

Chapter 7 - Threats to Covered Species from CCCL Activities

Introduction

Coastal construction and many other human activities occurring within the coastal zone are permitted by the FDEP through the CCCL Program. Although the FDEP strives to manage Florida's beaches for the benefit of both people and wildlife, the task is daunting, and despite best efforts to avoid impacts to listed species, impacts do occur. This chapter describes how activities permitted by the FDEP have the potential to cause harm and harassment of the plant and animal species covered under the FBHCP. It expands on general threats to covered species, both throughout their respective ranges and within the Plan Area, discussed in Chapter 5.

It should be noted that many of the activities permitted under the CCCL Program reduce negative effects of human activity. For example, dune restoration can improve the quality of sea turtle nesting habitat, dune crossovers prevent trampling of sensitive dune vegetation, and emergency cleanup efforts remove debris from the beach that could cause harm to listed species. Despite these longer-term positive effects, an ITP applicant is obligated to provide a comprehensive assessment of all threats, both immediate and long-term, posed by its proposed actions. A threat does not necessarily prescribe an impact. Minimization measures (Chapter 10) have been developed to avoid and minimize impacts to the maximum extent practicable. The scope, severity, and duration of impacts, as well as the conservation benefits provided by permitted activities, have been factored into the mitigation measures (Chapter 11) developed to offset unavoidable impacts.

Background

The sandy beaches and dunes of Florida provide essential habitat to a variety of plants and animals that have become well adapted to living in a harsh coastal environment. Some are rare and are found nowhere else on the planet. Migratory species such as shore/sea birds and sea turtles utilize the beach opportunistically at different points in their lifecycle, while other species, such as beach mice and gopher tortoise, occur primarily in the primary and secondary dunes where they are year round residents. For these and other species, survival is dependent upon the persistence and quality of the spatially limited and unique habitats that comprise the coastal zone. The life cycle of sea turtles, for example, would be permanently interrupted if there were no dry sandy beaches within which they could deposit their eggs.

As discussed in detail in Chapter 6 (Plan Area), Florida's coastal zone is both complex and dynamic. Beaches and dunes are not static; they are constantly being reshaped by prevailing weather patterns and associated sea conditions (winds, waves, and currents). Typically, these changes are gradual and reflect long-term trends, but they can also be abrupt as the result of major storm events (tropical storms, hurricanes, and nor'easters). Barrier island beaches, which constitute the majority of the state's sandy

coastline, are affected by both short- and long-term physical forces and are particularly vulnerable to storm effects.

The configuration and topography of the coastline is a function of the quantity and type of sediments (sand) comprising the beach and dune system, the response of that material to wave energy, and the volume of additional sediments introduced to the system via littoral transport (sand carried laterally along the shoreline by currents). Major storm events typically bring an elevated surge and higher than normal wave conditions that reshape the beach profile through suspension and transport of sand to other portions of the coastal system. When the barrier island is relatively low, the beach and dune system can be overtopped, with sediments being deposited landward of the dune, a phenomenon referred to as overwash. Conversely, during high frequency storm events, which have lower storm surges and are of relatively short duration, sand can be transported from the dunes and upper beach seaward along the beach profile resulting in a temporary expansion of the beach (accretion). More typically, however, elevated tides result in storm waves that transport sediments offshore, leaving behind an eroded beach and dune system.

The amount of sediment transported laterally along the shoreline is dependent on the force of waves and the angle at which they approach the beach. During storm events, the approach of waves to the shoreline varies, which coupled with higher than normal wave heights can result in high sediment transport rates. Consequently, storm events may cause significant reconfiguration of the shoreline, particularly near coastal barriers, such as headlands and inlets. Although the beach and dune system appears to be in a state of dynamic equilibrium during calm weather periods, it is actually in constant flux, continually adjusting to prevailing littoral transport regimes in the aftermath of past disturbances, such as storms.

Beach erosion and accretion are natural phenomena, to which coastal species have become adapted. As long as coastal processes are not interrupted, sandy beaches and dunes and the habitat they provide for listed species will be present, although their shape and location may change over time. The coastal zone also constitutes highly sought after property for humans. People are attracted to the beach, and Florida's coastline has been influential in shaping communities and local culture since humans first migrated to the area. As noted in Chapter 6, 75 percent of the state's population now lives in coastal counties. Building along barrier island beaches and mainland coasts has been ongoing for more than a century, and some of that development has significantly altered natural processes, resulting in permanent impacts to the beach and dune system.

There are many coastal inlets throughout Florida, both natural and manmade, and attempts have been made to stabilize these inlets to facilitate waterborne commerce and provide recreational boat access from inland waterways to the Atlantic Ocean and Gulf of Mexico. The jetties and/or maintenance

dredging projects used to stabilize inlets interrupt longshore sediment transport and typically create highly unstable and erosional conditions on downdrift beaches.

Natural inlets interact with littoral sediment transport on varying tidal cycles. Sediments carried inside inlets on incoming (flood) tides are deposited on flood shoals, while on outgoing (ebb) tides, tidal currents and waves interact to transport sand offshore where it settles on ebb shoals. Ultimately under natural conditions, ebb shoals provide a means for sand to bypass the inlet. However, efforts to ensure specific navigable depths or inlet position through dredging and/or construction of jetties commonly interrupt this natural balance and result in a deficit of sand within the coastal system. Well designed studies are necessary to understand sediment budgets and transport rates in and around inlets and the impacts that anthropogenic changes have on the system so appropriate management strategies can be developed to eliminate sand deficits on adjacent beaches. These management strategies typically require expensive dredging cycles, erosion control structures, and/or introduction of more sand to the adjacent beaches (*e.g.*, mechanical sand bypassing, beach nourishment, etc.). Areas of persistent high erosion in the vicinity of inlets are typically indicators of the need for improved inlet management and corrective procedures.

Intact beach and dune systems provide a natural buffer to upland properties from wave action during storms. When impacted by storm events these systems typically recover, with the rate and extent of recovery dependent on the interval between storms. When homes, resorts, businesses, and infrastructure are too close to the shoreline, either by design or as a result of erosion, the resiliency and integrity of the system is compromised. Structures placed within the beach and dune system can permanently eliminate, fragment, and/or degrade habitat and are at increased risk from erosion during storms. As noted in Chapter 6, 639 km (397 mi) or nearly half of the state's sandy beaches are now classified by the FDEP as critically eroded. In an attempt to combat erosion, property owners of vulnerable older structures often resort to armoring to protect their homes and businesses. During subsequent storms, this armoring can exacerbate erosion problems on adjacent or nearby beaches further degrading local beach and dune habitat.

