (11.59 s/m^2 in 2012), which are concentrated in localized portions of the study area, are not considered a management priority. These species tend to grow in very dense patches at slightly higher elevations

along back lines in the SPA and along the back berm of the NPA, which is west of the NTE and primarily outside the study area. It did appear that prior to Hurricane Sandy, *C. canadensis* had expanded into some lower transects in the SPA. Table 9 below shows the statistical analysis for AB density from 2008 through 2012.

AB was found to be the densest within the SPA in 2012 with a mean density of 52.03 ± 17.46 s/m^2; the SBA was found to have a mean density of 49.44 ± 18.39 s/m^2; and the NPA contained a mean density of 11.71 ± 7.41 s/m^2. The mean density for AB has increased slightly within the SPA since 2008. In 2008, the mean density of AB in the SPA was 51.50 ± 16.67 s/m^2. Densities for the NPA and SBA have decreased since 2008. In 2008, the mean density of AB in the NPA was 47.11 ± 10.91 s/m^2 and was 70.61 ± 23.48 s/m^2 in the SBA. The Study Area's overall AB mean density for 2012 equaled 28.73 ± 7.85 s/m^2 (95% confidence level). Mean densities of AB among transect subsections within the NPA ranged from 0 (NTA 1-2) to 109 s/m^2 (NTC 3-4). The SBA contained a distribution of AB mean densities ranging from 2 to 97 s/m^2. The SPA had mean densities of AB ranging from 4 to 92 s/m^2.

Cakile edentula was found to be the densest within the NPA in 2012 with a mean density of 4.59 s/m^2. The SBA had the next highest density of *Cakile edentula* at 3.33 s/m^2 and the SPA had the lowest density at 1.77 s/m^2. The overall Study Area density of *Cakile edentula* is 3.62 ± 1.88 s/m^2 (95% confidence interval). This number increased from the 1.46 ± 0.90 s/m^2 during the 2008 season.

Solidago sempervirens was found to be the densest in the SPA in 2012 with a mean density of 5.33 s/m^2. The NPA and SBA had relatively similar *Solidago sempervirens* densities of 2.16 s/m^2 and 2.94 s/m^2 respectively. The Study Area's overall *Solidago sempervirens* mean density was determined to be 3.14 ± 1.59 s/m^2 (95% confidence level). This number increased slightly from the 0.83 ± 0.48 s/m^2 during the 2008 season.

Table 6: Mean Densities of AB by Transect Subsection						
Study Area Section	**Transect subsection**	**2008 Mean Density s/m^2**	**2009 Mean Density s/m^2**	**2010 Mean Density s/m^2**	**2012 Mean Density s/m^2**	**2008 to 2012 Difference**
NPA						
	NTA1-NTA2	0.50	24.00	35.00	0.00	-0.50
	NTA2-NTA3	32.50	34.67	0.00	0.00	-32.50
	NTA3-NTA4	28.67	47.00	0.00	0.00	-28.67
	NTA4-NTA5	27.67	73.33	0.00	0.00	-27.67
	NTA5-NTA6	25.25	101.50	0.00	0.00	-25.25
	NTB1-NTB2	77.67	100.50	82.50	4.00	-73.67
	NTB2-NTB3	50.50	28.33	97.00	62.33	11.83
	NTB3-NTB4	94.00	64.50	63.67	60.50	-33.50
	NTB4-NTB5	82.00	62.33	29.50	0.00	-82.00
	NTB5-NTB6	52.00	51.33	35.75	0.00	-52.00
	NTC1-NTC2	93.00	114.00	124.00	8.50	-84.50
	NTC2-NTC3	72.00	31.00	47.00	2.67	-69.33
	NTC3-NTC4	44.67	27.00	45.00	109.00	64.33
	NTC4-NTC5	31.50	45.67	42.33	0.33	-31.17
	NTC5-NTC6	51.75	43.33	75.67	0.00	-51.75
	NTD1-NTD2	168.50	60.00	145.00	17.00	-151.50
	NTD2-NTD3	14.00	94.67	15.67	0.00	-14.00
	NTD3-NTD4	13.33	0.00	1.50	0.00	-13.33
	NTD4-NTD5	13.00	2.67	7.00	0.00	-13.00
	NTD5-NTD6	61.50	38.00	94.33	8.75	-52.75
	NTE1-NTE2	21.50	79.50	50.50	0.00	-21.50
	NTE2-NTE3	6.33	17.00	0.00	0.00	-6.33
	NTE3-NTE4	0.00	40.00	12.00	0.00	0.00
	NTE4-NTE5	20.00	33.33	8.00	22.00	2.00
	NTE5-NTE6	39.00	89.33	67.67	14.33	-24.67
Average		47.11	50.80	41.42	11.71	-35.40
SBA						
	SBTA1-SBTA2	50.50	75.50	76.50	11.50	-39.00
	SBTA2-SBTA3	46.00	105.33	106.33	2.33	-43.67
	SBTB1-SBTB2	43.50	80.33	161.00	97.33	53.83
	SBTB2-SBTB3	93.33	66.00	107.00	58.33	-35.00
	SBTC1-SBTC2	125.33	163.00	119.33	54.00	-71.33
	SBTC2-SBTC3	79.67	123.00	114.00	73.00	-6.67
	SBTD1-SBTD2	25.00	87.50	57.50	33.00	8.00
Average		70.61	98.67	107.22	49.44	-21.17
SPA						
	STA1-STA2	53.50	41.50	58.33	91.50	38.00
	STA2-STA3	64.67	51.00	147.00	84.00	19.33
	STB1-STB2	100.00	54.00	127.33	15.00	-85.00
	STB2-STB3	88.33	53.75	190.00	68.67	-19.66
	STC1-STC2	31.50	8.50	56.00	81.50	50.00
	STC2-STC3	63.00	100.67	123.67	39.33	-23.67
	STD1-STD2	74.00	66.00	102.00	67.50	-6.50
	STD2-STD3	38.67	97.00	159.00	58.00	19.33
	STE1-STE2	30.00	29.00	61.50	31.00	1.00
	STE2-STE3	82.50	64.50	72.50	75.00	-7.50
	STF1-STF2	3.00	1.50	34.00	5.00	2.00
	STF2-STF3	14.00	63.50	39.00	4.00	-10.00
	STG1-STG2	6.00	54.50	41.00	33.67	27.67
Average		51.50	53.52	99.45	52.03	0.53
Study Area		52.06	59.17	67.82	28.73	-23.33

Table 7: Mean Densities of *Cakile edentula* by Transect Subsection (Not recorded in all transect subsections)						
Study Area Section	**Transect Subsection**	**2008 Mean Density s/m^2**	**2009 Mean Density s/m^2**	**2010 Mean Density s/m^2**	**2012 Mean Density s/m^2**	**2008 to 2012 Difference**
NPA						
	NTA1-NTA2	0.00	0.00	0.00	6.00	6.00
	NTA2-NTA3	18.00	0.00	0.00	18.00	0.00
	NTA3-NTA4	0.00	1.00	0.00	1.50	1.50
	NTA4-NTA5	3.33	0.00	0.00	0.00	-3.33
	NTA5-NTA6	0.00	4.50	0.00	0.00	0.00
	NTB1-NTB2	0.00	1.00	0.00	0.00	0.00
	NTB2-NTB3	13.50	0.00	2.00	30.33	16.83
	NTB3-NTB4	5.00	2.50	0.67	29.00	24.00
	NTB4-NTB5	0.50	0.67	0.00	0.33	-0.17
	NTB5-NTB6	0.33	0.33	0.00	0.33	0.00
	NTC1-NTC2	8.67	0.00	0.00	1.00	-7.67
	NTC2-NTC3	2.50	0.33	1.00	0.00	-2.50
	NTC3-NTC4	0.67	0.00	1.00	1.50	0.83
	NTC5-NTC6	0.25	0.00	13.00	2.33	2.08
	NTD1-NTD2	0.00	0.00	8.00	1.00	1.00
	NTD2-NTD3	0.00	0.00	2.67	0.33	0.33
	NTD3-NTD4	2.67	0.00	1.00	0.50	-2.17
	NTD4-NTD5	0.00	0.67	0.33	2.50	2.50
	NTD5-NTD6	0.25	0.00	0.67	10.75	10.50
	NTE1-NTE2	0.00	1.00	0.00	2.00	2.00
	NTE3-NTE4	0.00	0.00	0.00	0.50	0.50
	NTE4-NTE5	0.67	0.00	0.67	0.00	-0.67
	NTE5-NTE6	0.00	0.00	0.67	4.00	4.00
Average		2.11	0.41	1.30	4.59	2.48
SBA						
	SBTA1-SBTA2	1.00	0.00	0.00	8.00	7.00
	SBTA2-SBTA3	0.67	0.00	0.33	1.33	0.66
	SBTB1-SBTB2	1.50	2.00	0.50	6.67	5.17
	SBTB2-SBTB3	0.33	0.00	0.00	1.33	1.00
	SBTC1-SBTC2	0.00	0.00	0.33	0.00	0.00
	SBTC2-SBTC3	0.00	0.00	0.00	5.33	5.33
	SBTD1-SBTD2	0.50	0.00	0.00	0.00	-0.50
Average		0.50	0.33	0.17	3.33	2.83
SPA						
	STA1-STA2	1.00	0.00	0.67	24.00	23.00
	STA2-STA3	1.67	0.00	1.50	1.33	-0.34
	STB1-STB2	1.00	0.00	1.00	0.00	-1.00
	STB2-STB3	0.00	1.75	1.00	0.33	0.33
	STC1-STC2	1.00	0.00	0.00	0.00	-1.00
	STC2-STC3	2.00	0.67	0.00	0.00	-2.00
	STD1-STD2	0.00	0.50	0.50	0.00	0.00
	STG1-STG2	0.67	0.00	0.00	0.00	-0.67
Average		0.63	0.32	0.39	1.77	1.14
Study Area		1.46	0.37	0.87	3.62	2.16

Table 8: Mean Densities of *Solidago sempervirens* by Transect Subsection (Not recorded in all transect subsections)						
Study Area Section	**Transect subsection**	**2008 Mean Density s/m^2**	**2009 Mean Density s/m^2**	**2010 Mean Density s/m^2**	**2012 Mean Density s/m^2**	**2008 to 2012 Difference**
NPA						
	NTA4-NTA5	0.00	0.33	0.00	0.00	0.00
	NTB3-NTB4	0.00	0.50	0.00	0.00	0.00
	NTB4-NTB5	0.00	0.33	0.00	0.00	0.00
	NTC1-NTC2	0.00	0.00	0.00	3.00	3.00
	NTC2-NTC3	0.00	0.67	0.33	1.33	1.33
	NTC3-NTC4	0.00	0.50	1.50	0.50	0.50
	NTC4-NTC5	0.00	1.33	6.67	5.00	5.00
	NTC5-NTC6	0.00	0.33	0.67	0.00	0.00
	NTD1-NTD2	0.00	0.00	6.00	21.50	21.50
	NTD2-NTD3	2.50	0.67	0.00	2.33	-0.17
	NTD3-NTD4	2.00	0.00	4.50	0.00	-2.00
	NTD4-NTD5	0.00	4.67	0.33	1.50	1.50
	NTD5-NTD6	1.50	2.33	0.00	0.00	-1.50
	NTE1-NTE2	5.50	3.50	2.00	11.00	-5.50
	NTE2-NTE3	4.67	4.00	5.00	16.00	11.33
	NTE3-NTE4	6.50	2.50	0.50	1.00	-5.50
	NTE4-NTE5	0.00	0.67	1.67	0.00	0.00
	NTE5-NTE6	0.67	5.33	2.67	0.33	-0.34
Average		0.89	1.19	1.27	2.16	1.27
SBA						
	SBTB1-SBTB2	0.00	0.00	0.50	6.33	6.33
	SBTB2-SBTB3	2.67	0.00	0.00	0.33	-2.34
	SBTC1-SBTC2	1.00	1.50	2.33	7.00	6.00
	SBTC2-SBTC3	1.00	0.00	0.00	5.00	4.00
	SBTD1-SBTD2	2.00	10.50	13.00	2.00	0.00
Average		1.00	1.33	1.89	2.94	1.94
SPA						
	STA2-STA3	0.00	0.00	0.00	0.33	0.33
	STB1-STB2	0.00	0.00	0.00	2.00	2.00
	STB2-STB3	0.00	0.25	0.00	20.33	20.33
	STC1-STC2	0.00	0.50	0.00	19.00	19.00
	STC2-STC3	0.00	1.00	0.00	2.67	2.67
	STD1-STD2	0.00	2.50	2.50	1.00	1.00
	STD2-STD3	0.67	4.00	0.00	1.00	0.33
	STE1-STE2	3.50	6.00	5.00	4.00	0.50
	STE2-STE3	0.00	0.00	1.00	14.50	14.50
	STF2-STF3	9.00	0.50	6.00	3.00	-6.00
	STG1-STG2	0.00	0.00	0.00	0.00	0.00
Average		0.60	1.19	0.74	5.33	4.73
Study Area		0.83	1.21	1.22	3.14	2.31

Table 9: Statistical Analysis of AB Density 2008-2012					
Location	**Statistical Parameter**	**2008**	**2009**	**2010**	**2012**
NPA					
	Standard Deviation	43.64	42.84	51.17	29.44
	Coefficient of Variation	92.63%	84.33%	123.53%	251.30%
SBA					
	Standard Deviation	49.81	46.59	46.32	39.01
	Coefficient of Variation	70.55%	47.22%	43.20%	78.90%
SPA					
	Standard Deviation	45.63	40.21	65.91	47.82
	Coefficient of Variation	88.61%	75.14%	66.28%	91.90%
Study Area					
	Standard Deviation	45.55	59.17	67.82	28.73
	Coefficient of Variation	87.49%	77.35%	91.92%	143.96%

* The confidence interval for each sample event is 95%.

F. Frequency

Measurements of frequency provide an indicator of species diversity within the Study Area. Frequency results of Study Area quadrat samples in 2012 show the low diversity of vegetation species onsite, and the overall dominance of AB. Tables 10 through 13 list the frequencies by transect, by study area section and for the entire study area for AB, *Cakile edentula*, *Solidago sempervirens* and *Chamaesyce polygonifolia* for 2008, 2009, 2010 and 2012 as well as the difference from 2008 to 2012.

