

ENVIRONMENTAL ASSESSMENT

**Reintroduction of the Endangered Endemic St. Croix Ground
Lizard, *Ameiva polops*, to St. Croix, U. S. Virgin Islands**

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ABSTRACT

The Caribbean is a biodiversity hotspot with species under intense pressure from exotic introduced species, climate change, and habitat loss. The St. Croix ground lizard *Ameiva polops* (*A. polops*), is still endangered despite 50 years of active management and 30 years under the ESA. Self-sustaining populations of the species inhabit small offshore islands that comprise less than 1% of its historic range. The collection and repatriation of individuals of St. Croix ground lizards, *A. polops*, from offshore cays, such as Buck Island Reef National Monument (BUIS), to the main island of St. Croix is being proposed as a measure to mitigate the potential for catastrophic loss of remaining remnant populations from fire, flood, hurricane, tsunami, and non-native predation. Repatriation to St. Croix will establish new populations and will increase species range dramatically. In 1989 and in 2008 two new populations were created on mongoose-free offshore islands in an effort to replicate the last two native populations of the St. Croix ground lizard. Currently, lizard habitat totals 84.9 ha among the four offshore cays. Years of management of the St. Croix ground lizard accomplished much of the action needed to allow its populations to persist in the short term, but its survival into the future is not clear. Recent research has shown that there is reason to believe that *A. polops* populations will be able to effectively be reestablished on the main island of St. Croix. Since the 1950s and the end of the sugar cane industry, which dominated the local landscape, land cover types have re-emerged with suitable habitat throughout the island. Suitable reintroduction sites within established protected areas have been identified on St. Croix that contain the necessary habitat requirements, along with reduced numbers of non-native predators. Through the participation of local and federal agencies, along with other stakeholders, several sites have been selected for the reintroduction of *A. polops*.

Collection and Re-introduction of Endangered Endemic St. Croix Ground Lizard, *Ameiva polops*, to St. Croix, U. S. Virgin Islands

SECTION I – PURPOSE AND NEED FOR PROPOSED ACTION

1.1 PURPOSE

The Division of Fish and Wildlife within the Department for Planning and Natural Resources of the U.S. Virgin Islands in collaboration with the University of the Virgin Islands (UVI), National Park Service and the U. S. Fish and Wildlife Service, plan to capture and collect individuals of St. Croix Ground Lizard (*Ameiva polops*) from surrounding cays, and translocate them to a number of designated protected areas on the main island of St. Croix. The re-introduction of *Ameiva polops* to St. Croix will work towards achieving stated recovery objectives of the Recovery Plan for the St. Croix Ground Lizard, *Ameiva polops* (1984). Translocation of individuals of *A. polops* is being undertaken as a measure to mitigate the potential for catastrophic loss of remaining remnant populations from Green Cay NWR, Protestant Cay, Ruth Island and Buck Island National Monument from fire, flood, hurricane, tsunami, habitat loss and degradation, and non-native predation; and to enhance the conservation status of the species. Translocation and re-introduction will establish a “self-sustaining population (500 or more individuals) on St. Croix increasing the species range into high quality habitats in protected natural areas and obtain an adequate population dispersion so the species can be considered for reclassification from endangered to threatened.



The purpose of this Environmental Assessment is to consider a range of re-introduction alternatives that have been proposed, evaluated, and discussed among concerned agencies, along with the public, and to select a preferred alternative. Alternative B is the preferred alternative, which increases the species range into a number of high-quality habitats thereby reducing the threat of catastrophic loss of the species, reduces exposure to non-native

predators (e.g., mongoose and tree rat) and provides for opportunity to establish self-sustaining populations. Effective translocation and re-introduction of *A. polops* will maximize benefits to wildlife and provide the more opportunities for public in the form of environmental education and awareness.