In addition to their interference with natural coastal processes, habitable structures placed too close to the beach introduce a large number of ancillary threats (ripple effects) to listed plant and animal species. Native, salt-tolerant vegetation helps build and stabilize dunes. Yet many property owners prefer non-native plants that contribute little to dune stabilization and that must be maintained by constant irrigation. To achieve unobstructed views of the ocean, property owners remove or trim vegetation to provide a clear line of sight. These artificial conditions reduce dune stability and create corridors through which lighting can reach the beach at night, potentially resulting in harm or harassment of nesting sea turtles, roosting shorebirds, and foraging beach mice. Beach furniture and recreational equipment left on the beach overnight or stored on the dune may impact listed species and their habitat. Dune crossovers can act as barriers to sea turtle nesting and may entrap nesting females. Additionally, improper disposal of trash and food refuse may attract predators or competitors of listed species;

escaped or released non-native pets can result in similar impacts. If not properly managed, artificial lighting used at night for safety, security, or aesthetics can trespass into adjacent habitat, potentially causing harm and harassment of listed species. Dogs and cats allowed to roam free trample dune vegetation, kill beach mice and shorebirds, dig up turtle nests and otherwise harm and harass listed species. Non-native landscaping around facilities can introduce invasive species that spread into adjacent areas and outcompete native vegetation, thereby altering essential habitat of listed species. Irrigation used for landscaping can similarly affect native plant communities or directly impact listed species (*e.g.*, sea turtle nests) if not properly managed (*e.g.*, broadcast into adjacent native habitats).

With increased human presence in the coastal zone, there also is an increased demand for associated activities, such as beach cleaning, special events, and the construction of ancillary structures (*e.g.*, pools, cabanas, etc.). All of these activities have the potential to further impact listed species and their coastal habitats.

Chapter 4 discussed the various CCCL activities for which incidental take authorization is being requested. Those activities were partitioned into eight major groups thought to have the greatest potential for impacting covered species. Depending upon construction methods, the location of permitted activities relative to the beach and dune system, and a variety of other factors, impacts are often similar across those categories. For example, storage of construction equipment on the beach can impact sea turtles in a similar manner regardless of whether the project involves installation of a seawall, construction of a dune crossover, dune restoration, or an emergency response. Consequently, this chapter focuses on general aspects of CCCL projects regardless of the type of activity for which a permit is issued. The vast majority of CCCL permits involve activities that fall into one or more of the following categories:

- (a) Vehicle operations;
- (b) Ground disturbance (*e.g.*, excavation/digging);
- (c) Filling;
- (d) Planting/Trimming;
- (e) Paving;
- (f) General construction and special event activities (*e.g.*, noise, vibrations, movement of people and equipment, etc.);
- (g) Construction/security lighting;
- (h) Equipment storage and temporary safety/security barriers;
- (i) Temporary facilities (*e.g.*, construction trailers, storage boxes, stages for special events, etc.);
- (j) Refuse and chemicals;
- (k) Installation of permanent non-habitable structures (*e.g.*, armoring structures, decks, sand fences, dune crossovers, etc.); and
- (l) Installation of permanent habitable structures (*e.g.*, residences, hotels, restaurants, offices, etc.).

Potential impacts associated with each CCCL activity group are presented in Table 7-1 below. These impacts will only occur during times when protected species are present.

Table 7-1. Direct Impacts to Covered Species Potentially Resulting from CCCL Activities.

Activities Potentially Impacting Covered Species	CCCL Activity Category							
	Coastal Development - Major Structures	Beach/Dune Restoration	Armoring	Dune Crossovers	Mechanical Beach Cleaning	Sand Fencing	Emergency Response	Special Events
Vehicle Operations								
Ground Disturbance, such as Excavation/Digging								
Filling								
Planting/Trimming								
Paving								
General Construction and Special Event Activities								
Temporary Lighting								
Equipment Storage/ Temporary Barriers								
Temporary Facilities								
Refuse/Chemicals								
Permanent Non-habitable Structures								
Permanent Habitable Structures								

* Direct effects are those occurring at the time the permitted activity is in progress.

Following completion of the activity, indirect effects may occur. For example a sand fence may result in sand accretion over time, which could affect shorebird habitat in a manner similar to placement of fill during a dune restoration project (*i.e.* filling). Similarly, construction of boardwalks or habitable structures may result in increased trash in and around the beach-dune system and thereby affect covered species similarly to refuse generated during construction.

Impacts to covered species can be both direct and indirect and either permanent or temporary. Direct impacts are those that affect the organism at the time and location the authorized activity is undertaken. An example of a direct impact would be the crushing or unearthing of sea turtle eggs during installation

of an armoring structure. Indirect effects are causally related to the permitted activity, but occur later in time or are spatially removed from the initial action. For example, once construction has been completed and an armoring structure is permanently in the ground, it is likely to result in decreased nesting success at that site and exacerbate future beach or shoreline erosion, thereby degrading nesting habitat. The latter may affect nesting habitat suitability not only at the project site, but on adjacent downdrift beaches as well.

Just as impacts resulting from each of the categories listed above can be similar for a variety of CCCL projects, similar effects may occur to different species. Consequently, the 19 covered animal and 3 plant species have been combined into 6 groups based on similarity of life histories: sea turtles (five species), beach mice (six sub-species), non-breeding shore and seabirds (six species), nesting shore and seabirds (five species, four of which are also included in the non-breeding group outside the breeding season), the gopher tortoise (one species), and plants.

For the purpose of the threat assessment that follows, the term shorebird encompasses both true shorebirds (five species) and seabirds (two species). As described in Chapter 4, shorebirds are typically solitary nesters, and their precocious chicks leave the nest and begin to forage with their parents shortly after they hatch. Seabirds, on the other hand, tend to be colonial nesters, forage in the ocean, and feed their chicks until they fledge. Consequently, impacts to foraging behavior associated with CCCL activities only apply to true shorebirds and not to seabirds.

Non-breeding shorebirds are those that use the Plan Area for roosting, resting, and/or foraging outside their respective nesting seasons. Sub-lethal impacts associated with CCCL activities to species in this group may reduce a bird's fitness for migration and subsequent breeding, particularly for species that must travel great distances between foraging and breeding grounds. Threat assessments for nesting shorebirds include impacts not only to nesting, but also to foraging and resting activities during the nesting season, both of which can affect a parent's capacity to care for its offspring.

The potential direct and indirect impacts to covered species summarized below served as the basis for developing the minimization measures presented in Chapter 10.

Vehicle Operations

Vehicles associated with CCCL activities can impact covered species in a variety of ways depending on:

- The number and types of vehicle involved (size, weight, tire pressure, etc.);
- The time of day the vehicle is in operation;
- The location(s) where vehicles access the site and/or operate within the beach and dune system;

- The areal extent (*i.e.* footprint) of vehicle operations;
- The time of year the activity takes place;
- The duration of the activity; and
- The frequency (repetitiveness) of the activity at a given location.

Vehicles can include everything from light-weight ATVs to heavy construction equipment (cranes, graders, etc.). Vehicles used for beach cleaning/grooming are included in this category.