AB was the most common species in 2012, occurring in nearly 73% of the quadrats sampled, which is down about 20% since 2008. AB was the most frequent in the SBA, occurring in 100% of the quadrats sampled, followed by the SPA with a frequency of 96.67% and the NPA at 53.97%. The frequency of AB presence in quadrat samples fell by nearly 40% since 2008 within the NPA, while the SPA and SBA have remained relatively constant (<10% change).

Solidago sempervirens was the second most common species, occurring in 45% of all quadrats in 2012, up from the 17.86% in 2008. *Solidago sempervirens* was the most frequent in the SPA in 2012, occurring in 66.67% of all quadrats sampled, followed by the SBA with a frequency of 61.11% and the NPA with a frequency of 30.16%. This species increased in frequency in all Study Area sections since 2008, with the greatest

increase in the SPA of 50%, followed by an increase of 33% in the SBA and 15% in the NPA.

Cakile edentula was the third most common species, occurring in nearly 43% of all quadrats, up from the 33.93% in 2008. *Cakile edentula* was the most frequent in the SBA in 2012, occurring in approximately 60% of all quadrats sampled, followed by the NPA with a frequency of approximately 50% and the SPA with a frequency of approximately 17%. The frequency of this species increased since 2008 within the NPA and SBA by 11.71% and 22.31% respectively. However, it decreased in frequency since 2008 by 6.66%.

Chamaesyce polygonifolia was the fourth most common species within quadrats sampled in 2012, occurring in approximately 22, up from the 10.72% in 2008. *Chamaesyce polygonifolia* was the most frequent in the SPA in 2012, occurring in 30% of all quadrats sampled, followed by the NPA with a frequency of 22.22% and the SBA with a frequency of 5.56%. This species increased in frequency in all Study Area sections since 2008, with the greatest increase in the SPA of 13.33%, followed by an increase of 11.28% in the NPA and 5.56% in the SBA.

In 2008, AB was present in over 93% of the sample quadrats. *Cakile edentula* was the second most frequent species, occurring in 34% of the samples and *Solidago sempervirens* was the third most common species, occurring in nearly 18% of all quadrats. By utilizing frequency data, surveyors can better detect the presence of certain species that are more widespread than cover percentages or stem count density would indicate. Examples include *Cakile edentula*, which occurs at a frequency of 42.34% of the samples and *Conyza canadensis* which occurs in 18.92% of the samples.

Table 10: AB Frequency by Study Area Section and Transect

Study Area Section	Transect	2008 Sample Frequency %	2009 Sample Frequency %	2010 Sample Frequency %	2012 Sample Frequency %	2008 to 2012 Difference
NPA						
	NTA	90.91	100.00	16.67	41.67	-49.24
	NTB	100.00	100.00	76.92	46.15	-53.85
	NTC	100.00	92.31	100.00	84.62	-15.38
	NTD	84.62	69.23	76.92	53.85	-30.77
	NTE	84.62	76.92	53.85	41.67	-42.95
Average		**92.19**	**87.50**	**65.63**	**53.97**	**-38.22**
SBA						
	SBTA	100.00	100.00	100.00	100.00	0.00
	SBTB	100.00	100.00	100.00	100.00	0.00
	SBTC	100.00	100.00	100.00	100.00	0.00
	SBTD	50.00	100.00	100.00	100.00	50.00
Average		**94.44**	**100.00**	**100.00**	**100.00**	**5.56**
SPA						
	STA	100.00	100.00	100.00	100.00	0.00
	STB	100.00	100.00	100.00	100.00	0.00
	STC	100.00	100.00	100.00	100.00	0.00
	STD	100.00	100.00	100.00	100.00	0.00
	STE	100.00	100.00	100.00	100.00	0.00
	STF	100.00	100.00	100.00	66.67	-33.33
	STG	66.67	100.00	100.00	100.00	33.33
Average		**96.67**	**100.00**	**100.00**	**96.67**	**0.00**
Study Area		**93.75**	**92.92**	**80.53**	**72.97**	**-20.78**

Table 11: *Cakile edentula* Frequency by Study Area Section and Transect						
Study Area Section	**Transect**	**2008 Sample Frequency %**	**2009 Sample Frequency %**	**2010 Sample Frequency %**	**2012 Sample Frequency %**	**2008 to 2012 Difference**
NPA						
	NTA	27.27	16.67	0.00	50.00	22.73
	NTB	38.46	53.85	38.46	53.85	15.39
	NTC	64.29	15.38	53.85	46.15	-18.14
	NTD	38.46	7.69	61.54	53.85	15.39
	NTE	15.38	7.69	23.08	41.67	26.29
Average		**37.50**	**20.31**	**35.94**	**49.21**	**11.71**
SBA						
	SBTA	60.00	0.00	20.00	80.00	20.00
	SBTB	40.00	16.67	20.00	66.67	26.67
	SBTC	0.00	0.00	16.67	40.00	40.00
	SBTD	100.00	0.00	0.00	50.00	-50.00
Average		**38.80**	**5.56**	**16.67**	**61.11**	**22.31**
SPA						
	STA	40.00	0.00	40.00	60.00	20.00
	STB	20.00	16.67	83.33	20.00	0.00
	STC	60.00	20.00	40.00	20.00	-40.00
	STD	0.00	25.00	20.00	0.00	0.00
	STE	0.00	0.00	0.00	0.00	0.00
	STF	0.00	0.00	0.00	0.00	0.00
	STG	33.33	0.00	0.00	0.00	-33.33
Average		**23.33**	**9.68**	**32.26**	**16.67**	**-6.66**
Study Area		**33.93**	**15.05**	**31.86**	**42.34**	**8.41**

Table 12: *Solidago sempervirens* Frequency by Study Area Section and Transect						
Study Area Section	**Transect**	**2008 Sample Frequency %**	**2009 Sample Frequency %**	**2010 Sample Frequency %**	**2012 Sample Frequency %**	**2008 to 2012 Difference**
NPA						
	NTA	0.00	8.33	0.00	0.00	0.00
	NTB	0.00	15.38	0.00	7.69	7.69
	NTC	0.00	46.15	46.15	46.15	46.15
	NTD	46.15	53.85	53.85	30.77	-15.38
	NTE	30.77	46.15	38.46	66.67	35.90
Average		**15.63**	**34.38**	**28.13**	**30.16**	**14.53**
SBA						
	SBTA	0.00	0.00	0.00	0.00	0.00
	SBTB	20.00	0.00	20.00	66.67	46.67
	SBTC	50.00	40.00	50.00	100.00	50.00
	SBTD	50.00	100.00	100.00	100.00	50.00
Average		**27.77**	**22.22**	**33.33**	**61.11**	**33.34**
SPA						
	STA	0.00	0.00	0.00	20.00	20.00
	STB	0.00	16.67	0.00	100.00	100.00
	STC	20.00	80.00	0.00	100.00	80.00
	STD	20.00	75.00	60.00	50.00	30.00
	STE	50.00	40.00	100.00	80.00	30.00
	STF	33.33	25.00	33.33	33.33	0.00
	STG	0.00	0.00	0.00	66.67	66.67
Average		**16.66**	**35.48**	**25.81**	**66.67**	**50.01**
Study Area		**17.86**	**32.74**	**28.32**	**45.05**	**27.19**

Table 13: *Chamaesyce polygonifolia* Frequency by Study Area Section and Transect						
Study Area Section	**Transect**	**2008 Sample Frequency %**	**2009 Sample Frequency %**	**2010 Sample Frequency %**	**2012 Sample Frequency %**	**2008 to 2012 Difference**
NPA						
	NTA	0.00	0.00	0.00	16.67	16.67
	NTB	7.69	23.08	0.00	23.08	15.39
	NTC	7.14	15.38	23.08	15.38	8.24
	NTD	23.08	38.46	38.46	23.08	0.00
	NTE	15.38	46.15	46.15	33.33	17.95
Average		**10.94**	**25.00**	**21.88**	**22.22**	**11.28**
SBA						
	SBTA	0.00	0.00	0.00	0.00	0.00
	SBTB	0.00	0.00	0.00	0.00	0.00
	SBTC	0.00	20.00	0.00	20.00	20.00
	SBTD	0.00	0.00	0.00	0.00	0.00
Average		**0.00**	**5.56**	**0.00**	**5.56**	**5.56**
SPA						
	STA	0.00	0.00	0.00	0.00	0.00
	STB	0.00	16.67	0.00	0.00	0.00
	STC	0.00	20.00	0.00	40.00	40.00
	STD	20.00	50.00	40.00	50.00	30.00
	STE	50.00	60.00	50.00	60.00	10.00
	STF	33.33	75.00	100.00	33.33	0.00
	STG	33.33	0.00	0.00	33.33	0.00
Average		**16.67**	**32.26**	**22.58**	**30.00**	**13.33**
Study Area		**10.72**	**23.89**	**18.58**	**21.62**	**10.90**

G. Species Diversity and Composition

Species diversity generally remains low within the Study Area. A total of 18 species were captured onsite in the quadrat data from 2008 - 2012. The greatest species diversity was identified on the back transects of the Northern and Southern Protection Areas for the 2008, 2009, 2010 and 2012 survey seasons. Species other than AB occasionally dominate small portions of the Study Area. These species were often found on the periphery of the Study Area or in small imbedded clusters. Examples include the dense monocultures of *Spartina patens* that were captured in the data primarily in transects STE, STF, and STG (20% frequency in the SPA in 2012) and *Yucca filamentosa*, which is captured in small amounts each season exclusively within the SPA (approximately 3% frequency in SPA in 2012).

The data tables below evaluate the species composition and overall site diversity. Table 14 shows the species diversity by transect, by study area section and by total study area based on quadrat captures. The higher transect diversity of the western portions of the Study Area corresponds with increased contribution of varying species to canopy cover.

During 2012, nine species were observed within the quadrats within the NPA, which is up by one species since 2008. Five species were observed within the SBA in 2012 and eleven species were observed in the SPA. Overall trends from one year to the next note small changes in the number of species observed within each study area section and within the study area as a whole. Table 15 is a complete list of species that have been

observed within the NGJTC Study Area and secondary dune areas during the 2007 - 2012 seasons.

Table 14: Species Diversity by Study Area Transect (Based on Quadrat Data)						
Study Area Section	**Transect**	**2008 Total # of Species**	**2009 Total # of Species**	**2010 Total # of Species**	**2012 Total # of Species**	**# of Species Gained or Lost 2008 to 2012**
NPA						
	NTA	2	3	1	3	+ 1
	NTB	3	6	2	4	+ 1
	NTC	4	5	5	5	+ 1
	NTD	6	5	7	5	- 1
	NTE	7	7	6	7	0
Total		8	9	8	9	+ 1
SBA						
	SBTA	2	1	2	2	0
	SBTB	3	2	3	3	0
	SBTC	3	4	3	5	+ 2
	SBTD	3	3	2	4	+ 1
Total		4	6	3	5	+ 1
SPA						
	STA	2	1	2	3	+ 1
	STB	2	5	3	4	+ 2
	STC	3	6	2	5	+ 2
	STD	4	5	4	5	+ 1
	STE	3	5	4	6	+ 3
	STF	6	9	6	7	+ 1
	STG	8	5	7	9	+ 1
Total		11	12	11	11	0
Study Area		12	14	13	13	+1

Table 15: NGJTC Study Area and Secondary Dune Vegetation Species List 2007-2012 (* indicates captured in survey data)		
Latin Name	**Common Name**	**Study Area Loc. Observed**
*Ammophila breviligulata**	American beachgrass	SPA, NPA, SBA, SD
Amaranthus pumilus	Seabeach amaranth	SPA
*Cakile edentula**	sea rocket	SPA, NPA, SBA, SD
Carex kobomugi	Asiatic sand sedge	NPA
Cenchrus tribuloides	sanddune sandbur	SPA, SD
Centaurea maculosa	spotted knapweed	SPA, SD
Centaurea sp.	knapweed species	SD
*Chamaesyce polygonifolia**	seaside spurge	SPA, NPA, SBA, SD
*Conyza canadensis**	horseweed	SPA, NPA, SBA, SD
*Cyperus grayi**	flat sedge	SPA, NPA, SD
Digitaria sanguinalis	large crabgrass	SPA
*Digitaria sp.**	crabgrass	SPA, NPA, SD
*Diodia teres**	poorjoe	SPA, SD
Eragrostis pectinata	lovegrass	SPA
Euthamia tenuifolia	slender fragrant goldenrod	SD
Linaria canadensis	toadflax	SPA
*Lathyrus maritimus**	beach pea	SPA, NPA, SBA, SD
Lechea maritima	beach pinweed	SPA
Mollugo verticillata	green carpetweed	SPA
*Morella pensylvanica**	Northern bayberry	NPA, SBA, SD
Oenothera oakesiana	Oake's evening primrose	SPA, NPA, SD
*Panicum amarum**	bitter panicgrass	NPA, SD
Phragmites australis	common reed	SD
Plantago psyllium	sand plantain	SPA, SD
Poa sp.*	cool season grass	SPA, SD
Salsola kali	prickly saltwort	NPA, SPA
Saponaria officinalis	soapwort	SPA
Rhus coppalina	winged sumac	SD
Rosa Carolina	Carolina rose	SD
*Rosa rugosa**	Rugosa rose	NPA, SPA, SD
Solidago canadensis	Canada goldenrod	SD
Solidago nemoralis	Gray goldenrod	SD
*Solidago sempervirens**	seaside goldenrod	SPA, NPA, SBA, SD
Solidago sp.	goldenrod	SD

Table 15: continued		
Latin name	**Common Name**	**Species Area Loc. Observed**
*Spartina patens**	salt meadow cordgrass	SPA, NPA, SBA, SD
Spartina pectinata	prairie cordgrass	SD
*Strophostyles helvula**	trailing wild bean	NPA, SD
Toxicodendron radicans	poison ivy	SD
Taraxacum sp.	dandelion	SPA, SD
*Triplasis purpurea**	purple sandgrass	SPA, NPA, SBA
*Xanthium strumarium**	rough cocklebur	SPA, NPA, SD
*Yucca filamentosa**	spoonleaf yucca	SPA

H. Habitat Quality and Plant Vigor

Plants within the sample quadrats were observed for health conditions including herbivory, dieback and parasites, or any abnormalities. According to the USDA plant database, mean plant height for AB mature plant height is 76.2 cm. Random samples were taken for a select number of plants throughout the community. A random selection of plant heights collected during the 2012 monitoring season averaged 76.0 cm. Previous measurements have generally ranged 76 to 82 mm, reflecting the relatively consistent and standard plant height of AB during the study period at NGJTC.