1.2 NEED

The goal of this action is to help achieve the recovery of the St. Croix Ground Lizard (*Ameiva polops*). Specifically, the goal is to obtain adequate population dispersion so the species can be considered for reclassification from endangered to threatened. This endemic species, one of only three native lizards to St. Croix, Virgin Islands became globally endangered in the 1900s after the Javan mongoose (*Herpetes auropunctatus*) was introduced to St. Croix, U.S. Virgin Islands (USFWS 1984). The introduction of mongoose along with coastal development and predation by feral cats and dogs has been implicated in the extirpation of *A. polops* from St. Croix (Knowles 1990). *A. polops* survives today on only four small near-shore cays around St. Croix and nowhere else in the world. The current largest remaining population resides on the 71-ha federally protected area of Buck Island Reef National Monument (BUIS), which is managed by the National Park Service and located a little less than two miles offshore of the northeast coast of St. Croix. In 2008, 56 adult *A. polops* were introduced to BUIS from a surviving population on the small nearby island of Green Cay, about 1.5 miles from BUIS. The introduced population on BUIS has continued to grow and a study conducted by herpetological experts from University of Texas A&M in 2013, estimated that more than 1400 individuals were on BUIS (Fitzgerald et al. 2015). Smaller populations of *A. polops* can be found on three smaller cays surrounding St. Croix. Green Cay lies 1.5 miles southwest of Buck Island and became a National Wildlife Refuge in 1977 to offer protection to this lizard and its habitat. Two smaller populations reside on Protestant Cay (3.0 acres), an islet in Christiansted Harbor consisting of a hotel and maintained grounds; and Ruth Island (27 acres), a flat, dredged-material islet located off the south shore of St. Croix in the shipping channel of a major oil refinery. The population on Ruth Island was successfully translocated in 1990 with 10 individuals from Protestant Cay and one from Green Cay NWR (Knowles 1996). Presently, *A. polops* can only be found on these four small islands, which make *A. polops* one of the most endangered reptiles in the world.

The proposed action is a fundamental element of the St. Croix Ground Lizard Recovery Plan (USFWS 1984) and was identified as one of the amended delisting criteria in 2018, in which it states that additional populations need to be established that show a stable or increasing trend, evidenced by natural recruitment and multiple age classes. The Government of the Virgin Islands Department of Planning and Natural Resources-Division of Fish and Wildlife (DPNR-DFW) in consultation with the National Park Service (NPS) Buck Island Reef NM, the U. S. Fish & Wildlife Service (USFWS), the University of the Virgin Islands (UVI) and other local stakeholders have agreed translocation and re-introduction of *A. polops* to St. Croix will benefit the species survival (Angeli and Fitzgerald 2019, In Press). The action minimizes the risks of the species extinction because it is less likely that catastrophic events (hurricanes, tsunamis, fires, etc.), and other threats (e.g. predation and habitat loss), will affect equally and simultaneously four spatially segregated populations. The proposed action is expected to foster the recovery of the

species because *A. polops* released in protected, high quality habitats will result in a self-sustaining population which should mimic the extant wild population on St. Croix, Virgin Islands.

Actions need to include: 1) capture and collection of individuals on Buck Island, 2) translocation and re-introduction to designated protected areas on the main island of St. Croix, 3) post re-introduction monitoring and the development and implementation of a monitoring protocol and 4) protection and education of visiting public concerning species introduction and long-term survival.

1.3 REQUIRED DECISIONS

The Government of the Virgin Islands Department of Planning and Natural Resources, Division of Fish and Wildlife (DPNR-DFW) will determine whether and how to conduct the translocation and re-introduction of *A. polops* to St. Croix, which is the preferred alternative of this EA. This decision must incorporate the best available scientific information and appropriate measures to protect the species if action is taken. DPNR-DFW's decision will also incorporate measures to protect related resources if action is taken. In the meantime, any decision the DPNR-DFW reaches will include avoidance and minimization measures for reasonably foreseeable adverse impacts. DPNR-DFW must coordinate and consult with its partners, in particular, the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS) and the University of the Virgin Islands (UVI) who manage areas where *A. polops* will be collected (Buck Island) or designated areas to be introduced (e.g., Sandy Point National Wildlife Refuge, UVI Wetlands, and Manning Point).