Direct Impacts from Vehicle Operations

General Impacts to All Covered Species

- Vehicles can cause injury or death by colliding with or running over all life history stages;
- Vehicles can harass resting, roosting, foraging, and nesting animals;
- Vehicle headlights can harass animals by disrupting essential nocturnal behaviors and Circadian rhythms;
- Vehicles operating within the beach and dune system, can destroy native vegetation, leave ruts, compact sediments, and otherwise degrade habitat; and
- Vehicle access points constructed through the dune can temporarily degrade habitat.

Sea Turtles

- Vehicles can run over and crush eggs in incubating sea turtle nests causing embryonic death, thereby reducing reproductive success;
- Vehicle headlights can harass nesting and hatchling sea turtles by temporarily disrupting their sea finding capabilities; and
- Vehicles used for beach cleaning can dislodge pre-emergent hatchlings from the nest.

Beach Mice

- Vehicles operating in the beach and dune system may collapse burrows; and
- Vehicle headlights can disrupt nocturnal foraging activities and expose mice to predators.

Non-breeding Shorebirds

- Vehicles operating on the beach may repeatedly flush birds (harassment), which could diminish valuable energy reserves;

- Vehicles may cause birds to avoid or abandon preferred resting, roosting, and/or foraging habitat;
- By removing wrack and the associated biotic community, beach cleaning vehicles eliminate an important component of the shorebird prey base, which may render the habitat unsuitable; and
- Vehicles operating on the beach may crush potential prey and/or otherwise degrade foraging habitat.

Nesting Shorebirds

- Vehicles may disturb nesting birds and/or cause them to avoid or abandon preferred nesting habitat;
- Harassment resulting in temporary abandonment of nests places eggs at increased risk of mortality because of depredation and exposure to the elements (e.g., hypothermia or hyperthermia);
- Vehicles may cause separation of adults and chicks, particularly precocious shorebird species, and result in increased risk of mortality caused by depredation and exposure to the elements;
- Repeated harassment may cause adults to permanently abandon the nest site resulting in mortality of eggs and chicks;
- Repeated harassment of foraging shorebirds by vehicles and/or degradation of foraging habitat may reduce the fitness and ability of adults to care for their chicks; and
- By removing wrack and the associated biotic community, beach cleaning may cause adults to forage farther from their nest site, thereby expending valuable energy, affecting their fitness to care for their chicks; and increasing the risk of predation on unattended chicks.

Gopher Tortoise

- Vehicles operating in the dune system may crush or otherwise damage burrows, entomb tortoises within their burrows, and/or crush buried eggs within nests at burrow aprons.

Plants

- Vehicles may crush and destroy covered plant species.

Indirect Impacts from Vehicle Operations

General Impacts to All Covered Species

- Vehicles operating within the beach and dune system may compact sediments, leave ruts, kill vegetation, introduce propagules of exotic plant species (i.e. alter the native vegetative

composition), or otherwise cause habitat degradation that persists after construction is completed;

- Vehicle access points constructed through the dune can allow artificial lighting from adjacent landward areas to trespass onto the beach or allow wave upwash to penetrate farther landward than otherwise;
- Leaking fluids (grease, oils, gas, radiator coolant, etc.) may contaminate sediments and introduce toxic materials or noxious fumes into the environment that can result in injury or death;
- By removing wrack, running over emergent vegetation, and/or damaging sub-surface roots of pioneering dune plants, beach raking vehicles and equipment may alter the natural ecology of the beach (e.g., nutrient cycling) and otherwise degrade resting, roosting, foraging, and/or nesting habitat; and
- Vehicles operating on the beach following completion of the permitted activity (e.g., vehicles provided access to the beach as the result of a new vehicular access ramp or vehicle operations in and around a newly constructed lifeguard station) pose the same threats as vehicles used to conduct the permitted activity.

Sea Turtles

- Following construction, hatchlings are at increased risk of depredation and dehydration if they become trapped in vehicle ruts on the beach or are slowed in their progress to the ocean, resulting in increased mortality;
- Hatchlings may expend considerable energy in navigating ruts before eventually reaching the ocean, resulting in lower survivorship as they migrate offshore;
- Vehicles may harm sea turtles by temporarily compacting beach sediments resulting in reduced nesting success;
- Compacted sediments over a nest may alter the incubation environment, reduce reproductive success, and/or inhibit hatchling emergence;
- Artificial lighting illuminating the beach through vehicle access points in the dune can disorient nesting and hatchling sea turtles;
- Contaminated sediments may introduce noxious fumes into the incubation environment resulting in embryonic and/or hatchling mortality; and
- Under certain conditions, vehicles can modify the beach profile, thereby altering important cues used by nesting and hatching sea turtles.

Beach Mice

- Alteration of the natural ecology of the beach caused by beach raking may inhibit dune formation/expansion (i.e. expansion of beach mouse habitat), and reduce foraging resources.

Non-breeding Shorebirds

Same as general impacts.

Nesting Shorebirds

- Vehicle ruts may trap flightless young shorebirds, thereby increasing the risk of mortality caused by depredation or starvation.

Gopher Tortoise

Same as general impacts.

Plant Indirect Impacts

- Vehicles operating within the dune system may introduce propagules of exotic or competing plant species, thereby altering the native vegetative composition.

Ground Disturbance (Excavation/Digging)

Excavation associated with CCCL activities can impact covered species in a variety of ways depending on:

- The type of equipment used;
- The areal extent (i.e. footprint) of the excavation;
- The depth of excavation;
- The location of the excavation site within the beach and dune system; and
- The time required for buried organic marine debris (e.g., dead fish, seaweed, etc.) to decompose, if applicable.

Direct Impacts from Ground Disturbance

General Impacts to All Covered Species

- Excavation can temporarily degrade or eliminate otherwise suitable burrowing, resting, roosting, foraging, and/or nesting habitat; and
- Deep holes left during construction can trap listed species.

Sea Turtles

- Digging on the beach or within the primary dune can exhume incubating eggs and pre-emergent hatchlings resulting in injury or death; and
- Digging can destabilize sediments causing adjacent nests to collapse;

Beach Mice

- Major excavation can destroy burrows and/or exhume mice from active burrows, particularly pups unable to escape; and
- Minor digging (e.g., installation of irrigation systems used for dune planting) may damage burrows.

Non-breeding Shorebirds

- Excavation on the beach may remove shorebird prey items (infaunal and epifaunal invertebrates) and cause the birds to abandon preferred foraging sites.

Nesting Shorebirds

- Excavation can affect the local prey base and foraging behavior, as described above for non-breeding shorebirds, and cause parents to take their chicks farther from preferred resting/roosting sites in search of food. This can result in increased energy expenditures for both adults and chicks and increase the risk of predation, dehydration, and other perils for chicks.

Gopher Tortoise

- Major excavation can destroy burrows and nests and/or harm/exhume turtles and eggs from active burrows; and
- Minor digging (e.g., installation of irrigation systems used for dune planting) may damage burrows.