Plant parasites: Between 2008 and 2012, no unusual or widespread pathological issues related to plant disease have been observed in the studied community. Root feeding nematodes are one of the more common parasitic associates of AB and diebacks of AB along the Atlantic Coast have been attributed to several species of nematodes (Seliskar and Huettel, 1993). Analysis of soils for these nematodes would be a consideration in future surveys only if a substantial dieback potentially related to disease were to occur, particularly as the AB recovers from storm impacts.

A potential fungal species has been identified on some AB in the NPA each season since 2008. The fungus appears to be leaf smut fungal spores attached to several plants that appeared to have recently died. The infected plants were all completely yellowed, but had not broken down and generally retained their structure. The plants were covered with patches of black "soot" that appeared to be fungal spores. Smuts of the class *Ustilaginomycetes* generally attack the reproductive systems of grasses and release spores from a gall that forms on the plant and bursts. Observations of this potential smut were fairly isolated and on several occasions observations of the fungus in the survey data were inconclusive. Other patches of dead AB were identified onsite and appeared to be the result of natural successional dieback from the previous season. It appears that there is no substantial expansion of this potential fungus within the protection areas.

ASGECI scientists have also noted the presence of what may possibly be a rust fungus (*Uredinales* order) on a few *Solidago sempervirens* plants. During 2012 and previous seasons, this orange fungus did not appear to be currently harming the growth of the plants. There are numerous types of rust fungi that have varying effects on their hosts.

In past seasons, a very small amount (several samples) of leaf spots with "bullseye" (round with defined edges) characteristics were identified on *S. sempervirens* onsite. These spots are likely fungal in nature.

At the time of the 2012 study, it did not appear that any diseases were impacting populations of the dominant plant species within the Study Area.

Herbivory: In our study, herbivory refers to any cropping of grasses or forbs. Mammal (Eastern cottontail - *Sylvilagus floridanus*) herbivory on AB has been regularly observed since 2008 in multiple quadrats in all three protection areas. It appears that some of this activity may be linked to path maintenance as well as food consumption. Rabbit feces and herbivory (cropped leaves and/or discarded clippings) were noted throughout the entire Study Area.

Direct evidence of *S. floridanus* herbivory at NGJTC was most common along the dense central portions of the SBA and back portions of the SPA. In general, the frequency of rabbit herbivory within the study area was less than in 2010, which corresponds with reduction in overall AB cover. As with previous seasons, the frequency of rabbit herbivory was highest within the SBA in 2012 where it was observed in 9 of the 18 quadrats. The SPA contained rabbit herbivory in 10 of the 30 quadrats. Within the NPA cottontail herbivory changed most drastically from 15 of the 64 quadrats, in 2010 to 1 of the 63 quadrats in 2012.

Arthropod egg cases on the undersides of AB leaves were observed originally in 2008 and were seen again during all subsequent vegetation surveys. These egg cases were observed within all three protection areas. It is possible that the egg sacs are spider egg sacs (NJDEP Tony McBride, 2008) which would eliminate the herbivory concerns.

Invasive Species: Asiatic Sedge was not identified by ASGECI since 2009 in species monitoring or cover surveys. Asiatic sedge had been identified in the same approximate 25 sq. ft. polygon location between 2007 and 2009. The sedge and its root systems may were removed from the site in 2009. No Asiatic sand sedge populations were identified onsite during 2010. This species was again identified in 2011 in the same location and in a similar sized cluster as previous years. Following a series of storms in late 2011, the topographic conditions in the NPA, including in the previous sedge location, had been extensively altered and the plant was not identified onsite during 2012.

Salsola kali, known as saltwort or Russian thistle is a common exotic plant in NJ dune communities and may be invasive. Although it was observed frequently in 2008, *S. kali* is not a significant component of the NGJTC beachgrass community at this time and was not observed between 2009 and 2012. No documented invasive species were captured in the survey dataset through any of the methods employed and currently do not appear to be substantially impacting the Study Area.

I. Soil Data

Soils at the NGJTC were regularly tested between 2008 and 2010 with uniform physical and chemical properties assessed across the Study Area. Soluble salt, organic matter and carbon levels were consistently low, with little variation across the Study Area.

Generally pH for onsite soils is somewhat alkaline, falling between 7.5 and 7.9. All samples have very low levels of both organic matter and organic carbon (less than 0.1%).

The greatest sample variation in the soil of the NGJTC Study Area is related to the grain size of sand, which is primarily between 0.05 and 2 mm in most samples. Soils within the study area tend to be dominated by medium grain sized sand, with 60-90 % around 0.5 mm. Lesser amounts of coarse sand generally ranging from 10-30% may occur in samples. Soil samples closer to the beach front outside of the study area tend to have larger grain sizes, including course sand and some gravel and higher levels of soluble salt.

Samples were not collected in 2012 as a result of Hurricane Sandy. Additional soil samples will be taken as part of the 2013 study to determine if Hurricane Sandy has altered sand conditions in any measurable way.

IV. Discussion:

A. Piping Plover Preferences

The United States Fish and Wildlife Service (USFWS) indicates that dense beachgrass cover (over 50%) may reduce the probability of piping plover beach nesting and varying densities of vegetation (20% to 70%) that may be optimal for key species including piping plovers, least terns and rare plants such as seabeach amaranth. It is held by the USFWS and others that on stabilized beaches, periodic management of vegetation in piping plover nesting areas may be needed to provide suitable areas of open beach interspersed with clumps of beach vegetation.

Several studies within the Northeast and Mid-Atlantic region indicate that piping plover nesting habitat immediately surrounding the nest (nest microhabitat) is typically well below 50% vegetation cover. In addition, mean vegetation cover within the general vicinity of the nest tends to be extremely sparse. Cohen *et al.* 2008 identified plovers nesting at a vegetation cover percentage mean of 7.5 ± 1.7% on nourished beaches in Westhampton, Long Island, NY. All nest site plots ($1m^2$ around nest location) in the study were under 47% coverage. Average nest microhabitat vegetation cover on sites studied in Maryland and Virginia was approximately 11% (range 9-16%) (Patterson, 1991) and approximately 15% in a Massachusetts nest site study (MacIvor, 1990). Random points surrounding nests in the Massachusetts Study Area indicated mean vegetation levels of approximately 9% (McIvor, 1990). The mean cover within the surrounding 50 m vicinity of the Long Island nest sites was <5% with a maximum of 48.6% cover (Cohen, *et al.* 2008). Fraser (2006) suggested approximately 5% vegetative cover may be ideal nesting habitat on Atlantic coast barrier island beaches. Although not

represented in the 2012 vegetation study data, Hurricane Sandy has currently reduced the vegetation cover levels to below 5% throughout most of the Study Area.

B. Seabeach Amaranth Preferences

Seabeach amaranth does not occur on beach microhabitats that are heavily vegetated. Seabeach amaranth is quickly outcompeted by perennial herbs (i.e. AB) and shrubs. Seabeach amaranth has been known to occur with vascular plant species such as *Cakile edentula*, *Chamaesyce polygonifolia*, and *Polygonum glaucum*.

The USFWS Recovery Plan for seabeach amaranth states, "seabeach amaranth occupies elevations from 0.2 to 1.5 meters (8 inches to 5 feet) above mean high tide." The predicated mean high tide nearby the Study Area is approximately 4.56 feet AMSL. Based on this information, seabeach amaranth should inhabit areas of the beach ranging from 5.26 feet to 9.59 feet above mean high tide.

Three seabeach amaranth plants had been identified at the NGJTC (prior to the vegetation cover study) in 2009 at three distinct locations: one in the southeast corner of the SPA, one near the central portion of Line B in the SPA, and one near the central portion of Line B in the NPA. Seabeach amaranth plants have not been identified onsite since the late summer of 2009. All three plants were likely destroyed by major storm accretion in the late summer of 2009 shortly after their identification.

Major storm events, including Hurricanes Irene and Sandy, have drastically altered the topographic and vegetation conditions at Sea Girt NGJTC beaches. Seabeach amaranth seeds may have been washed away or exposed post-Hurricane Sandy. Careful evaluation in subsequent seasons will need to be performed to determine presence/absence of seabeach amaranth at the NGJTC. While the reduction of AB cover is generally beneficial to seabeach amaranth, the leveling of the topography and loss of elevation may cause more frequent ocean inundation of the Study Area and reduce the chance of seedling survival. Post-Sandy topographic surveys planned in September 2013 will reveal the extent of this impact.

C. General Site Conditions

ASGECI collected data utilizing multiple qualitative and quantitative vegetation assessment parameters and observations of abiotic conditions to provide a multi-faceted profile of the beach community at the NGJTC. The four year dataset indicates that the NGJTC Study Area is a low diversity community dominated by an AB population that is robust and extremely dense over significant sections of the study area and absent in others.

AB continues to be the dominant species, comprising approximately 57% of all vegetation cover; however, this number dropped from past seasons where it typically represented around 80% of all cover. The beachgrass population was reduced significantly throughout the study area as a result of Hurricane Irene. Whereas in 2010, the beach community appeared stable or expanding from previous seasons, the storm surge caused by Hurricane Irene caused significant erosion and accretion within the

protection areas ranging from one to three feet and accretion in excess of 4 feet in portions of the intertidal zone. The storm also resulted in more defined topographic variation in the study area, including steeper slopes along several dune peaks. Section O, Erosion and Topography discusses these topographic changes and their impacts in greater detail.

Storms, such as Hurricane Irene, resulted in a reduction of AB cover by approximately 34.8% from 2008 in the NPA. Between 2010 and 2012, storms had impacted all of the NTA and much of the NTB lines leaving very little vegetation. Other transect subsections, including portions of NTC, NTD and NTE that once contained cover in excess of 50%, had very little or no AB vegetation cover following Hurricane Irene. AB cover reductions were also present to a lesser extent in the SBA and SPA with losses of 19.7% and 7.9% respectively.

After AB, *Solidago sempervirens* was again the most common species sampled within the Study Area in 2012 at approximately 19%, which is up significantly from approximately 7.4% in 2010. Other increasingly dominant species include sea rocket (8.5%), saltmeadow cordgrass (6.7%), horseweed (5.2%) and seaside spurge (1.7%) of total species cover. An additional seven species occur in total cover composition at levels less than 1%. In 2010, sea rocket, saltmeadow cordgrass and Northern bayberry represented the most dominant species after AB and seaside goldenrod. All were at significantly less levels (between 1.5 and 2.0% of total species cover). Secondary species comprise very minor portions of total vegetation when evaluated in all of the existing datasets; however, it appears that several species have increasing dominance which is likely the partial result of storms reducing AB cover and allowing for new species colonization. AB may have eventually outcompeted these species in various locations over time as succession progressed, had conditions remained stabilized over successive growing seasons.

In past study seasons, the NPA's habitat use had been limited, in part, by a combination of dense vegetation cover, distribution and erosion. The vegetation data between 2008 and 2010 season data showed a trend toward an increasingly dense AB population. Hurricane Irene in 2011 created more open, less vegetated patches onsite, particularly within the dune trough of the NPA. The resultant change in the habitat may have played a role in the attempted colonization by least terns in 2012 (see 2012 NGJTC Summary Report).

Following completion of the 2012 Vegetation Survey, Hurricane Sandy devastated the shorelines of New Jersey in late October 2012. The near complete loss of vegetation and leveled topography may be somewhat conducive to beach nesting birds. However, the current vegetation levels are less than 5% and allow piping plover and least terns very little escape from environmental elements such as wind and sun and little protection from predators. The vegetation and topographic study planned for September 2013 will help quantify impacts of Hurricane Sandy and its significance relative to endangered species habitat at the NGJTC.

D. Cover Estimation (Daubenmire)

Table 2 presents Daubenmire cover results for 2012 and previous survey years. The Daubenmire Site-wide cover datasets of 2008 - 2010 and 2012 indicate that AB cover levels dropped since previous years. The 2012 overall mean cover of 17.57 ± 4.50 is notably lower than the previous seasons results (2010: 42.98 ± 6.24; 2009: 48.64 ± 5.79; and 2008: 42.69 ± 5.67).

The coefficient of variation for cover (Cc) among the sample is 134.80% which indicates a fairly high variability level of AB cover distribution among the entire Study Area. The Cc among the 2010 sample was 77.23%. The Cc in 2009 was 63.3% and 70% in 2008. These numbers demonstrate that AB within the Study Area consistently remains somewhat unevenly distributed.

Estimated cover levels of AB within the NPA remained statistically identical at approximately 42% during 2008 and 2009. In 2010, AB cover dropped to 29.05 ± 7.88 (95% confidence interval) due to erosion and accretion along the NTA and NTB lines. During 2012, AB cover dropped significantly to 7.01 ± 4.00 AB as a result of severe erosion from storm events, such as Hurricane Irene. The conditions have become extremely patchy as a result with a Cc of 226.60% in 2012, which is significantly patchier than in 2008 when the Cc was 72%. AB cover for the SBA was 33.25 ± 12.47 (95% confidence interval) and for the SPA was 30.33 ± 9.05 (95% confidence interval). These numbers are also down from previous seasons with increases in the Cc. Between 2008 and 2012, the overall Study Area cover level of AB has dropped by approximately 25%.