1.4 BACKGROUND

St. Croix ground lizards were common until 1910 throughout the island. An eastern population at the Fort Christiansvaern was gone by 1920 (Dodd, 1978). Development of Fredericksted on the western coast of St. Croix led to their steady decline. A small group of individuals were seen in 1968 between Two Brothers and Fort Frederick, but disappeared by 1969. Historic populations of the St. Croix ground lizard remained on two mongoose-free cays, Protestant and Green. In 1989 and in 2008 two new populations were created on mongoose-free offshore islands (Ruth Island and Buck Island) to replicate the last two native populations of the St. Croix ground lizard. Currently, lizard habitat totals 84.9 ha among the four offshore cays. On Green Cay, Protestant Cay and Ruth Island, *A. polops* populations are precariously small, with the number of individuals being estimated to as low as 300 individuals on Green Cay and less than 100 each on Ruth and Protestant Cays within the past 10 years (McNair, 2003).

These populations are threatened by nonnative predators, habitat restrictions and loss, anthropomorphic activities, hurricanes and storm surge. Limited and poor-quality habitat (small islands) severely reduces this species' health and long-term potential. In 1989, St. Croix and all its associated islands were severely damaged by Hurricane Hugo. This hurricane, followed by a succession of other storms in 1995, 1998, 1999, and 2017 has reduced optimal lizard habitat on

the small islands by eliminating critical vegetation canopy (McNair and Lombard, 2004; C. Lombard, USFWS, pers. comm. 2007, 2017). More recently in August and September of 2017, Hurricanes Irma and Maria both caused severe damage to St. Croix and its surrounding islands. The *A. polops* populations were possibly impacted by those storms, but visual encounter surveys of the lizards were conducted and all populations were found present (N. Angeli pers comm).

Green Cay is a 5.7 ha islet off the northeastern shore of St. Croix and was designated as a National Wildlife Refuge in 1977 primarily to protect one of the only two remaining natural populations of *A. polops* (McNair, 2003; McNair and Lombard, 2004). Habitat degradation caused by introduced tree rats has reduced and altered preferred *A. polop* habitat; USFWS began non-native predator control efforts for tree rats (*Rattus rattus*) in 2000 and began a reforestation project in 2004 to improve the habitat quality at Green Cay. In addition, Mackay (2007) suggests continued habitat restoration by removing hurricane grass and ginger thomas to improve *Ameiva* habitat conditions on Green Cay. The most recent surveys of *A. polops* on Green Cay estimated the population to be between 108-258 individuals (McNair and Lombard, 2004). In 2008, 56 individuals were taken from Green Cay in order to establish a new population on the larger, nearby islet of Buck Island, which continues to grow and is currently estimated at over 1400 individuals (Fitzgerald et al., 2015; Angeli et al., 2018).

Protestant Cay is a 1.2 ha islet off the northeastern coast of St. Croix. Protestant Cay contains one of the remaining natural populations, along with Green Cay, where because of the absence of mongoose *A. polops* persisted after their extirpation from the main island of St. Croix. In 1967, researchers stated that there was a wide distribution of 200 individuals found a couple years prior to the establishment of a hotel built in 1968-69 (Philibosian and Ruibal, 1971; McNair 2003). On Protestant Cay lizards are threatened by hotel development and maintenance activities (landscaping), nesting and roosting cattle egrets, guest activities and non-native predators (mongoose and rats). This population has been steadily declining, and the most recent study conducted in 2002 found only 30 individuals (McNair 2003). A 2007 site visit confirmed the lizards' presence, but no formal population estimates were conducted.

Ruth Island is a 9.7 ha islet located off the south-central coast of St. Croix that was created from dredge spoil in 1965 (McNair and Mackay, 2005). Ten individuals of *A. polops* from Protestant Cay were introduced to Ruth Island in 1990 (Knowles, 1990; McNair and Mackay, 2005) and with one additional individual from Green Cay being released in 1995 (McNair and Mackay, 2005). Of the four current islets that contain populations of *A. polops*, Ruth Island is the only islet that is not currently identified as a protected area. The most recent population surveys for *A. polops* were conducted in 2003 and there were an estimated 60 ground lizards occupying Ruth Island.

The largest population of *A. polops* currently resides on Buck Island (BUIS) with an estimated population of over 1400 individuals (Fitzgerald et al., 2015; Angeli et al., 2018) after an introduction of 56 individuals in 2008 on 76 ha. It was presumed present on Buck Island by Philibosian and Rubial (1971) prior to the introduction of mongoose in 1912. The Recovery Plan

stated two goals: 1) to establish a self-sustaining population on BUIS; and 2) to obtain adequate population dispersion so the species can be reclassified from endangered to threatened. Prior attempts to translocate *A. polops* to BUIS (1968 and mid-1980s) were initially successful (Philibosian and Ruibal, 1971), but ultimately failed because of the continued presence of exotic predators (Philibosian and Yntema 1976).