Plants

- Excavation can exhume and destroy covered plant species; and
- Minor digging (e.g., installation of irrigation systems used for dune planting) may damage plants.

Indirect Impacts from Ground Disturbance

General Impacts to All Covered Species

- Excavation resulting in altered topography following construction can impact beach hydrology, plant community composition and/or otherwise degrade resting, roosting, foraging, and/or nesting habitat; and
- Burial of organic marine debris (e.g., dead fish, seaweed, etc.) within the beach and dune system may temporarily pollute sediments, attract scavengers (potential predators of listed species), and/or degrade resting, roosting, foraging, and/or nesting habitat.

Sea Turtle Indirect Impacts

- Excavation to open coastal dune lake outfalls may cause nesting habitat degradation that persists after construction is completed; and
- Marine debris of any type buried on the beach may pose obstacles to turtles digging egg chambers.

Beach Mice

Same as general impacts.

Non-breeding Shorebirds

- The quality of foraging habitat may be diminished for months after construction is completed until the prey base has had sufficient time to recolonize; and
- Excavation to open coastal dune lake outfalls may cause resting, roosting, and foraging habitat degradation that persists after construction is completed.

Nesting Shorebirds

- The quality of foraging habitat may be diminished for months after the permitted activity is completed until the prey base has had sufficient time to recolonize; and
- Excavation to open coastal dune lake outfalls may cause nesting habitat degradation that persists after construction is completed.

Gopher Tortoise

Same as general impacts.

Plants

Same as general impacts.

Filling

Filling associated with CCCL activities can impact covered species in a variety of ways depending on:

- The characteristics (*e.g.*, grain-size, color, composition, etc.) of the fill material used;
- The areal extent (*i.e.* footprint) of the fill;
- The depth of fill placement; and
- The location of the fill site within the beach and dune system.

Direct Impacts from Filling

General Impacts to All Covered Species

- Prior to its distribution into a design feature, fill material placed within the beach and dune system can temporarily degrade or eliminate burrowing, resting, roosting, foraging, and/or nesting habitat; and
- Fill material placed on top of buried nests or burrows may trap or smother species below ground.

Sea Turtles

- Fill placed on top of a nest may alter the incubation environment within the egg chamber, causing embryonic mortality or reducing fitness; and
- Fill placed on top of a nest may impede or prevent hatchlings from reaching the beach surface.

Beach Mice

- Fill placed on top of burrows may smother mice, particularly pups unable to escape, or cause burrows to collapse;
- Material placed on top of burrows may cause mice to expend additional energy to re-open burrow entrances and/or maintain burrow integrity; and

- Fill placed within the dune system may temporarily eliminate refuge habitat.

Non-breeding Shorebirds

- Fill material can temporarily reduce and/or degrade foraging habitat by burying invertebrate prey base; and
- Fill material can temporarily reduce and/or degrade resting/roosting habitat by eliminating physical characteristics important to predator avoidance.

Nesting Shorebirds

- Fill material can temporarily reduce and/or degrade foraging habitat by burying invertebrate prey base, thereby causing parents to take their chicks farther from preferred resting/roosting/nesting sites in search of food. This increases their vulnerability to predation, dehydration and other perils.

Gopher Tortoise

- Material placed on top of burrows may cause tortoises to expend additional energy to re-open burrow entrances.

Plants

- Filling can bury and destroy covered plant species.

Indirect Impacts from Filling

General Impacts to All Covered Species

- Incompatible sediments may alter the natural ecology of the beach and dune system, thereby reducing its suitability as burrowing, resting, roosting, foraging, and/or nesting habitat.

Sea Turtles

- Incompatible beach sediments (physical/chemical aspects) can alter the incubation environment of nests (*e.g.*, moisture content and gas exchange), thereby reducing reproductive success;

- Substantial deviation in sediment color from native sands can alter sex ratios, and very dark sediments can elevate egg chamber temperatures to levels that cause embryonic mortality;
- Sediments with large percentages of fine materials can lead to increased compaction/concretion, which may inhibit digging, alter egg chamber configuration (shape and depth), and/or prevent or impede hatchling emergence;
- Sediments containing large percentages of coarse material (*e.g.*, large shells and rocks) can inhibit digging by nesting turtles and reduce nesting success;
- Fill used in beach/dune restoration projects may change the beach profile (elevation, width, and slope) relative to natural beaches and present nesting turtles with altered visual and tactile cues, causing reduced nesting success;
- During storm events, persistent vertical escarpments often form in fill used for dune restoration projects (with or without a geotextile tube core), thereby limiting access of nesting turtles to otherwise suitable habitat farther landward;
- Altered beach profiles may result in increased placement of nests along seaward portions of the beach where they are more susceptible to overwash, tidal inundation and washout; and
- Altered beach profiles may allow more artificial lighting from landward areas to reach the beach, increasing the incidence of hatchling disorientation.

Beach Mice

- Incompatible sediments may inhibit burrowing or cause mice to abandon their traditional habitat;
- Incompatible fill material may cause burrows to collapse or compromise their structural integrity relative to those built in native sediments, thereby increasing energy expenditures for burrow maintenance;
- Diminished burrow integrity may result in higher vulnerability to otherwise minor threats;
- Incompatible sediments may affect the microclimate of burrows;
- Incompatible sediments may affect the type, quantity, and/or composition of dune vegetation used for foraging and shelter; and
- Fill obtained from upland sand sources can introduce exotic vegetation propagules that can affect the quality and quantity of available forage material.

Non-breeding Shorebirds

- The quality of foraging habitat may be diminished for months following fill placement until the prey base has had sufficient time to recolonize;
- Incompatible fill material can result in permanent degradation of foraging habitat if the reestablished invertebrate prey base is less abundant or composed of different species than the pre-existing prey base; and

- Fill used in beach/dune restoration projects may alter the beach profile (elevation, width, and slope) relative to natural beaches, thereby affecting the suitability of resting/roosting habitat for some species.

Nesting Shorebirds

- The quality of foraging habitat may be diminished for months following fill placement until the prey base has had sufficient time to recolonize;
- Incompatible fill material may alter the incubation environment of the nest (*e.g.*, dark sediments will increase sand temperatures);
- Fill used in beach/dune restoration projects may alter the beach profile (elevation, width, and slope) relative to natural beaches, thereby affecting the suitability of nesting habitat for some species;
- Newly placed fill may attract some avian species from more protected areas and result in nesting in areas where disturbances, water levels, and/or predation risks are not properly managed, thereby creating a biological sink; and
- Placement of fill may encourage beach driving in areas where driving was previously precluded, leading to vehicular impacts.

Gopher Tortoise

- Incompatible sediments may inhibit burrowing or cause turtles to temporarily or permanently abandon traditional habitat;
- Incompatible fill material may cause burrows to collapse or compromise their structural integrity relative to those built in native sediments, thereby increasing energy expenditures for burrow maintenance;
- Diminished burrow integrity may result in higher vulnerability to otherwise minor threats; and
- Incompatible sediments may affect the microclimate of burrows.