Cover levels within some microhabitats within the study area, particularly the NPA, appear to change dramatically from season to season depending on the size and frequency of storms. Hurricane Irene resulted in massive areas of erosion and accretion throughout the Study Area, which also led to decreases in cover. This drastic loss reduced the overall Study Area cover numbers and tended to offset cover data increases from other transect locations. Other portions of the Study area that are somewhat sheltered from storms have generally increased in cover or density.

Long term cover trends would be better determined by continuing to conduct a late summer vegetation survey each growing season to create a more robust, long term dataset where comprehensive statistical analysis may be completed to determine significant change.

E. Canopy Cover (Leaf Point Intercept)

The point intercept canopy estimation was included in 2009 and continued in 2012 as a secondary means of determining cover. Table 5 presents the point intercept canopy cover results for 2012 and previous survey years. The Study Area (all species) vegetation cover for 2012 was determined to be 33.63%. The point intercept AB canopy cover estimation result of 23.30% for the entire Study Area was found to be relatively similar to the Daubenmire Cover Class estimation for AB cover 17.57 ± 4.50. The correlation

coefficient for these two methodologies for AB cover on the transect subsection level was determined to be 0.73 which demonstrates a somewhat strong correlation.

Canopy cover results for AB utilizing the point intercept methodology were generally down overall when analyzed on a transect subsection level and on a study area section level as compared to 2009 and 2010 coverage percentages. Hurricane Irene resulted in massive areas of erosion and accretion throughout the Study Area, which is primarily responsible for the decreases in canopy cover observed. Decreases in point intercept canopy cover corresponds to overall decreases in percent cover (Daubenmire method), density and basal cover percentages observed.

F. Basal Cover (Basal Point Intercept)

Table 4 presents basal cover results based upon the point intercept survey methodology for 2012 and previous survey years. Basal vegetation cover for 2012 was 3.56% for the Study Area, down slightly from 2010's 3.74%. This number is down more from 2009's 8.00% and 2008's 17.15%. Within the NPA, basal vegetation hits have dropped by 10.28% since 2008 to 1.47%. Basal vegetation hits are down more substantially within the SBA and SPA, by 18.86% and 17.23%, respectively, since 2008. Basal vegetation decreases may be the result of vegetation loss and sand accretion due to storm events.

In the previous survey seasons, Study Area decreases in basal vegetation hits contradicted the relative stable or increasing leaf cover estimation or density data. One reason for this discrepancy may have been the result of accretion, often in excess 12 inches, from storm events which sufficiently covered AB bases while often leaving leaf canopy exposed. Stem density counts (which better identify tiller bases within a quadrat) combined with Daubenmire cover estimates and point intercept canopy cover estimations appear to be more accurate methods for determining both habitat cover and stem count to cover.

G. Species Composition Relationship between Daubenmire Cover Class Estimation, Basal Point Intercept and Leaf Point Intercept

Table 16 compares the species composition onsite by utilizing the Daubenmire cover methodology, the canopy point intercept methodology and the basal point intercept methodology.

Although the number of basal AB hits has dropped since 2008, basal point intercept does reveal broad trends in species composition similar to the other methodologies employed. However, the point intercept basal cover method tends to not sufficiently capture less frequent species within the vegetation community and is therefore limited in its ability to determine secondary species diversity onsite (see Table 16).

When analyzing the three sampling methods side by side, it can be seen that the canopy cover point intercept method captures the greatest species composition as compared to the basal point intercept method and the Daubenmire method. However, all three sampling methods show a relatively similar dominance of certain species (e.g. AB, *Solidago sempervirens*, *Conyza canadensis*, *Cakile edentula* and *Spartina patens*).

On a more localized management unit scale, point intercept canopy estimation may be the more useful method of determining distribution trends on a smaller management unit scale because of the number and even distribution of samples per management unit.

Table 16: 2012 Comparison of Species Composition for the Study Area Utilizing Point Intercept Basal Cover, Point Intercept Canopy Cover and Daubenmire Cover Class Methodologies

Species	Species Composition (Basal Point Intercept)	Species Composition (Canopy Point Intercept)	Species Composition (Daubenmire)
Ammophila breviligulata	47.47%	69.28%	56.79%
Cakile edentula	5.06%	2.28%	8.50%
Spartina patens	5.06%	4.15%	6.70%
Chamaesyce polygonifolia	1.27%	0.67%	1.70%
Solidago sempervirens	28.48%	15.33%	19.13%
Panicum amarum	0.63%	0.40%	N
Triplasis purpurea	1.27%	0.47%	0.60%
Lathyrus maritimus	N	0.60%	0.07%
Rosa rugosa	N	0.13%	0.07%
Morella pensylvanica	0.63%	1.20%	N
Yucca filamentosa	1.90%	0.74%	0.07%
Strophostyles helvula	N	0.07%	N
Xanthium strumarium	N	0.13%	0.07%
Cyperus grayi	0.63%	0.80%	0.98%
Digitaria sp.	N	0.27%	N
Conyza canadensis	7.59%	3.41%	5.24%
Unknown grass	N	N	0.07%
Iris sp.	N	0.07%	N

N – not detected in sampling method

H. Density

Tables 6-8 present density results for 2012 and previous survey years. The Study Area's overall AB mean density equaled approximately 28.73 ± 7.85 s/m^2 (95% confidence level), which is less than the Study Area's overall AB mean density of 67.82 ± 11.73 s/m^2 in 2010; 59.17 ± 8.61 s/m^2 in 2009 and 52.06 ± 8.85 s/m^2 in 2008.

Comparisons of density from 2008 to 2012 at the subtransect level have consistently shown both increasing and decreasing AB densities across all three protection areas. The 2012 data indicates increasing AB density in few subtransects with an overall decrease of AB density across the study area. When analyzing density on a protection area level, decreases in density were observed within the NPA (decrease of 35.40 s/m^2) and SBA (decrease of 21.17 s/m^2) since 2008, with an extremely minor increase in density in the SPA (increase of 0.53 s/m^2). Typically only 2 or 3 quadrat samples per subtransect section are recorded per season and as a result, frequent fluctuations in the data would be expected at this level. However, consistent AB density decreases in certain subtransects

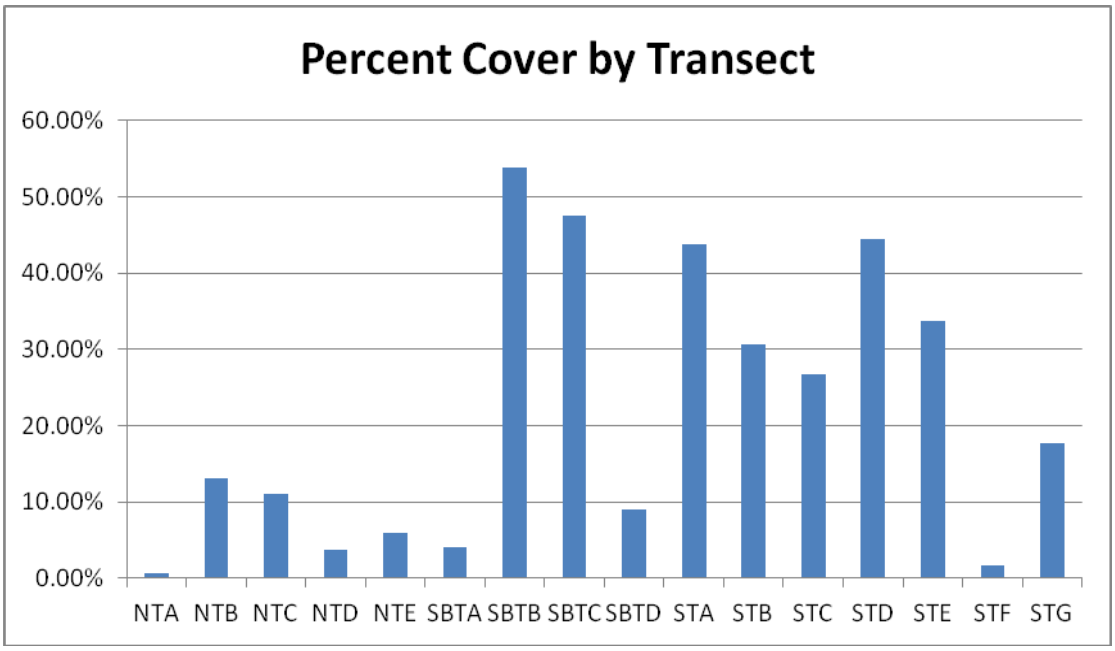
and consistent increases in others have now been observed after multiple seasonal samples preliminarily formulate a picture of the Study Area dynamics on a microhabitat level.

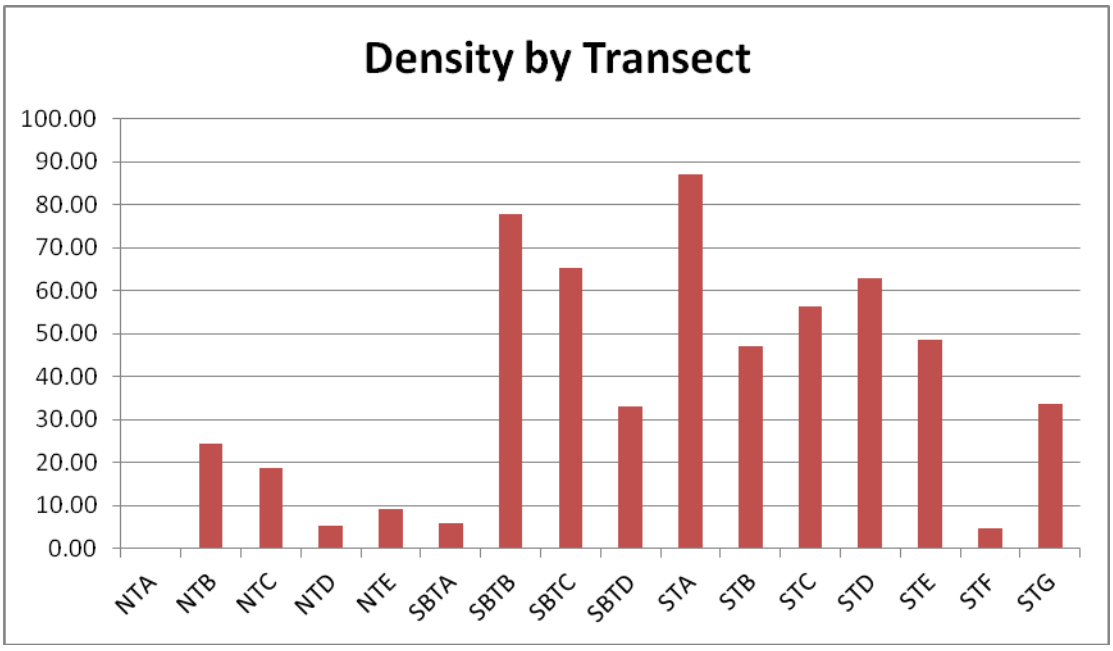
Anecdotal observations indicated an increase in *Conyza canadensis* across the Study Area since the 2008 monitoring season, particularly within the SPA. Calculations for density confirmed these anecdotal observations. Increases in this species may be the result of various factors, including weather, human disturbance, and change in dynamics of the vegetation community.

I. Relationship between Percent Cover and Density

As expected, there is a strong correlation between the results of cover estimates and density (stems/m^2) for AB within the Study Area. A correlation coefficient (CC) of 95.59% was identified for the species. This number is slightly higher than 2010's 90.95%, 2009's 88.81%, and 2008's 78.99%. The correlation coefficient is a reflection of the positive and negative relationship trends between the two measurement variables. A high CC number (close to 100) tends to reflect similar positive movement among the two measurement variables. A comparison of Charts 1A and 1B illustrates this strong correlation. Variables including herbivory of leaves and leaf overhang from plants outside the quadrat are examples of factors that may account for some variation between cover and density trends. This correlation will aid in determining the number of stem removals required to achieve cover percentage goals in any Study Area vegetation management. Additional data collection onsite will more fully demonstrate this stem count/cover relationship and help refine potential vegetation removal methodologies.

Chart 1A and 1B: Relationship between Daubenmire Cover and Density For AB by Transect





J. Biomass

Due to the non-invasive collection methods utilized onsite, the NGJTC biomass is a very general estimation and is not utilized in any additional site analysis in this report. As additional AB biomass estimations in the northeast become available, they may be utilized in the NGJTC site estimation and thus improve above ground biomass estimation accuracy.

K. Frequency

Tables 10-13 present frequency results for the 2012 survey season and previous survey years. During 2012, frequency of AB within the NPA dropped within each transect when compared to 2008. Frequency data revealed relatively stable conditions for AB across the remainder of the Study Area (SPA and SBA), with changes occurring in only a few transects. AB frequency remains at approximately 100% within the SPA and SBA. Within the NPA, AB frequency has fallen to 53.97%. *S. sempervirens* frequency within the Study Area has increased since 2008. *S. sempervirens* frequency within the NPA is up to 30.16% (approximate 15% increase since 2008). Additionally, its frequency within the SBA is up to 61.11% (an approximate 30% increase since 2008) and within the SPA is up to 66.67% (an approximate 50% increase since 2008). The 2012 data shows *C. edentula*, occurred at around 49% in the NPA, approximately 17% in the SPA and approximately 60% in the SBA. The presence of sea rocket may correlate with tidal inundation as it tends to thrive in areas occasionally flooded by wave action particularly mid-front transects of the Study Area. *C. polygonifolia* frequency is approximately 22% in the NPA, 30% in the SPA and below 6% in the SBA and has increased within each of the Study Area sections since 2008.

Numerous other species occur throughout the Study Area sections, although these species generally occur in less than 20% of the quadrats sampled. One notable species that increased in frequency in 2012 was *Conyza canadensis*, particularly within the SPA. This species occurred in 60% of the quadrats sampled in the SPA. The cause of this increase may be due to human impact and seed dispersal or the lack of storm exposure and overall increase in density and expansion of the vegetation community in the SPA. The overall contribution to cover or vegetation composition for many of these other species remains small, as frequency does not account for the size or number of plants within a single quadrat. As a result species other than AB continue to be of low management priority and should not be factored substantially into onsite management decisions.