As summarized from McNair et al. 2003, Buck Island Reef habitat was compared to all three offshore cays supporting *A. polops* populations. Comparisons between random sites on lizard-inhabited Ruth and Protestant Cays and random lowland sites on Buck Island reveal no significant differences in the nature of light patches, suggesting similar habitat structure between existing and potential habitats. Analysis of uplands areas found less similarities between small cays and Buck Island however, these upland areas provide important vertical refuges from flooding events that are not available on the three smaller and lower cays that presently sustain all existing lizards.

In 2003 and 2007, the Virgin Islands/Puerto Rico multi-agency *Ameiva* Working Group was established to collaborate on the translocation and introduction plan. The *Ameiva* Working Group consisted of NPS/Buck Island Reef NM/Division of Resource Management, St. Croix, USFWS-Sandy Point NWR/Green Cay NWR, St. Croix, USFWS Caribbean Ecological Services Field Office/Puerto Rico, Virgin Islands DPNR-Division of Fish & Wildlife, Acadia University, Maryland Cooperative Fish and Wildlife Research Unit (USGS), and Texas A&M University-Department of Wildlife & Fisheries Sciences met to discuss and plan the next steps. *A. polops* population assessments for Green Cay, Protestant Cay, and Ruth Island were conducted and genetic analyses of tissue samples from individuals captured and tagged were collected. NPS BUIS and USFWS undertook an Interagency Environmental Assessment for the capture, collection, translocation and re-introduction of *A. polops* from Green Cay to Buck Island Reef NM. NPS project funds were used to support a professional herpetology team from Texas A&M University to conduct the capture, collection, and translocation and re-introduction of *A. polops* to BUIS and the post-translocation monitoring during the critical first year. NPS provided in-kind support for the translocation and re-introduction population research project. After the first year and fifth years, re-introduced *A. polops* population monitoring were implemented by BUIS staff collaboratively with USFWS, Texas A&M University, and DPNR-DFW.

In 2019, a public stakeholders meeting was held to discuss the possibility for reintroducing *A. polops* to the main island of St. Croix and where would the introductions have the greatest chance for success. Stakeholders were presented habitat suitability maps for areas around St. Croix based on habitat quality, changing land cover, predicted distribution of mongooses, and predicted carrying capacity across a 30 m² grid. Stakeholders were then allowed to vote for where introductions should take place. Based on the results of the stakeholders' votes three sites have been selected for each of the reintroduction phases. Three sites along the southern shore (UVI Wetlands, Manning Bay Wetlands and Sandy Point National Wildlife Refuge) were chosen for Phase I in 2020 and three sites along the northern shore (Altona Lagoon, Southgate Coastal Reserve, and Salt River Bay National Historic Park and Ecological Preserve) for Phase II in 2021 (Table 1).

Table 1. Summary of information on possible reintroduction sites on St. Croix, along with votes casted by stakeholders at a public forum for discussing where *A. polops* should be reintroduced during Phase I (2019-2020) and Phase II (2020-2021).

| Reintroduction Site | Area (km ²) | Suitability (%) | Stakeholder Votes (Phase I, 2019-2020) | Stakeholder Votes (Phase II, 2020-2021) |
|--|-------------------------|-----------------|--|---|
| Sandy Point National Wildlife Refuge | 1.56 | 28.2 | 18 | 0 |
| *Altoona Lagoon Beach Recreation Area | 0.07 | 100.0 | 11 | 7 |
| *Salt River Bay National Historic Park and Ecological Preserve | 1.62 | 40.9 | 7 | 10 |
| UVI Wetlands | 0.35 | 19.4 | 6 | 4 |
| Manning Bay Wetlands | 0.30 | 97.6 | 5 | 1 |
| East Bay and Point Udall | 0.54 | 5.8 | 2 | 2 |
| Southgate Coastal Preserve | 0.42 | 46.1 | 1 | 12 |
| Estate Little Princess | 0.19 | 81.5 | 0 | 1 |
| Long Point Bay | 0.08 | 27.9 | 0 | 1 |
| Jack and Isaacs Bays Preserve | 1.21 | 2.4 | 0 | 5 |

*Although these sites were two of the top three sites voted on for Phase I, it was decided to introduce *A. polops* in these areas during Phase II due to considerably long permitting processes.