Plants

- Filling resulting in altered topography following completion of the permitted activity can impact beach hydrology and/or plant community composition.

Planting/Trimming

Planting/trimming associated with CCCL activities can impact covered species in a variety of ways depending on:

- The type of material planted (*e.g.*, native, salt-tolerant vegetation);
- The time of year the planting takes place;
- The depth of planting;
- Methods used to ensure survival (watering and fertilizer); and
- The extent to which trimming allows artificial light to trespass onto the beach.

Direct Impacts from Planting/Trimming

General Impacts to All Covered Species

- Planted vegetation may permanently eliminate, reduce, or alter burrowing, resting, roosting, foraging, and/or nesting habitat.

Sea Turtles

See general impacts.

Beach Mice

- The quantity, size, composition, and persistence of planted material used in dune restoration projects may affect foraging patterns or habitat use.

Non-breeding Shorebirds

See general impacts.

Nesting Shorebirds

See general impacts.

Gopher Tortoise

- The quantity, size, composition, and persistence of planted material used in dune restoration projects may alter foraging patterns or habitat use.

Plants

None

Indirect Impacts from Planting/Trimming

General Impacts to All Covered Species

- Planted material may differ in composition from that in natural beach-dune communities, thereby reducing the attractiveness of burrowing, resting, roosting, foraging and/or nesting habitat; and
- Frequent watering of newly planted vegetation may diminish the suitability of burrowing, resting, roosting, foraging, and/or nesting habitat.

Sea Turtles

- Roots of newly planted vegetation may invade egg chambers and destroy incubating eggs;
- Frequent watering of nests that are near newly planted vegetation may inundate incubating eggs or alter the incubation environment, causing altered sex ratios and/or reduced reproductive success;
- Trimming of dune vegetation, such as seagrasses, may allow artificial lighting from adjacent landward areas to trespass onto the beach, resulting in the disorientation of nesting and hatchling sea turtles; and
- Over trimming or complete vegetation removal may destabilize the dunes.

Beach Mice

- Frequent watering near newly planted vegetation may diminish burrow integrity and/or affect the microclimate of the burrows.

Non-breeding Shorebirds Indirect Impacts

- The visual barrier created by planted vegetation may reduce the ability of roosting shorebirds to detect approaching predators, resulting in increased depredation.

Nesting Shorebirds Indirect Impacts

- The visual barrier created by planted vegetation may reduce the ability of nesting shorebirds and their chicks to detect approaching predators, resulting in increased depredation.

Gopher Tortoise

Same as general impacts.

Plants

- Over time, planted species may outcompete or eliminate essential habitat for listed plant species.

Paving

Paving associated with CCCL activities can impact covered species in a variety of ways depending on:

- The areal extent (*i.e.* footprint) of the paving; and
- The location of the paving within the beach and dune system.

Direct Impacts from Paving

General Impacts to All Covered Species

- Paving within listed species habitat permanently eliminate burrowing, resting, roosting, foraging, and/or nesting habitat.

Sea Turtles

None (paving is not permitted in sea turtle nesting habitat).

Beach Mice

- Paving over burrows may trap or smother mice, particularly pups unable to escape, or cause burrows to collapse.

Non-breeding Shorebirds

Same as general impacts.

Nesting Shorebirds

Same as general impacts.

Gopher Tortoise

- Paving over burrows may trap or smother tortoises or cause burrows to collapse.

Plants

- Paving can bury and destroy covered plant species.

Indirect Impacts from Paving

General Impacts to All Covered Species

- Paved vehicular beach access corridors may lead to increased traffic on the beach, which may result in harm and harassment of listed species.

Sea Turtles

- Excessive freshwater runoff from impervious surfaces during storm events may wash out nests, create gullies on the beach, or otherwise degrade nesting habitat.

Beach Mice Indirect Impacts

- Paved areas may fragment beach mouse habitat; and
- Mice traveling over pavement from one sandy area to another are more susceptible to predation.

Non-breeding Shorebirds

Same as general impacts.

Nesting Shorebirds Indirect Impacts

Same as general impacts.

Gopher Tortoise

- Paved areas may fragment gopher tortoise habitat;
- Tortoises traveling over pavement from one sandy area to another are more susceptible to being struck by vehicles.

Plants

- Excessive freshwater runoff from impervious surfaces during storm events may wash out plants, alter beach hydrology, and/or degrade the beach and dune system.

General Construction and Special Event Activities

General construction activities associated with CCCL permits not specifically described elsewhere include, but are not limited to, the movement of people and equipment, noise, vibrations, pile driving, water jetting, and other mechanical disturbances. Special events often involve large numbers of individuals, movement of equipment, and the placement of temporary structures on the beach. All of these activities can impact covered species in a variety of ways depending on:

- The type of activity involved (*e.g.*, amount and type of equipment, number of people involved, etc.);
- The location of the activity within the beach and dune system;
- The time of year the activity takes place;
- The time of day the activity takes place; and
- The duration of the activity.

Direct Impacts from General Construction and Special Event Activities

General Impacts to All Covered Species

- Noise, movement of equipment, and pedestrian traffic within and adjacent to the dune system may harass resting, resting, roosting, foraging and nesting animals, particularly at night if the activities are accompanied by transient lighting (*e.g.*, flashlights, lanterns, spotlights, etc.).

Sea Turtles

- Transient lighting associated with nighttime operations may disorient hatchlings;
- Pile driving and water jetting during installation of structures may destroy incubating eggs and/or hatchlings in nests; and

- Vibrations associated with pile driving and operation of heavy equipment may addle developing embryos or cause premature hatchling emergence.

Beach Mice

- Pile driving, water jetting, and other mechanical disturbances during installation of structures may harm mice, destroy burrows, or cause mice to abandon their burrows; and
- Pedestrian traffic within the dune system may collapse burrows and/or degrade foraging habitat.

Non-breeding Shorebirds

Same as general impacts.

Nesting Shorebirds

Same as general impacts.

Gopher Tortoise

- Pile driving, water jetting, and other mechanical disturbances during installation of structures may harm tortoises, destroy burrows, or cause tortoises to abandon their burrows.

Plants

- Movement of equipment and pedestrian traffic through the dunes can trample and otherwise damage listed plant species.

Indirect Impacts from General Construction and Special Event Activities

General Impacts to All Covered Species

- Movement and operation of equipment and associated pedestrian traffic within the beach and dune system may cause degradation of burrowing, resting, roosting, foraging, and/or nesting habitat that persists after the permitted activity is completed; and
- Pedestrian traffic through the dunes can damage dune vegetation and create blow out zones that are more easily eroded during high water events/storm surges and are slow to revegetate.