Aside from clear erosion and burial, increases and decreases in the frequency of these species are likely influenced by several factors including the patchiness of the vegetation community, the number of samples taken within the protection areas, precipitation/weather, and human/animal or other seed dispersal factors.

L. Species Diversity and Composition

As expected, AB remains consistently dominant within the Study Area and likely outcompetes annual species. Although AB is significant in community establishment, the

species has been shown to have a negative impact on sympatric annuals over time. *Triplasis purpurea* has been specifically studied relatively locally (Cheplick, 2005) and determined to be negatively impacted by AB competition. This species is one that occurs at relatively low densities at NGJTC and colonizes open sandy areas not locally dominated by AB.

Between 2008 and 2012, the back transects of the NPA and SPA remain slightly more diverse than other areas. This was evident in 2012 where AB losses in the NPA from Hurricane Irene facilitated the colonization of competitive species in several trough locations. Portions of these transects tend to contain open sandy patches with lower levels of AB, with apparently less direct exposure to tidal action and greater levels of human disturbance including fill material deposition, exposed jetties, and bulkheads. The change in community dynamics along back transects allows for the establishment of more opportunistic or generalist species such as *Lathyrus maritimus* and *Xanthium strumarium* as well as minor amounts of shrub species.

M. Habitat Quality and Plant Vigor

The AB population experienced substantial losses from Hurricane Irene in August 2011. This was the first vegetation survey over a several year period where the AB population was not at the relatively same cover level or spreading in comparison to previous seasons. Areas such the frontal edge of the SPA, which had expanded eastward in AB cover were bare at the time of the 2012 study.

Plant parasites and herbivory continued to not be limiting factors of the late season growth of the remaining AB within the Study Area.

Plant parasites:
As with previous vegetation survey seasons, it did not appear that the smut that was observed on plants had a significant impact on the establishment or growth of AB onsite. Observations of the potential smut were fairly isolated and on several occasions observations of the fungus in the survey data were inconclusive and qualitatively appear more prominent on certain days and less on others. Other patches of dead AB were identified onsite and appeared to be the result of natural successional dieback from the previous season.

Herbivory:
For the purposes of this study, herbivory is considered to be any cropping or consumption of a plant, even for the potential purpose of travel corridor maintenance. It does appear that some of the Eastern cottontail (*Sylvilagus floridanus*) herbivory observed within the Study Area may be for this purpose.

Anecdotal observations indicate that rabbit herbivory is the most common herbivory activity impacting the NGJTC during all vegetation surveys. The herbivory was particularly noticeable in the Spring of 2009 but did not appear to result in a change to overall density or cover during the fall 2009 survey. The overall frequency of herbivory was approximately 31% in 2010. The herbivory frequency dropped to approximately 18% in 2012, which corresponds closely with overall AB losses.

Changes or correlations in rabbit herbivory have not been directly studied at NGJTC; however, it may be expected that as rabbit populations fluctuate, potentially so will the level of herbivory. Therefore any positive or negative impacts to rabbit populations, including predator control, disease or other factors may impact observed AB herbivory levels. Other dynamics, such as rabbit competition and selection of habitat areas may also factor into herbivory changes.

Between 2008 and 2012, rabbit herbivory did not result in any substantial reduction (significant for plover suitability) in overall vegetation cover within the Study Area during the late summer/early fall data collection. It is important to consider that onsite observations indicate that rabbit herbivory may be a greater cover suppressing factor in the spring when beach nesting birds are potentially onsite. Herbivory may also be a greater factor as AB reestablishes itself following losses from Hurricane Sandy.

N. Wind and Tide Data

A standard tide line recorded by VS Land Data during topographic surveys in on October 8, 2012 was just below 4 feet. The mean tide range (that is the typical difference between high and low tide) at NGJTC is approximately 4.4 feet based on NOAA data from Belmar. The spring range (difference between spring high and low tides) is approximately 5.3 feet with the spring high typically at 6 ft AMSL with the spring low often less than one foot AMSL. As of early October 2012, this spring high line was well outside of protection areas (see Appendix H of Summary Report for Topographic Survey).

The beach topography at the time of the 2012 indicated accretion by as much as three feet (since 2008) in the frontal portions of the NPA following Hurricane Irene (see Figure 3). Subsequently, Hurricane Sandy in late October appeared to have significantly reduced overall topography within the study area. This may include a shift of the spring high tide line closer or within the NPA. The topographic survey planned for the Fall 2013 will quantify this change in topography and may impact future management decisions onsite.

Prevailing wind directions at the NGJTC (collected from the Office of the NJ State Climatologist) are most often derived from westerly or northwesterly winds with average summertime maximums of 20 mph; however occasional northeast winds from Hurricanes or Nor'easters are at times in excess of 40 mph. On August 27, 2011 leading up to Hurricane Irene, wind speeds reached 48 mph at Sea Girt, with approximately 2.5 inches of rain. Easterly winds, typically northeast or southeast, though less common than maximum westerly winds, were generally common throughout much of the year and typical mean daily maximum wind (mph) tend to be 20-25 mph.

Summer months at NGJTC tend to have slightly lower maximum wind speeds with an average of approximately 20 mph. The 2008-2012 trends show maximum daily winds originating directly from the south increase during the summer months. Information was provided from the Sea Girt Station of the NJ Weather and Climate Network, Rutgers University (http://climate.rutgers.edu/njwxnet/) which collects wind data from a station onsite just west of the Study Area.

Wind observations taken onsite (4 feet above ground elevation) during the vegetation surveys tend to be highly variable from day to day and within the various dune micro habitats. Recordings indicated that westerly winds are sometimes reduced in the NPA by the presence of the seawall and the elevated secondary dune area. Trough areas onsite, particularly the mid transects of the SPA and the back transects of the NPA, are partially sheltered from east or northeasterly winds.

O. Erosion and Topography

ASGECI compared beach topography between the 2008 and 2012 surveys (see Appendix A, Figures 1-3). Between 2008 and 2010, intertidal beach (areas in front of protection areas) across the entire NGJTC had decreases in elevation of 3 to 6 feet. These included general elevation losses along the central portions of the NTA line of 2 to 4 feet. It appears that accretion from Hurricane Irene in 2011 resulted in an elevation increase of 2 to 4 feet of sand (from 2008 levels) in the NGJTC intertidal areas.

Between 2008 and 2012, topographic conditions within the protection areas have fluctuated with some dune peaks and troughs shifting with subsequent storms (see Appendix A, Figures 1-3). Generally the topographic conditions with the NPA have remained between 9 to 16 ft. AMSL. Fluctuations in NPA topography generally ranged from 0-2 feet between 2008 and 2012, with accretion or depletion occurring in many locations (see Appendix A, Figure 1).

Localized topography, particularly dune slope steepness within protection areas, changed significantly in several locations a result of Hurricane Irene. A storm surge breach of the dunes created more flat expanses between subsections 4 and 5 of the NTA - NTD transects (see Appendix A, Figure 1). This expanse dropped in topography by at least 2 feet in portions of these subsections, particularly between NTC 4-5. Dune peaks located near the NTB 4 and NTB 5 transect points became steeply sloped and elevated by one foot or more in some spots (see Appendix A, Figure 1). In general this surge resulted in a reduction of established AB vegetation. Other areas, including transect subsection NTD 5-6, had accretion by as much as 2 feet between 2008 and 2012.

The SBA had similar sand accretion between one and three feet, particularly along frontal transects SBTA and SBTB. A similar steeper sloping dune condition developed on the southern end of the SPA. A flat level expanse also developed between the central portions of the STA and STD between 2008 and 2012 (see Appendix A, Figure 3).

These results of the 2012 study were subsequently altered by Hurricane Sandy in October of 2012. The storm resulted in a near complete loss of vegetation and a complete leveling of topography within the study area. It appears that some of the sand loss from the storm was recovered by wave action during 2013; however, the topographic variation of dune peaks and troughs was lost throughout much of the study area. A complete topographic study planned in the Fall of 2013 will help quantify these impacts.

Impacts of Topography in Relation to Dune Vegetation

Multiple studies (Disraeli, 1984; Marshall, 1965; Wallen, 1980; Eldred and Maun, 1982) have illustrated a strong positive correlation between AB vigor and sand accretion in dynamic dune habitats. In contrast, relatively stable dunes tend to have greater levels of AB senescence over time (Disareli, 1984). Disraeli (1984) demonstrated increases in biomass, leaf area; plant height; tiller density; buds per tiller; number and internode length of vertical rhizomes; and chlorophyll concentration on AB plants exposed up to 35 cm of sand accretion. In this study, key perimeters of cover and plant height continued to correspond positively to accretion levels of up to 59 cm. Maun and Lapierre (1984) found a 50% survivorship of AB after artificial burial of depths of less than or equal to 60 cm of sand. Shoot emergence from deep sand by surviving plants was marked by longer internodes and an increase in nodes. The study also noted that surviving portions of the population may through rhizome spreading, successfully and rapidly recolonize the newly formed bare areas. In addition, sand accretion may suppress growth of some AB associate species such as *Triplasis purpurea*. These associate species are often found in greater numbers on more stable dune areas (Disraeli, 1984). One associate exception is *Cakile edentula*, which has shown some positive root growth and increased seed production following sand accretion (Zhang and Maun, 1992).

Between 2010 through 2012, it appeared sand accretions and erosion resulted in continual reductions in AB cover and density to some portions of frontal and middle Transect subsections of the study area. Research indicates that sand accretion at the levels previously observed at NGJTC over the course of one full seasonal growth cycle may promote AB increases. However, the level of sand shifting including erosion or accretion in excess of two feet in recent seasons (2010 - 2012) may have hindered the quick reestablishment of AB in some areas. It does appear that the clearing of AB in some portion of the site, particularly the central NPA, had allowed less dominant species, such as sea rocket, seaside goldenrod and purple sandgrass, to establish themselves.

As of June 2013 anecdotal observations find cover levels of all vegetation remaining well under 5%. Certain annual species, such as sea rocket, are currently the most dominant species. The recommendations below reflect the most recent observations of topography and vegetation establishment at NGJTC.

V. Recommendations:

A. Introduction and 2008-2010 Methodology

ASGECI scientists previously recommended future vegetation (AB) reduction management in portions of the NPA, based on vegetation and topographic trends identified in data collection between 2008 and 2010 Vegetation and topographic study data collected during from 2008 - 2010 indicated that vegetation reduction strategies that incorporate AB removal at the NGJTC had the potential to significantly increase the probability of key species establishment in the NPA.

Patterns of erosion and sand accretion from storms between 2008 and 2010 demonstrated a progressive or stable density of the AB community with a continually steeper gradient in frontal portions of the NPA. During the vegetation and topographic data collected

during September of 2012 demonstrated the most drastic changes to the NPA community from previous seasons. This includes an expansion of the intertidal zone by accretion levels as much as three feet or more in the front of the NPA. And the establishment of large level areas between dune peaks within the NPA. Topographic changes within the NPA corresponded with substantial reductions of AB/vegetation cover vegetation at several locations within the NPA including along frontal transects and within portions of the dune trough around the C transect. These conditions were completely altered immediately after data collection by Hurricane Sandy.

In past seasons, ASGECI created preliminary recommendations for selective vegetation removal with certain areas, or individual management units, within the NPA. Management recommendations within these units were updated based data collected and the trends discerned from the most recent survey season.

Each management unit was created from transect subsections (150-165 ft) and a 12.5-foot parallel buffer on either side of the transect subsection. Individual management unit recommendations and seasonal adjustments were previously based on the following Management Unit Recommendation Factors:

1. Previous species locations (including observed piping plover nesting activity and seabeach amaranth locations)
2. Current vegetation cover percentages and density
3. Human disturbance potential or conflicts
4. Topography
5. Wind and Tide Data

Cover reduction goals were determined based on previous studies of piping plover preferences in the northeast (Cohen, *et al* 2008, others) as well as qualitative observations of plover site preferences performed by ASGECI surveyors, NJDEP and USFWS. It has been repeatedly demonstrated that vegetation cover should be less than 50% for ideal piping plover nesting habitat, the primary species of management concern. Therefore, all of the previous reductions would have ideally resulted in a <50% maximum cover at all locations within each managed unit with specific clumped distribution patterns to be developed based on Cairns (1982) and Prindiville-Gaines and Ryan (1988) to provide protection from predators. Creating windows of target cover goals will allow for some patchiness in the cleared areas. To facilitate the management, target areas of less than 5%, 5% to 15% and 20% to 25% were established. Secondary areas, such as those in the back dune areas (i.e. NTC 5-6 and NTE 1-2), were assigned slightly higher targets cover of 20-25% to allow cover for piping plovers from extreme weather conditions and predators. Key potential nest area targets were much lower, ranging less than 5% to 5-15%. Additional details of previous management unit strategies are available in the 2010 Vegetation Survey Report.

B. 2012 Post Hurricane Management Recommendations

The two most recent hurricanes to severely impact the NGJTC Beach: Hurricane Irene in August 2011 and Hurricane Sandy in October 2012 resulted in substantial changes to the study area and subsequently our onsite management strategy. As mentioned throughout

this document, the impacts of Hurricane Sandy, though not yet quantified, have drastically changed the beach front at Sea Girt.

The level topography and loss of vegetation may result in more frequent establishment attempts by beach nesting birds. The attempted establishment of least terns in 2012 may be an indication of this trend. The likely limiting factors, particularly with a complete lack of AB and other vegetation cover, would be the presence of foxes and exposure to elements. The vegetation cover within the Study Area may not be the most optimal for piping plover usage of the site (as discussed in Section IV - A above). Also depending on current topography and study area elevation (which appears to be altered substantially), inundation of the NPA from storm surges during critical nesting and fledging periods may be more likely to occur.

The complete loss of vegetation and leveling of localized topography throughout the NPA have suspended the need for active onsite management for the foreseeable future. This would include both the less invasive hand removal strategies at the unit level and more substantial mechanized sand movement strategies previously considered.

The topography survey and subsequent vegetation survey in 2013 will allow ASGECI to more fully evaluate the impacts of Hurricane Sandy and will be significant tools in determining future vegetation and topographic strategies.