SECTION II – ALTERNATIVES

2.1 ALTERNATIVES ANALYZED IN DETAIL

The alternatives under considerations include:

Alternative A: No Action

Alternative B: Translocation and re-introduction to St. Croix , mainland

Alternative C: Translocation to other U.S. Caribbean island location

The alternatives are presented separately to highlight salient strengths in terms of suitability and tradeoffs.

2.1.1 Alternative A – No Action; Do not translocate, maintain and improve habitat for existing four populations on Green Cay NWR, Protestant Cay, Ruth Island and Buck Island Reef NM.

Under this alternative, the fundamental goal of the action would not be accomplished; there would be no re-introduction of *A. polops* to St. Croix. Specifically, another spatially segregated and self-sustaining population of St. Croix Ground lizards would not be created to reduce the chances of catastrophic loss of the species. Without the creation of a fifth population on the main island of St. Croix (*A. polops* ancestral home range) there is limited future for the species due to the spatial and habitat limitations, and threats to the existing populations on the four offshore cays. At present, available resources and opportunities on Green Cay NWR, Protestant Cay, Ruth Island, and Buck Island are aimed at maintaining existing populations, controlling

non-native predators, and improving existing habitat conditions. However, due to the limitations on the four cays no major population growth can be expected and radical population fluctuations may occur as a result of natural variation in a variety of factors including weather (temperature, rainfall, etc.), prey base, and natural catastrophes, accidental man-caused damage (fires), which could, at times, increase chances for extirpation on individual islands. Therefore, improving conditions for St. Croix Ground lizard on Green Cay NWR, Protestant Cay, Ruth Island and Buck Island should not be mutually exclusive but complimentary to translocation to St. Croix.

2.1.2 Alternative B – Capture, collect, translocate, and re-introduce *A. polops* to St. Croix; Preferred Alternative

Under this alternative, the Division of Fish and Wildlife (DPNR-DFW) with NPS and USFWS would cooperatively catch and collect *A. polops* from Buck Island Reef NM, translocate and re-introduce captured individuals to designated protected areas in the summer of 2020. Wildlife biologists from the DPNR-DFW, along with staff from NPS, USFWS, and other collaborators will conduct intense post re-introduction monitoring for 3 months and DPNR-DFW staff will conduct monitoring on *A. polops* thereafter according to established monitoring programs reviewed and approved by NPS South Florida/Caribbean Inventory and Monitoring Program team.

Individuals of *A. polops* will be released in a total of six designated protected areas over the next couple of years in two phases (Phase I: 2019-220 and Phase II: 2020-2021) (Fig. 1). Three introduction sites for each phase were selected according to habitat quality, changing land cover, predicted distribution of mongooses, and predicted carrying capacity across a 30 m² grid covering St. Croix. Site selections for each phase were voted on by attendees of a local stakeholder meeting in the summer of 2019 (Table 1).

As a result of this selection process, three introduction sites along the south coast of St. Croix were selected for Phase I (A: Sandy Point National Wildlife Refuge, B: Manning Bay Wetlands, and C: University of the Virgin Islands Wetlands). For Phase II three introduction sites were selected along the northern coast of St. Croix (D: Salt River Bay National Historic Park and Ecological Reserve, E: Altona Lagoon Beach Recreation Area and F: Southgate Coastal Preserve) (Fig. 1).