Sea Turtles

- Relocation of nests from construction areas may result in reduced reproductive success (mortality of developing embryos during movement and altered incubation environment resulting from improperly configured egg chamber at recipient site).

Beach Mice

Same as general impacts.

Non-breeding Shorebirds

Same as general impacts.

Nesting Shorebirds

Same as general impacts.

Gopher Tortoise Indirect Impacts

Same as general impacts.

Plants

- Equipment movement and operation within the dune system may introduce propagules of exotic or competing plant species (*i.e.* alter the native vegetative composition).

Construction/Security Lights

Lighting associated with CCCL activities can impact covered species in a variety of ways depending on:

- The number of lights involved;
- The type of lights involved (wattage, wavelengths, directional properties, etc.);
- The mounting height of the lights;
- The placement and orientation of the lights relative to the beach and dune system;
- The effectiveness of shielding and other modifications to manage the lighting footprint;
- The time of year the activity takes place; and

- The duration of the activity.

Direct Impacts from General Construction/Security Lights

General Impacts to All Covered Species

- Lighting within the beach and dune system can harass animals by disrupting essential nocturnal behaviors (*e.g.*, resting, roosting, foraging, and nesting), potentially causing them to temporarily abandon the habitat;
- Persistent disruption of Circadian rhythms may reduce the fitness of animals over time; and
- Lighting within the beach and dune system may increase the vulnerability of adults and offspring to predation.

Sea Turtles

Same as general impacts.

Beach Mice

Same as general impacts.

Non-breeding Shorebirds

Same as general impacts.

Nesting Shorebirds

Same as general impacts.

Gopher Tortoise

Same as general impacts.

Plants

- Artificial nighttime lighting in the dune system alters the natural periodicity to which all plants have become adapted and could impact their physiology (respiration, flowering, etc.) if persistent.

Indirect Impacts from General Construction/Security Lights

General Impacts to All Covered Species

None – all impacts are eliminated when the source of lighting is removed from the beach and dune system.

Equipment Storage and Temporary Safety/Security Barriers

The storage of construction equipment and supplies, as well as the installation of temporary safety/security fencing, associated with CCCL activities can impact covered species in a variety of ways depending on:

- The type of equipment and materials being stored;
- The type of safety fencing being used;
- The areal extent (*i.e.* footprint) of the storage area or area enclosed by fencing;
- The location of the storage/fenced area within the beach and dune system; and
- The duration of storage/fencing.

Direct Impacts from Equipment Storage and Temporary Safety/Security Barriers

General Impacts to All Covered Species

- Equipment and materials placed within the beach and dune system, as well as safety/security fencing placed around construction sites, may temporarily eliminate resting, roosting, foraging, and/or nesting habitat; and
- Equipment, materials, and temporary fencing within the beach and dune system may trap/entangle animals or impede/prevent essential movements of listed species within and between resting, roosting, foraging and/or nesting habitat.

Sea Turtles

- Equipment and supplies placed on top of nests may crush eggs and/or prevent hatchlings from emerging; and

- Equipment remaining on the beach overnight during the nesting season poses obstacles to nesting turtles.

Beach Mice

- Equipment and supplies placed on top of burrows may trap mice or cause burrows to collapse.

Non-breeding Shorebirds

- The storage of equipment and supplies and/or the placement of safety fencing on the beach may cause birds to avoid preferred resting, roosting, and foraging sites.

Nesting Shorebirds

- The storage of equipment and supplies and/or the placement of safety fencing on the beach may cause birds to avoid preferred nesting sites.

Gopher Tortoise

- Equipment and supplies placed on top of burrows may trap tortoises in their burrows, cause damage to burrows and/or crush buried eggs within nests at burrow aprons.

Plants

- The placement of equipment and supplies and erection of temporary barriers within the dune system may damage or destroy covered plant species.

Indirect Impacts from Equipment Storage and Temporary Safety/Security Barriers

General Impacts to All Covered Species

- The storage of equipment and supplies within the beach and dune system may damage native vegetation and otherwise cause degradation of resting, roosting, foraging, and/or nesting habitat that persists after the permitted activity is completed.

Sea Turtles

Same as general impacts.

Beach Mice

Same as general impacts.

Non-breeding Shorebirds

Same as general impacts.

Nesting Shorebirds

Same as general impacts.

Gopher Tortoise

Same as general impacts.

Plants

Same as general impacts.

Temporary Facilities

Temporary facilities associated with CCCL activities include, but are not limited to, construction trailers, recreational equipment storage boxes, stages and a variety of other structures erected for special events. These facilities can impact covered species in a very similar manner as equipment storage. However, temporary facilities, particularly those associated with special events, have the additional impact of an elevated human presence on the beach.

Temporary facilities associated with CCCL activities can impact covered species in a variety of ways depending on:

- The type of facility deployed;
- The areal extent (*i.e.* footprint) of the facility;

- The location of the facility within the beach and dune system;
- The amount of human activity associated with the facility;
- The amount of artificial lighting associated with the facility; and
- The length of time the temporary facility is deployed.

Direct Impacts from Temporary Facilities

General Impacts to All Covered Species

- Temporary facilities placed within the beach and dune system may temporarily eliminate resting, roosting, foraging, and/or nesting habitat;
- Temporary facilities placed within the beach and dune system may prevent or interfere with essential movements of listed species within and between resting, roosting, foraging and/or nesting habitat;
- Temporary facilities may provide habitat for predators (rats, raccoons, foxes, skunks), thereby increasing predator populations within the habitat of listed species; and
- Nighttime lighting in and around temporary facilities can harass animals by disrupting essential nocturnal behaviors and Circadian rhythms.

Sea Turtles

- Temporary facilities placed on top of nests may crush eggs, or prevent hatchlings from emerging.

Beach Mice

- Temporary facilities placed on top of burrows may trap mice or cause burrows to collapse.

Non-breeding Shorebirds

- Temporary facilities located within the beach and dune system may cause birds to avoid preferred resting, roosting, and foraging sites;
- Nighttime lighting in and around temporary facilities located on or near the beach may increase roosting shorebird's vulnerability to predation; and
- The visual barrier created by temporary structures can reduce the ability of shorebirds to detect approaching predators, thereby resulting in increased depredation.

Nesting Shorebirds

- Temporary facilities located within the beach and dune system may cause birds to avoid preferred nesting sites;
- Nighttime lighting in and around temporary facilities located on or near on the beach may increase the vulnerability of adults, eggs and chicks to predation; and
- The visual barrier created by temporary structures can reduce the ability of nesting shorebirds to detect approaching predators, thereby resulting in increased depredation.

Gopher Tortoise

- Temporary facilities located within the dune system may crush burred eggs within nests at burrow aprons, cause burrow collapse, or trap animals in their burrows.

Plants

- The placement of temporary facilities within the dune system may damage or destroy covered plant species.