ASGECI's observations from the beginning of the vegetation study have demonstrated major fluctuations in beach topography based on storm cycles. These include periods of accretion and periods of erosion. The current observed condition, following Hurricane Sandy, appears to be significant erosion over the entire Study Area. While it is impossible to determine on a seasonal basis what the short-term condition will be, the predicted range of sea level rise due to global climate change would be expected to compromise the habitat quality within the Study Area. Temporary solutions to this issue may include beach replenishment, similar to that previously conducted on the NGJTC beach; however, this would only occur as a larger regional project and would not be under the control of the NGJTC.

Based on the current conditions, ASGECI would recommend the following:

- No short term management in topography as the localized topographic recommendations previously proposed do not reflect the current onsite condition.

- Observation of vegetation establishment. ASGECI will continue vegetation and topographic analysis in 2013. It is likely that the vegetation analysis will not have the same quantified transect design as previous studies based on the heavily reduced level of vegetation currently onsite. This report will include additional detailed information on the post storm reestablishment of AB and other vegetation within the Study Area. At this time, ASGECI does not believe that it would be useful to perform planting or seeding of the Study Area to encourage vegetation establishment.

- Continued monitoring of invasive species. Observations of the potential establishment of *Carex kobomugi* should be continued. This may be of particular concern due to Study Area alteration caused by Hurricane Sandy.

- Continued monitoring and future control of fox populations. Fox control is increasingly crucial to the success of beach nesting birds at NGJTC, particularly with the increased amount of exposure onsite due to the complete lack of dune vegetation cover.

- Future long term vegetation and topographic management strategies may again be considered. Post storm conditions need to be closely monitored in order to evaluate habitat suitability. This may include evaluation of prolonged exposure of jetties and bulkheads within the Study Area. If unsuitable topographic conditions persist for prolonged periods following storms, mechanical leveling of sand in a manner similar to the methodologies previously implemented at Seven Presidents Oceanfront Park may be considered (See Strategy B in 2010 Vegetation Survey Report).

- In previous vegetation survey reports, ASGECI considered minor substrate manipulation to encourage nesting for piping plover. This was due to the positive correlation between piping plover nest preference and the presence of coarse grain substrate (pebble and cobble sized objects) has been observed [Cohen *et al* (2008)]. As with other localized management strategies, this strategy would be suspended until post-Hurricane Sandy conditions can be further evaluated.

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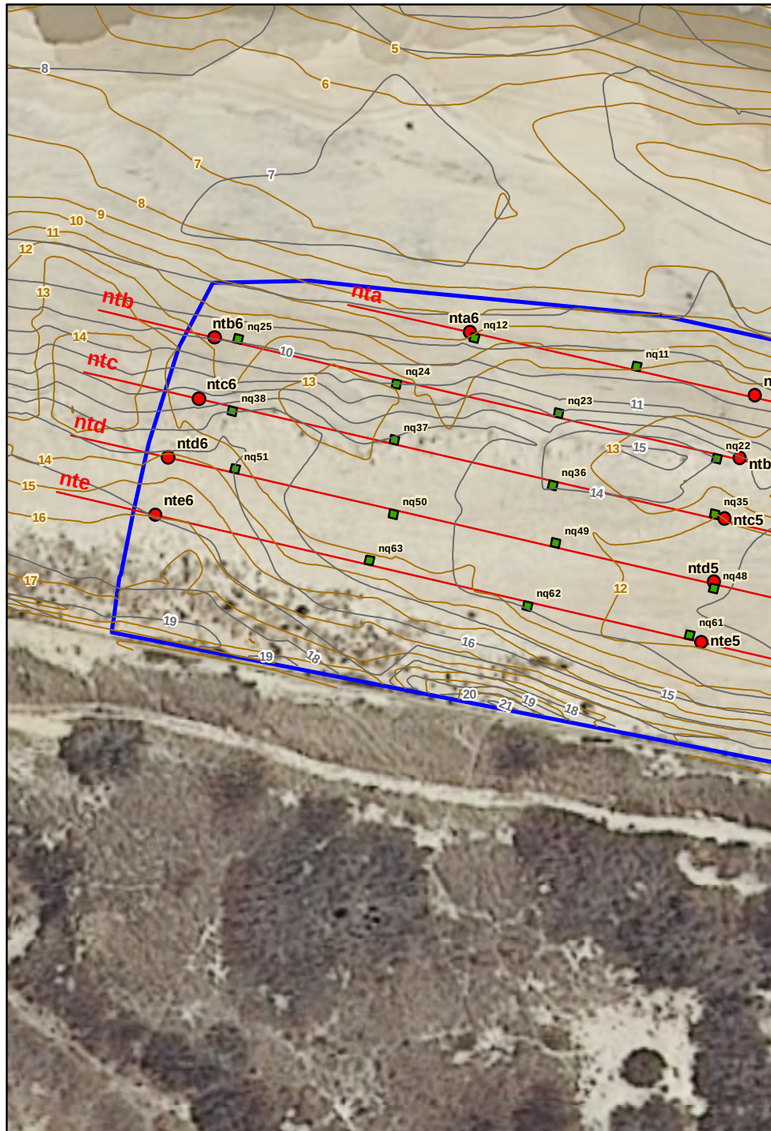
APPENDIX A

FIGURES



Legend

- Northern Protection Area
- Southern Protection Area
- Transect Lines
- Transect Line Points
- 1-sq. meter Quadrat
- Contour Lines - 2012
- Contour Lines - 2008

0 60 120 Feet

Sources:
Contour Lines from Sea Girt NGTC Topographical Survey, VS Land Data, Phillipsburg, New Jersey, from separate surveys conducted in September 2008 and September 2012.
Protection Areas, Beach Area, Quadrats, Transect Lines and Points provided by Amy S. Greene Environmental Consultants, Inc. produced utilizing Trimble GPS equipment during fieldwork conducted 2012.
New Jersey 2012 - 2013 High Resolution Orthophotography, NAD83 NJ State Plane Feet, MrSID Tiles, State of New Jersey - Office of Information Technology, Office of Geographic Information Systems, Trenton, March 2013.

Figure 1
Study Area with Contour Lines
Northern Protection Area

Sea Girt NGJTC
Vegetation Survey
Sea Girt Borough
Monmouth County, New Jersey

ASGECI # 3307

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Legend

- Northern Protection Area
- Southern Protection Area
- Transect Lines
- Transect Line Points
- 1-sq. meter Quadrat
- Contour Lines - 2012
- Contour Lines - 2008

0 30 60 Feet

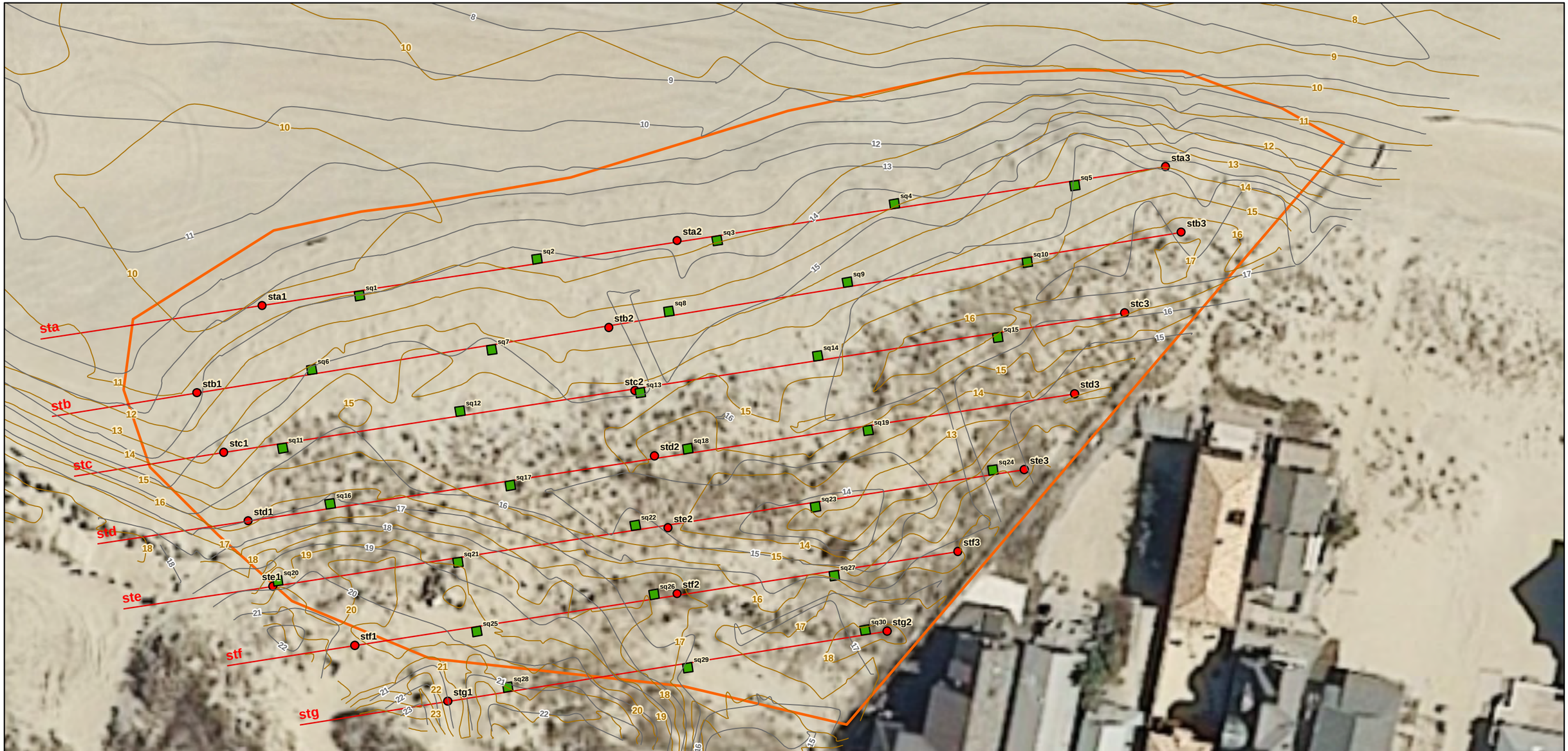
Sources:
Contour Lines from Sea Girt NGTC Topographical Survey, VS Land Data, Phillipsburg, New Jersey, from separate surveys conducted in September 2008 and September 2012.
Protection Areas, Beach Area, Quadrats, Transect Lines and Points provided by Amy S. Greene Environmental Consultants, Inc. produced utilizing Trimble GPS equipment during fieldwork conducted 2012.
New Jersey 2012 - 2013 High Resolution Orthophotography, NAD83 NJ State Plane Feet, MrSID Tiles, State of New Jersey - Office of Information Technology, Office of Geographic Information Systems, Trenton, March 2013.

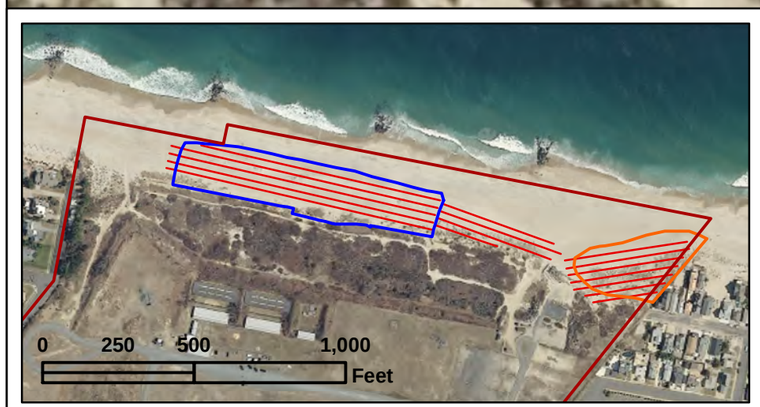
Figure 2
Study Area with Contour Lines
Southern Beach Area

Sea Girt NGJTC
Vegetation Survey
Sea Girt Borough
Monmouth County, New Jersey

ASGECI # 3307

AMY S. GREENE ENVIRONMENTAL CONSULTANTS, Inc.





Legend

- Northern Protection Area
- Southern Protection Area
- Transect Lines
- Transect Line Points
- 1-sq. meter Quadrat
- Contour Lines - 2012
- Contour Lines - 2008

0 35 70 Feet

Sources:
Contour Lines from Sea Girt NGTC Topographical Survey, VS Land Data, Phillipsburg, New Jersey, from separate surveys conducted in September 2008 and September 2012.
Protection Areas, Beach Area, Quadrats, Transect Lines and Points provided by Amy S. Greene Environmental Consultants, Inc. produced utilizing Trimble GPS equipment during fieldwork conducted 2012.
New Jersey 2012 - 2013 High Resolution Orthophotography, NAD83 NJ State Plane Feet, MrSID Tiles, State of New Jersey - Office of Information Technology, Office of Geographic Information Systems, Trenton, March 2013.