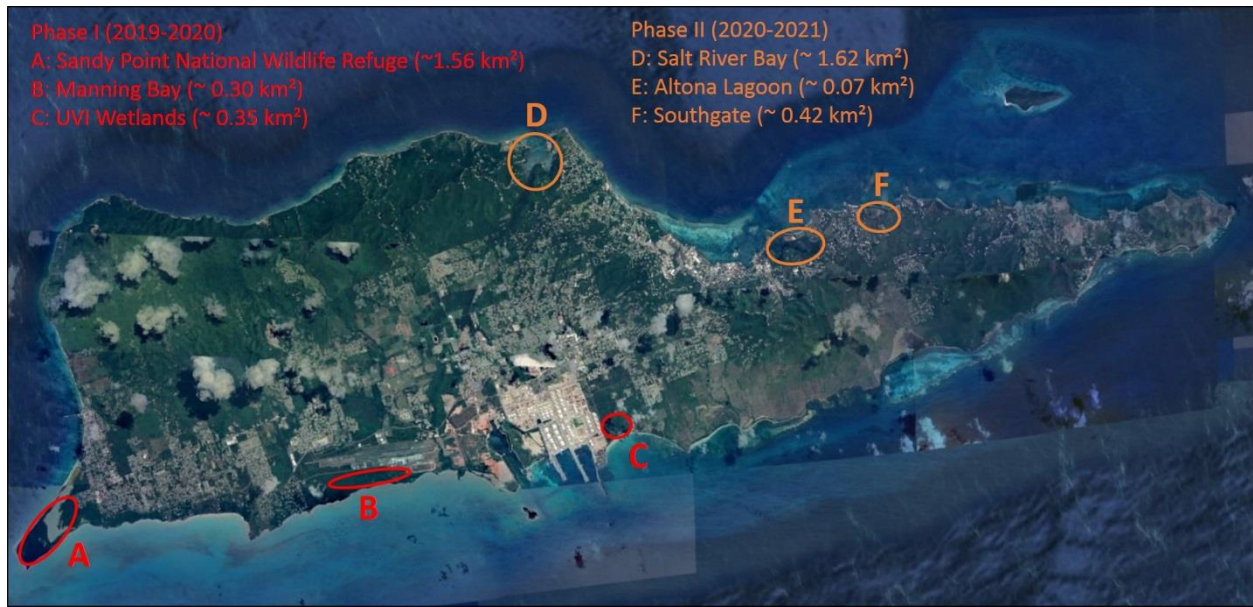


Figure 1. Map of St. Croix indicating the six designated areas (sites A-F) for reintroducing *A. polops* during Phase I (2019-2020) and Phase II (2020-2021).

It was documented that during the initial 1968 introduction of *A. polops* on Buck Island, individuals did initially survive in this habitat and reproduce (NPS 1983) despite of the presence of exotic predators (NPS 1983). In the reduced presence of non-native predators and with improved habitats (e.g., planting of native vegetation) these areas should provide all critical requirements for the translocation population's survival. Standard capture and handling methods used for most Teiid species will be followed and have proved successful for similar species. *Ameiva polops* will be captured using a noose, which is a common and safe technique used for catching a wide variety of lizards including other Teiids (i.e., Verwaijen et al. 2002) and has been used on *A. polops* by previous researchers (Meier et al. 1993). Measurements including snout-vent length (SVL), total tail length, regenerated tail length, and mass will be taken on all individuals. All individuals captured will be toe-clipped, which is a standard and accepted marking procedure (Dodd 1993, Borges-Landáez and Shine 2003) and adults >50mm SVL will be permanently marked using glass beads sutured to their tail as described by Fisher and Muth (1989). These techniques are commonly used because of minimal effects on the subjects, and all individuals will be observed upon release to ensure there are no obvious injuries that may contribute to mortality.

Individuals (1 male and 3 females) will be kept in temporary anti-predator structures. The sides of the structures will be constructed of aluminum metal flashing with 1 ft of flashing being buried in the ground with a concrete footing to deter predators from digging under the structure and 1.5 ft of flashing will be above ground. Metal wire mesh fencing will be used for the top of structure. In each site location there will be three anti-predator structures with one structure with the original completely enclosed design, the second anti-predator structure will have the same original design but will have small openings where the sides aluminum flashing meets the ground to allow for lizards to move in and out of the structure, and the third design

will be the same as the second but the fencing on top will be removed to document if aerial predation is a concern for the introduced lizards. In addition to the antipredator structures where the lizards will be introduced, there will also be several additional structures placed around each anti-predator enclosures that lizards will be able to use as additional cover as they begin to roam outside of their original enclosures. These additional “hides” for the lizards will be made of two wooden base boards attached to 3 ft segments of metal flashing. The hides will sit a couple of inches above the ground to allow for lizards to find shelter under them from possible predators.