Indirect Impacts from Temporary Facilities

General Impacts to All Covered Species

- Placement of temporary facilities within the beach and dune system may damage native vegetation and otherwise cause degradation of resting, roosting, foraging, and/or nesting habitat that persists after the permitted activity is completed.

Sea Turtles

Same as general impacts.

Beach Mice

Same as general impacts.

Non-breeding Shorebirds

Same as general impacts.

Nesting Shorebirds

Same as general impacts.

Gopher Tortoise

Same as general impacts.

Plants

Same as general impacts.

Refuse and Chemicals

This category includes the various refuse and chemicals that may be generated as the result of CCCL permitted activities including, but not limited to, construction debris, trash, and used chemicals. These materials can impact covered species in a variety of ways depending on:

- The type of refuse;
- The quantity of refuse;
- The toxicity of the material;
- The storage and disposal methods used; and
- The length of time the refuse is present within the beach and dune system.

Direct Impacts from Refuse and Chemicals

General Impacts to All Covered Species

- Construction debris stored within the beach and dune system may temporarily eliminate resting, roosting, foraging, and/or nesting habitat;
- Construction debris, garbage, and litter may trap/entangle animals or impede/prevent essential movements of listed species within and between resting, roosting, foraging and/or nesting habitat;
- Construction debris may provide habitat for predators (rats, raccoons, foxes, skunks), thereby increasing predator populations within the habitat of listed species;

- Spilled paints, oils, fuel and other chemicals may contaminate sediments and vegetation within the beach and dune system; and
- Improperly disposed of human food refuse within the beach and dune system may attract scavengers, which may then harm, harass, and/or prey on listed species.

Sea Turtles

- Chemicals and spilled fuel leaching into beach sediments may introduce toxic fumes into the nest incubation environment that may affect embryonic development and/or mortality.

Beach Mice

- Construction debris placed on top of burrows may trap mice or cause burrows to collapse; and
- Trash left on the beach overnight can attract mice from the dunes onto the beach where they are more susceptible to predation and other impacts.

Non-breeding Shorebirds

- Construction debris stored on the beach may cause birds to avoid preferred resting, roosting, and foraging sites; and
- Birds may ingest human food waste that could be detrimental to their health.

Nesting Shorebirds

- Construction debris stored within the beach and dune system may cause birds to avoid preferred nesting sites; and
- Construction debris may reduce the ability of nesting shorebirds to detect approaching predators, thereby resulting in increased depredation of eggs, chicks and adults.

Gopher Tortoise

- Construction debris stored within the dune system may crush buried eggs within nests at burrow aprons, cause burrow collapse, or trap animals in their burrows.

Plants

- Construction debris and other refuse placed within the dune system may damage or destroy covered plant species; and
- Spilled paints, oils, fuel, chemicals, and other toxic materials can damage or kill covered plant species.

Indirect Impacts from Refuse and Chemicals

General Impacts to All Covered Species

- Construction debris buried within the beach and dune system may pose obstacles to species digging burrows or egg chambers; and
- Paints, oils, fuel and other toxic materials spilled within the beach and dune system may cause habitat degradation that persists after construction is completed.

Sea Turtles Indirect Impacts

Same as general impacts.

Beach Mice Indirect Impacts

- Food debris left within the beach/dune system may attract competitors of beach mice.

Non-breeding Shorebirds Indirect Impacts

Same as general impacts.

Nesting Shorebirds Indirect Impacts

Same as general impacts.

Gopher Tortoise Indirect Impacts

Same as general impacts.

Plants

Same as general impacts.

Installation of Permanent Non-habitable Structures

This category includes the installation of a variety of ancillary structures or site improvements (*e.g.*, restrooms and boardwalks in public parks) permitted under the CCCL Program. Examples include pools, decks, porches, cabanas, gazebos, garages/parking facilities, privacy fences, sand fences, dune crossovers, and armoring structures. Impacts associated with their construction were addressed under general construction activities. This section deals with their permanent physical presence following construction.

Non-habitable structures can impact covered species in a variety of ways depending on:

- The type of structure;
- The design of the structure;
- The areal extent (*i.e.* footprint) of the structure;
- The siting of the structure within the beach and dune system;
- The effect of the structure on coastal processes;
- The extent to which the ancillary structure increases human activity in and around the beach; and
- Operational/maintenance requirements related to the structure (*e.g.*, lighting, discharges, etc.).

Direct Impacts from Permanent Non-habitable Structures

General Impacts to All Covered Species

- Structures placed within the beach and dune system can permanently eliminate, fragment, and/or alter resting, roosting, foraging, and/or nesting habitat.

Sea Turtles

Same as general impacts.

Beach Mice

Same as general impacts.

Non-breeding Shorebirds

- Structures adjacent to or on the beach can form visual barriers that may reduce the ability of shorebirds to detect approaching predators, thereby resulting in increased depredation.

Nesting Shorebirds

- Structures adjacent to or on the beach can form visual barriers that may reduce the ability of nesting shorebirds to detect approaching predators, thereby resulting in increased depredation of eggs, chicks and adults.

Gopher Tortoise

Same as general impacts.

Plants

Same as general impacts.

Indirect Impacts from Permanent Non-habitable Structures

General Impacts to All Covered Species

- Structures placed within the beach and dune system may impede/prevent essential movements of listed species within and between resting, roosting, foraging and/or nesting habitat;
- Exposed debris from buried structures (*e.g.*, geotextile tubes) damaged by storms may injure, trap or entangle listed species, eliminate resting, roosting, foraging, and/or nesting habitat, and/or impede/prevent essential movements within and between resting, roosting, foraging and/or nesting habitat;
- Artificial lighting associated with ancillary structures can harass animals by disrupting essential nocturnal behaviors and Circadian rhythms;
- Increased human activity associated with new dune crossovers and other ancillary structures may harass listed species by disrupting essential behaviors;
- Pool and other discharges onto the beach and dune system may harm listed species (*e.g.*, wash out nests, flood burrows, etc.), contaminate sediments, kill vegetation, and/or otherwise degrade resting, roosting, foraging, and/or nesting habitat; and
- Permanent structures may disrupt coastal processes and natural beach and dune system formation/regeneration, resulting in additional habitat loss, fragmentation, and/or degradation.

Sea Turtles

- Turtles may be trapped under dune crossovers;
- Contacts with structures on or seaward of the primary dune may cause an increased incidence of false crawls, thereby reducing nesting success;
- Eggs in nests constructed beneath structures (*e.g.*, under dune crossovers) may experience an altered incubation environment as a result of shading, which could affect sex ratios;
- Insufficient sand depth above buried structures (*e.g.*, dune crossover steps and geotextile tubes) may prevent nesting or not allow turtles to construct egg chambers of appropriate depth; and
- Eggs in shallow egg chambers above buried structures may experience altered incubation environment (*e.g.*, temperature) and are more susceptible to physical impacts (*e.g.*, erosion) and/or predation.