Figure 3
Study Area with Contour Lines
Southern Protection Area

Sea Girt NGJTC
Vegetation Survey
Sea Girt Borough
Monmouth County, New Jersey

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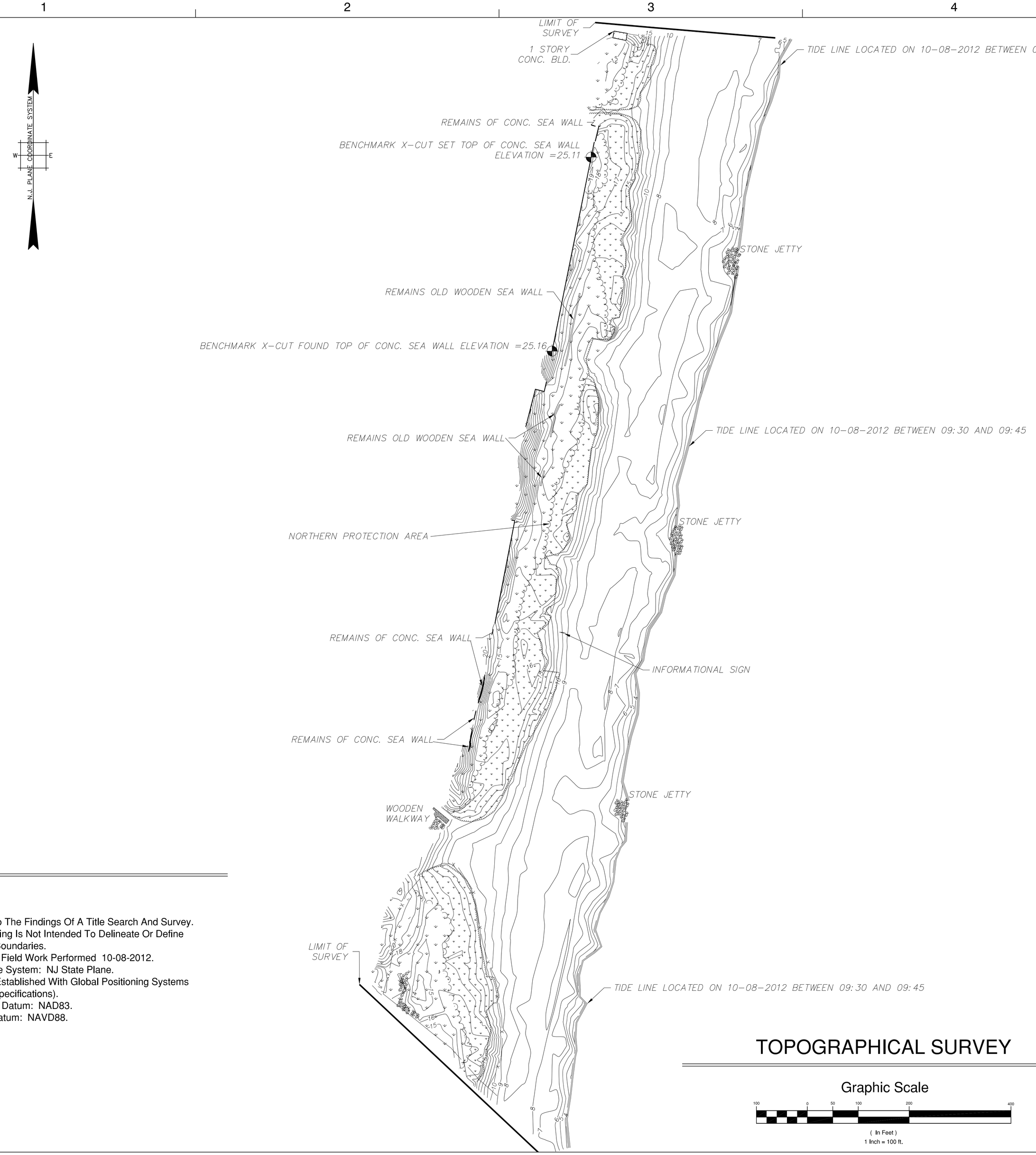
APPENDIX H

STUDY AREA FIGURE
SHOWING DATA COLLECTED &
2012 TOPOGRAPHIC SURVEY PLAN

("D" size image of NGJTC Beach in Back Pocket)



TOPOGRAPHICAL SURVEY

Graphic Scale

100 0 50 100 200 400

(In Feet)

1 Inch = 100 ft.

Notes

1. Subject To The Findings Of A Title Search And Survey.
2. This Drawing Is Not Intended To Delineate Or Define Property Boundaries.
3. Based On Field Work Performed 10-08-2012.
4. Coordinate System: NJ State Plane.
5. Control: Established With Global Positioning Systems (FAA2C Specifications).
6. Horizontal Datum: NAD83.
7. Vertical Datum: NAVD88.

Legend

- Edge Of Pavement
- Water Line — W
- Gas Line — G
- Underground Telephone Line — T
- Underground Electric Line — E
- Overhead Wire — OHW
- Storm/Sanitary Sewer
- Property Line
- Contour — 100
- Curb
- Fence — X X X X X
- Grass Line
- Shrub Line
- Edge Water
- Spring Low Tide
- Spring High Tide
- Storm Surge Line
- Rocks
- Grass Only
- Shrubs and Grass

SEA GIRT
NATIONAL GUARD
TRAINING CENTER

BLOCK 106 LOT 1
BOROUGH OF SEA GIRT
MONMOUTH COUNTY
NEW JERSEY

VS
LAND DATA

VS LAND DATA
80 River Road, Phillipsburg, NJ 08865
P 888.676.4435 F 800.220.6214 www.vslanddata.com
New Jersey Certificate Of Authorization Number 24GA28113500

SEAL

John J. Hanlon
Professional Land Surveyor
New Jersey License No. 37589
Pennsylvania License No. SU060784

SCALE

AS SHOWN

SUBMITTALS		
0	09/03/2008	TOPOGRAPHIC SURVEY
1	01/21/2009	ADDITION OF STORM SURGE LINE
2	06/04/2009	REVISED PER CLIENT COMMENTS
3	11/30/2010	ANNUAL RESURVEY
4	02/17/2011	ADD SPRING HIGH & LOW TIDES
5	10/10/2012	ANNUAL RESURVEY

DRAWN BY KJC

APPROVED BY JJH

CHECKED BY JJH

DATE 10/10/2012

TITLE

TOPOGRAPHIC SURVEY OF DUNE AREA

VS PROJECT NO. 07014

S - 1

SHEET NO.

Legend

- Installation Boundary
- 300-ft Vehicle Buffer
- No Rake Zone
- Northern Protection Area
- Southern Protection Area
- Primary Dune
- Secondary Dune

Observed Species

- American Oystercatcher
- Brown Thrasher
- Caspian Tern
- Common Tern
- Cooper's Hawk
- Fowler's Toad
- Glossy Ibis
- Great Blue Heron
- Horned Lark
- Least Tern
- Osprey
- Piping Plover
- Sanderling
- Semipalmated Sandpiper
- Snowy Egret
- Asiatic Sedge [Carex kobomugi Ohwi]

Sources:
Installation Boundary provided by Amy S. Greene Environmental Consultants, Inc., from survey conducted by VS Land Data using municipal deed records, July 2011.
Observed Species Locations and Southern Protection Area provided by Amy S. Greene Environmental Consultants, Inc., based on fieldwork conducted in 2012.
Additional Boundaries provided by Amy S. Greene Environmental Consultants, Inc., based on data acquired during the 2010 and 2011 monitoring seasons.
New Jersey 2012 - 2013 High Resolution Orthophotography, NAD83 NJ State Plane Feet, MrSID Tiles, State of New Jersey - Office of Information Technology, Office of Geographic Information Systems (OGIS), Trenton, NJ, March 2013.

0 100 200 300 400 Feet

2012 Study Area Map

Sea Girt National Guard Joint Training Center (NGJTC)
Sea Girt Borough
Monmouth County, New Jersey

ASGECI Project # 3307

AMY S. GREENE ENVIRONMENTAL CONSULTANTS, INC.

APPENDIX I

ADDITIONAL PROJECT MATERIALS
(Back Pocket Disc)

2012 Awareness Brief PowerPoint Presentation

Preliminary Goose Data August – October 2012

NJDEP Letter of Interpretation (dated August 3, 2012)

Annual Rare Species Awareness Briefing

Sea Girt NGJTC

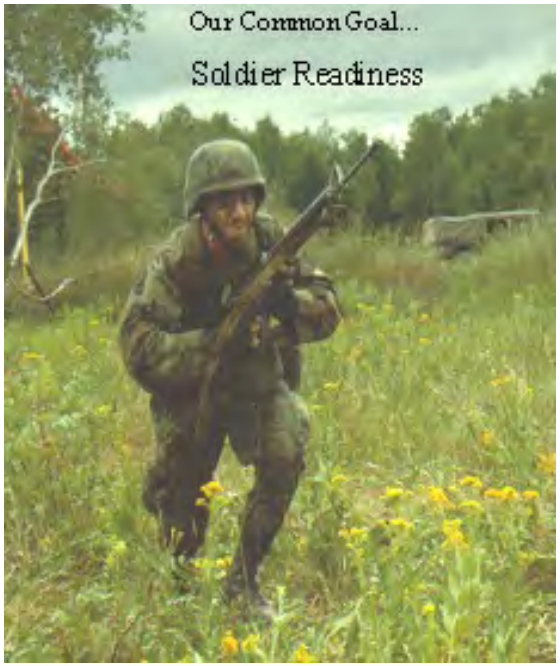
March 28, 2012

Harry Strano
Amy S. Greene Environmental Consultants, Inc.
(908) 788 -9676

Rare Species and the National Guard

Objectives of Today's Discussion

- Overview of Sea Girt NGJTC Natural Resources
- Overview of Rare Species Protection Measures



Sea Girt NGJTC
Natural Resources Overview

- Rare Species
  - 2 Federally-listed species
    - Piping plover and seabeach amaranth
  - Over 10 State-listed species (including State Special Concern) including least tern, osprey, yellow and black-crowned night herons, black skimmer, horned lark, Northern harrier, American oystercatcher, seabeach evening primrose, sea-milkwort, seabeach sandwort, seabeach purslane and Fowler's toad

Sea Girt NGJTC
Natural Resources Overview

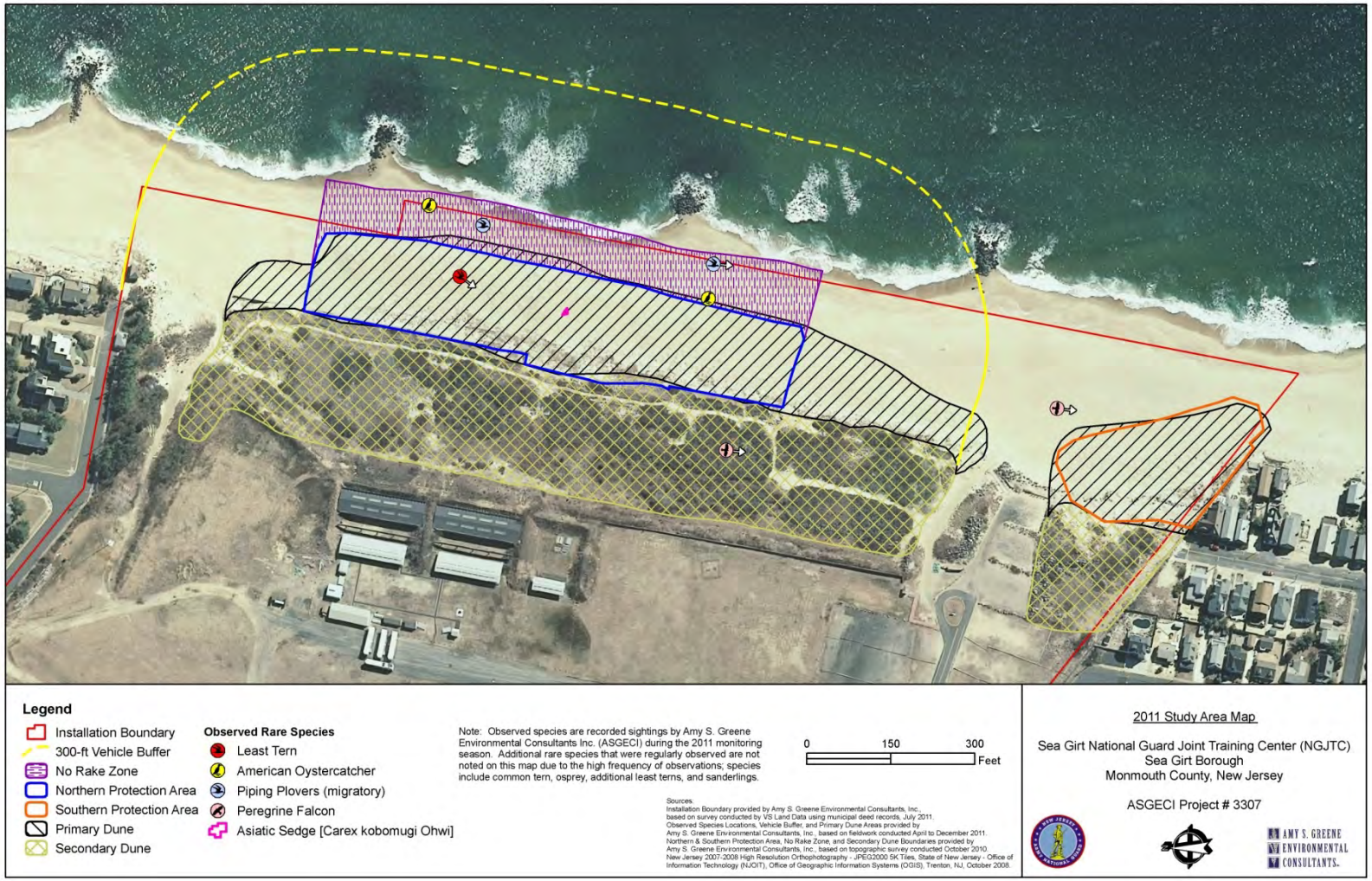
- Wetlands – Approx. 5 acres

- Coastal Zone (Including Beach and Dune Areas)

Regulations

- AR 200-1 – Army Environmental Regulation
- Fed/State Endangered Species Acts
  - Sikes Act
  - NGB INRMP Guidance Memo 28 Mar 2002
- Fed/State Wetlands Protection Acts
- Fed/State Coastal Zone Management Acts

NGJTC Beach and Protection Areas



NGJTC Specific Documents

- Beach Raking Permit
- Informal USF&WS Consultations
  - Protective measures review, beach raking, sea survival skills, and beach party
- Integrated Natural Resource Management Plan
  - Overall document that describes how NJARNG/NJDMAVA will manage natural resources at the NGJTC.
- Draft Memorandum of Understanding with Wreck Pond Watershed Association
  - Formally recognizes the partnership and mutual goals of NJDMAVA and the Association

Biological Info.

Piping Plover

- Shorebird that spends it's summers on the Jersey Shore.
- Nests on back beach areas on the ground between May and Sept.
- Eggs are difficult to see
- Chicks can't fly and spend most of their time running back and forth between nests and ocean's wrack line eating sea organisms.
- Plovers have nested (2007) and reared fledges (2009) on the NGJTC beach. Also uses the NGJTC seasonally for foraging in the spring and fall.