Beach Mice

- Habitat fragmentation caused by structures built within the beach and dune system may make beach mouse populations more vulnerable to genetic threats, disease, and catastrophic events from which the population might otherwise be able to recover; and
- Insufficient sand depth above buried structures (*e.g.*, dune crossover steps, geotextile tubes) may prevent burrowing or alter borrow depth and/or configuration, making mice more susceptible to physical impacts and/or predation.

Non-breeding Shorebirds

Same as general impacts.

Nesting Shorebirds

Same as general impacts.

Gopher Tortoise

- Insufficient sand depth above buried structures (*e.g.*, dune crossover steps, geotextile tubes) may prevent burrowing or alter borrow depth and/or configuration, making tortoises more susceptible to physical impacts;

Plants

- Human activity in the dune associated with permitted ancillary structures may trample listed plant species.

Installation of Permanent Habitable Structures

This category includes structures occupied by humans and collectively referred to as coastal development. Residential structures permitted under the CCCL Program vary from single-family homes to large condominiums. Commercial facilities include restaurants, offices, and hotels. Most of these facilities are accompanied by ancillary structures and amenities that were previously addressed under permanent non-habitable structures. Thus, this section deals strictly with the permanent physical presence of habitable structures following construction (construction-related impacts were addressed under general construction activities).

Habitable structures can impact covered species in a variety of ways depending on:

- The type of structure;
- The height and areal extent (*i.e.* footprint) of the structure;
- The siting of the structure within the beach and dune system;
- The effect of the structure on coastal processes;
- The extent to which the structure increases human and animal activity in and around the beach;
- The amount of interior and exterior lighting associated with the structure; and
- Stormwater management practices associated with the facility.

If a habitable structure is sited within habitat utilized by a particular covered species, it can have the same direct and indirect impacts as described above for non-habitable structures. Furthermore, placement of habitable structures along the coastline, particularly in consideration of climate change and sea level rise, may result in the need for future shoreline armoring, leading to further habitat degradation. Additional indirect impacts germane to habitable structures are described below.

Direct Impacts from Permanent Habitable Structures

General Impacts to All Covered Species

- Structures placed within the dune system can permanently eliminate, fragment, and/or alter resting, roosting, foraging, and/or nesting habitat.

Sea Turtles

None (assumes all habitable structures are sited landward of nesting habitat).

Beach Mice

Same as general impacts.

Non-breeding Shorebirds

- Structures adjacent to the beach can form visual barriers that may reduce the ability of resting/roosting shorebirds to detect approaching predators resulting in increased depredation.

Nesting Shorebirds

- Structures adjacent to the beach can form visual barriers that may reduce the ability of nesting shorebirds to detect approaching predators resulting in increased depredation of eggs, chicks, and adults.

Gopher Tortoise

Same as general impacts.

Plants

- Structures on and landward of the primary dune can kill listed plant species and permanently eliminate, fragment and/or alter their habitat.

Indirect Impacts from Permanent Habitable Structures

General Impacts to All Covered Species

- Artificial lighting associated with ancillary structures that trespasses into the beach and dune system can harass animals by disrupting essential nocturnal behaviors and Circadian rhythms;
- Stormwater discharges into the beach and dune system from upland properties may harm listed species (*e.g.*, wash out nests, flood burrows, etc.), contaminate sediments, kill vegetation, and/or otherwise degrade resting, roosting, foraging, and/or nesting habitat;
- Increased pedestrian traffic in and around the beach can harm and harass listed species;
- Unleashed dogs belonging to residents/tourists/patrons of habitable structures can harm and harass listed species and trample, uproot, and/or otherwise damage native dune vegetation thereby degrading resting, roosting, foraging, and/or nesting habitat;

- Free-roaming cats belonging to residents/tourists/patrons of habitable structures can harm listed species;
- Improperly disposed of human food refuse within the beach and dune system can attract scavengers, which may then harm, harass, and/or prey on listed species; and
- Improperly disposed of chemicals may harm listed species, kill native vegetation and/or degrade foraging habitat.

Sea Turtles

Artificial beachfront lighting that trespasses onto the beach or is visible from the beach can:

- Deter adult females from emerging from the ocean to nest;
- Prevent adult females from orienting properly to the ocean after nesting;
- Disorient hatchlings (causing them to take indirect paths to the ocean), resulting in increased energy expenditures and exposure to predation (reduced survivorship); and
- Misorient hatchlings (causing them to crawl away from the ocean) into parking lots, roadways, and other areas where they are likely to perish (crushed by vehicles, dehydration, predation, etc).

Residents/tourists/patrons of habitable structures can have the following impacts:

- Nighttime activities on or near the beach, particularly if accompanied by transient lighting (*e.g.*, flashlights, lanterns, fireworks, etc.) may deter adult female turtles from emerging from the ocean to nest, cause turtles already on the beach to abandon their nesting attempts, and/or disorient hatchlings;
- Beach furniture and recreational equipment left on the beach overnight can trap/entangle sea turtles and/or pose obstacles to nesting;
- Daytime use of beach umbrellas and other recreational equipment that penetrates the sand may cause harm to eggs and hatchlings and/or cause premature hatchling emergences; and
- Improperly disposed of fishing line may entangle adult nesting females and/or hatchlings.

Beach Mice

- Artificial beachfront lighting that illuminates the dune system may increase the vulnerability of beach mice to predation, and/or reduce the suitability of burrowing/foraging habitat;
- Residents/tourists/patrons of habitable structures can have the following impacts:
 - Beach access, if not restricted to elevated dune crossovers, can degrade beach mouse habitat;
 - Beach furniture and recreational equipment stored in the dune can damage dune vegetation and thereby degrade foraging habitat; and
- Unleashed dogs belonging to residents/tourists/patrons of habitable structures can harass beach mice, damage burrows and lead to avoidance of otherwise suitable habitat;

Non-breeding Shorebirds

Same as general impacts

Nesting Shorebirds

- During the daytime, beachgoers from habitable structures may trample nests and/or flush brooding birds, thereby increasing risk of hypo/hyperthermia and exposing eggs and chicks to predation; and
- Persistent daytime or nighttime human activity on the beach may cause birds to avoid otherwise suitable nesting sites or permanently abandon the nest, resulting in mortality of eggs and chicks.

Gopher Tortoise

- Residents/tourists/patrons of habitable structures walking through the dunes and associated beach furniture, boats, and recreational equipment stored in the dune can kill vegetation and degrade tortoise habitat.

Plants

- Habitable structures in or landward of the primary dune may alter coastal processes (*e.g.*, aeolian transport, natural dune formation, etc.), thereby degrading the habitat of listed plant species;
- Artificial nighttime lighting from habitable structures that trespasses into the dune system can alter the natural periodicity to which all plants have become adapted and can negatively impact their physiology (respiration, flowering, etc.); and
- Beach furniture and recreational equipment stored in the dune can damage or destroy plants and degrade dune habitat.