Piping Plover

Biological Info.

Least Tern

- Smallest of North American terns
- Typically nests in colonies on sparsely vegetated areas of the beach.
- Eggs are difficult to see. Similar in coloration to piping plover eggs.
- Adults bring fish to the young for up to 8 wks after fledging
- Least terns have in the past nested at the NGJTC. Also use the NGJTC seasonally for foraging in the spring and fall.

Least Tern

Biological Info.

Osprey

- Raptor that eats fish, including flounder, bluefish, perch, etc. and occasionally, frogs, snakes, birds, and small mammals
- Nests near lakes, rivers, and coastal areas. Prefers habitat with tall trees for nesting.
- Nests on cellular tower at the NGJTC
- Osprey platform has been constructed to encourage nesting in a designated area

Biological Info.

Seabeach Amaranth

Seabeach Amaranth

- Federally-Threatened small, annual, dune plant found on sandy beaches from New York to the Carolinas.
- Had not been observed in New Jersey since the early 20th century. Recently reappeared on Sandy Hook and in other locations. It has been identified on the NGJTC beach (last identified at NGJTC in 2009).
- Prefers sparsely vegetated areas including dune edges
- Growing season from 15 May to 1 December

Protection Measures

- In effect from 15 March to 1 December.
- Scope of protection measures are determined by the presence/absence of rare species.
- Protection area may change depending on location of species.
- USFWS and NJDEP does regular surveys of entire NJ beaches to enforce protection measures. NJDEP Volunteers from the Wreck Pond Watershed Association monitor the beach on a near daily basis (April 1 to August 31).
- ASGECI and/or AECOM consultants will monitor the beach on a regular basis between April and December.
- Legitimate emergency negates all protection measures.

Installing Fence

Protection Measures (cont.)

General Measures Include:

- String and sign fence installation around protection area (March - April).
- No beach raking, vehicle use, or pedestrian traffic in the protection area.
- No beach raking in front of the protection area.
- No sand scraping within protection area.
- No pets on the post. Predator prevention and litter/trash overflow control to reduce predators.
- USF&WS and NJDEP will continue weekly survey.
- Helicopters will not fly over or within 475 lateral feet of northern rare species protection area and achieve a minimum altitude of approx. 500 feet. Not applicable if safety is compromised - implemented at the pilot's discretion.

Protection Measures (cont.)

- **Measures when rare species nesting/chicks not present:**
  - All general protection measures in effect
  - Vehicles are not allowed to drive through the no rake zone (except lifeguards and EMS on routine patrol - limited to 5 mph and during daylight hours for routine patrols)
  - Vehicles will be routed around the protection area via the “Range Road Driving Route”

Protection Measures (cont.)

- **Protection Measures when Beach Birds are Nesting**:
  - Continue with general procedures.
  - ***NO ROUTINE VEHICLE TRAFFIC WHATSOEVER IN THE NO RAKE ZONE.***
    Vehicles will be routed around the protection area via the "Range Road Driving Route."
  - ***NO ROUTINE VEHICLE TRAFFIC/RAKING WITHIN 300 – FOOT BUFFER ZONE OF PROTECTION AREA (subject to change based on brood dynamics – such as the mobile chick from 2009).***
  - Pedestrian activities (such as ball playing) and some beach access may be limited. Fishing area may be shifted or closed down depending on proximity to nests and chicks.
  - Bona fide emergency negates protection measures. This does not include routine lifeguard or police patrols.
  - After an emergency, responders must prepare an After Action Report and forward it to NGJTC and NJDMAVA (William McBride at william.mcbride@njdmava.state.nj.us).
  - Rake operator will conduct a site walkover prior to initiating raking outside of the buffer zone. Raking will not be conducted in areas where chicks are observed even if the rake is outside of the buffer. The operator will stop raking if chicks are observed during the raking process.
  - NJDEP has sole jurisdiction of determining fledge status of chicks (typically up to 35 days after hatching) and the lifting of any temporary nesting or fledging plover protection measures.

Protection Measures (cont.)

Protection Measures when Protected Plants are Present:

- Continue with general procedures.
- Any plants growing outside the protection area will be fenced with a 3 meter buffer around them.

Protection Measures (cont.)

Military Training (Sea Survival Skills)

- All protection measures in effect.
- Conduct a briefing 1 month prior to training event with unit commander where a unit “rare species monitor” will be identified.
- Unit Rare Species Monitor will ensure that all protection measures are met.
- Unit will launch life rafts/jet skis from outside protection area/buffer zone and keep vehicles in military parking area while on beach.

Conclusions

- **Several rare species call Sea Girt NGJTC home.**
- **Sea Girt NGJTC is required under several Federal, State, and Army Regs. to protect them.**
- **Compliance with regulations depend on YOUR actions. So please follow the rules.**
  - **If we get an enforcement action from USF&WS or NJDEP we must report it to the US Army, so everyone knows when we've been bad.**
- **Contact ASGECI and EMB in early planning stages if activities are planned on the beach that may impact rare species.**
- **Protection measures may change depending on annual life cycles of rare species.**

QUESTIONS?

Canada Goose Surveys Sea Girt NGJTC Fall 2012

Plot Letter	Location	Description	8/2/2012-set up date no data	8/7/2012	8/16/2012	8/21/2012	8/30/2012*	9/7/2012	9/12/2012	9/21/2012	9/25/2012	9/28/2012	10/8/2012
A	bulkhead west - maintenance building	bulkhead sparse disturbance vegetation -bare ground	very large amounts of old feces	2	5	0	12		1	0	14	0	2
B	bulkhead central - camp bathrooms	distrubed sparse vegetation w/ 40% bare ground spots gravel		0	5	0	9	0	0	0	0	0	27
C	capgrround lawn	maintained lawn grasses with P. lanceolata		1	0	0	0	0	0	0	0	1	0
D	bulkhead east	very disturbed sparse vegetation and bare ground, rocks, debris	evidence of recent goose activity	3	2	0	4	0	0	0	1	0	1
E	wetland south	modified wetland area often saturated, polygonum, poor joe and sedges, bare portions	evidence of recent goose activity	5	1	4	0	0	0	0	1	0	2
F	wetland north	often very saturate dense polygonum and sedges		2	4	3	5	1	0	0	0	0	0
G	disturbed field east	mostly (60%) bare ground with quartz gravel, debris and sand, fill deposit sparse grassses and forbs	evidence of heavy goose usage	2	3	17	6	0	0	0	0	0	0
H	range road ditch	wetland ditch with sedges and patches of bare mud often saturated sometimes standing water	evidence of recent goose usage	8	6	15	10	4	0	2	0	0	0
I	ballfield east	maintained ballfield lawn dominated by gasses, plantago and black knapweed	light evidence of recent goose usage	0	11	NA	12	2	1	3	0	1	0
J	ballfield north near electrical box	maintained ballfield lawn dominated by grasses plantago and black knapweed, sparse bare patches	light evidence of recent goose usage	16	14	15	22	5	13	3	0	0	0
K	ballfield central	maintained ballfield lawn dominated by grasses with plantago and black knapweed		1	5	NA	16	0	0	0	1	0	0
L	tank park area	maintianed cool season lawn, less forbs, between shade trees	evidence of recent goose suage	0	11	0	0	0	0	0	0	0	0
M	lawn behind buildling 7	maintained lawn grass with P. lanceolata and black knapweed	evidence of recent goose usage	3	8	7	5	3	0	0	0	0	0
N	road east of croquet field	maintained lawn grass with P. lanceolata and black knapweed	light evidence of recent goose usage	1	7	10	10	0	1	1	0	0	0
O	building 37 lawn	maintained lawn for building cool season grass - less forbs		1	6	17	3	1	0	0	0	0	0
Total				45	88	86	114	17	15	9	17	4	31
number of plots with feces/total				12/15	14/15	8/13	12/15	8/15	3/15	4/15	4/15	3/15	4/15
weighted total - amount per day (total/days between surveys)				9	9.7	17.2	12.6	1.06	3.0	1	4.25	1.33	3.1
weighted plot total total divided (total/days/plots)				0.60	0.65	1.32	0.84	0.07	0.2	0.07	0.28	0.09	0.21
Conditions at Survey					75º F Wind 5 mph N	Sunny 73-84ºF wind NW5-10mph	Sunny 75-80 ºF Winds NW5-10mph	Cloudy no wind 75-78ºF	Sunny 75-80º F	Sunny 75-80 wind N 0-10 mph		Sunny 79ºF	Cloudy 55º F wind light
goose numbers			approx 215 geese observed near points e, f and g	110 near pt g 67 near pt j 29 flew off (206 total)	208 geese - near eastern ares: plots,f,g,i j	212 geese observed	65 near point l additional 17 near point K	No geese on ground One flock in flight	75 Geese behind quarters 15 flew off	No Geese onsite or observed	50 in fields in AM	No geese onsite; 20 in Stockton Lake.	10 by point e, 54 in Stockton Lake

#550 1

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Land Use Regulation
Mail Code 501-02A, P. O. Box 420
Trenton, New Jersey 08625-0420
www.state.nj.us/dep/landuse

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

AUG 03 2012

RECEIVED
AUG 10 2012
AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

Jeffery Pierson
101 Eggerts Crossing Rd.
Lawrenceville, NJ 08648

RE: Letter of Interpretation: Line Verification
File No.: 1300-11-0004.1
Activity Number: FWW110001
Applicant: NJ DEPT OF MILITARY AND VETERANS AFFAIRS
Block(s) and Lot(s): [54, 2.01] [106, 1]
Sea Girt Borough, Monmouth County

Dear Mr. Pierson:

This letter is in response to your request for a Letter of Interpretation to have Division of Land Use Regulation (Division) staff verify the boundary of the freshwater wetlands and/or State open waters on the referenced property.

In accordance with agreements between the State of New Jersey Department of Environmental Protection, the U.S. Army Corps of Engineers Philadelphia and New York Districts, and the U.S. Environmental Protection Agency, the NJDEP, the Division is the lead agency for establishing the extent of State and Federally regulated wetlands and waters. The USEPA and/or USACOE retain the right to reevaluate and modify the jurisdictional determination at any time should the information prove to be incomplete or inaccurate.

Based upon the information submitted, and upon a site inspection conducted by Division staff on February 14, 2011, the Division has determined that the wetlands and waters boundary line(s) as shown on the plan map entitled: "WETLAND LOCATION & TOPOGRAPHIC SURVEY", consisting of 4 sheet(s), dated August 11, 2011, last revised March 4, 2012, and prepared by John Hanlon, PLS, is accurate as shown.

Wetlands Resource Value Classification ("RVC")

Ordinary: "B1" to "B12", "D1" to "D15", "E1" to "E9", "F1" to "F6", "G1" to "G10", "11" to "16", "J1" to "J5" and "Q1" to "Q6" [No wetland buffer]

State Open Water: "K-8" – "K-14". [No wetland buffer]

Intermediate: All remaining flag numbers. [50 foot wetland buffer]

The Department has identified a water feature possibly regulated by the Flood Hazard Area Control Act Rules (FHACAR) N.J.A.C. 7:13. Under the FHACAR, a riparian zone is required along every regulated water with few exceptions (see N.J.A.C. 7:13-4.1). In order to determine the limits of any riparian zone on site, the applicant may obtain a Flood Hazard Area Verification (see 7:13-6.1), which determines all areas regulated under the FHACAR.

RVC may affect requirements for wetland and/or transition area permitting. This classification may affect the requirements for an Individual Wetlands Permit (see N.J.A.C. 7:7A-7), the types of Statewide General Permits available for the property (see N.J.A.C. 7:7A-4) and any modification available through a transition area waiver (see N.J.A.C. 7:7A-6). Please refer to the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and implementing rules for additional information.

Wetlands resource value classification is based on the best information available to the Department. The classification is subject to reevaluation at any time if additional or updated information is made available, including, but not limited to, information supplied by the applicant.

General Information

Pursuant to the Freshwater Wetlands Protection Act Rules, you are entitled to rely upon this jurisdictional determination for a period of five years from the date of this letter unless it is determined that the letter is based on inaccurate or incomplete information. Should additional information be disclosed or discovered, the Division reserves the right to void the original letter of interpretation and issue a revised letter of interpretation.

Regulated activities proposed within a wetland, wetland transition area or water area, as defined by N.J.A.C. 7:7A-2.2 and 2.6 of the Freshwater Wetlands Protection Act rules, require a permit from this office unless specifically exempted at N.J.A.C. 7:7A-2.8. The approved plan and supporting jurisdictional limit information are now part of the Division's public records.

This letter in no way legalizes any fill which may have been placed, or other regulated activities which may have occurred on-site. This determination of jurisdiction extent or presence does not make a finding that wetlands or water areas are "isolated" or part of a surface water tributary system unless specifically called out in this letter as such. Furthermore, obtaining this determination does not affect your responsibility to obtain any local, State, or Federal permits which may be required.

Appeal Process

In accordance with N.J.A.C. 7:7A-1.7, any person who is aggrieved by this decision may request a hearing within 30 days of the date the decision is published in the DEP Bulletin by writing to: New Jersey Department of Environmental Protection, Office of Legal Affairs, Attention: Adjudicatory Hearing Requests, P.O. Box 402, Trenton, NJ 08625-0402. This request must include a completed copy of the Administrative Hearing Request Checklist found at www.state.nj.us/dep/landuse/forms. Hearing requests received after 30 days of publication

notice may be denied. The DEP Bulletin is available on the Department's website at www.state.nj.us/dep/bulletin. In addition to your hearing request, you may file a request with the Office of Dispute Resolution to engage in alternative dispute resolution. Please see the website www.nj.gov/dep/odr for more information on this process.

Please contact Bob Kozachek of our staff by e-mail at bob.kozachek@dep.state.nj.us or (609) 633-2289 should you have any questions regarding this letter. Be sure to indicate the Department's file number in all communication.

Sincerely,

Bruce Stoneback

Bruce Stoneback, Acting Supervisor
Division of Land Use Regulation

c: Municipal Clerk
Municipal Construction Official
Harry Strano, Amy Greene Environmental Consultants, Inc. (original)