While in temporary anti-predator enclosures lizards will be monitored daily by trained observers walking around the enclosures. Observers will begin at random times (to 20 min. intervals) between 1000h and 1400h. The following data will be collected upon the first sighting of each lizard:

- Bead combination
- Location
- Microhabitat
- Sex/Maturity
- Behavior

Upon release from the enclosures 18 individuals will be radio-tracked for approximately 14 days (the life of the transmitters) to monitor immediate survival and dispersal. Visual encounter surveys will be concentrated within 50m from the enclosures to help monitor dispersal. When lizards are found >50m from enclosures, Visual Encounter Surveys will be expanded accordingly (Treglia, 2008).

Thereafter for the first year monthly visual surveys will be conducted using standardized protocol for monitoring Teiid lizards (Treglia, 2008). For example, trained observers will carefully walk through the translocation area in the selected habitats on St. Croix between 1000 and 1400 h. Start and stop times for visual encounter surveys will be noted so that search-efforts can be quantified. Observed *Ameiva* will be classified as juvenile or adult males and females. If marked individuals are seen, the bead combination will be noted. Each observation location will be recorded with a GPS. With this information, the locations of lizards can be plotted and the encounter rate (lizards/person-hour) can be computed. Dispersal movements can be quantified for marked individuals.

Beginning one month prior to and then continuing throughout the *A. polops* introduction there will data collected for habitat and prey availability. In each site data for vegetation, substrate, canopy cover, temperature and precipitation will be collected. To measure prey availability four pitfall traps at each reintroduction site will be deployed for 48 hrs every two weeks.

To reduce the possible impact from predation by invasive mammals (e.g., mongoose) there will be routine trapping conducted at each site using Tomahawk traps. Every two weeks traps will

be deployed for a 24hr period. There will also be GoPros placed around each site to observe any possible predation events.

2.1.3 Alternative C – Translocation to other U. S. Caribbean island location

Under this alternative, *A. polops* from Buck Island and Green Cay NWR would be collected and translocated to another offshore island with suitable habitat located in the northern Virgin Islands or Puerto Rico. Potential offshore cays exist in the northern Virgin Islands and Puerto Rico; however, it is almost impossible based on scientific consensus of bathymetric models to hypothesize that *A. polops* occurred there in the past (i.e., outside *Ameiva polops* historic range of contiguous landmasses) and therefore translocation to the northern Virgin Islands or Puerto Rico would in effect be introducing a non-native lizard into that ecosystem and adversely impact native lizard populations. Moreover, the uncontrolled populations of non-native predators and vegetation makes it unlikely translocation to these areas would succeed. The logistics and cost to conduct these translocations is also a negative factor for this alternative. This alternative does not meet goals for the recovery of the species.

2.1.4 Environmentally Preferred Alternative

The stated purpose of the Division of Fish and Wildlife (DPNR-DFW) within the Department of Planning and Natural Resources of the US Virgin Islands is to preserve, protect, restore and manage the natural and ecological environments of fish and wildlife. The preferred alternative of reintroducing *A. polops* to protected areas around St. Croix will accomplish this stated purpose and ensure that future generations of people will be able to observe and enjoy this iconic and endemic species in St. Croix.

SECTION III- AFFECTED ENVIRONMENT

3.1 PHYSICAL CHARACTERISTICS

3.1.1 Location

The island of St. Croix is the largest of the U.S. Virgin Islands and is about 22 miles long from east to west. On the western end of the island the width is about six miles from north to south and at the east end of the island it is only about a mile wide. The entire island has an area of roughly 85 square miles. The northern region of the island contains the most mountainous areas, with a maximum elevation of around 350 masl at Mt. Eagle. The mountainous area is divided into east and west regions by ancient marine sediments that extend in a south-westerly direction from around the town of Christiansted located on the north-eastern shore. The majority of the watersheds found on St. Croix run from north to south and are characterized by steep ghuts which generally contain intermittent streams dependent upon seasonal rainfall. The southern regions of St. Croix are dominated by rolling coastal plains.

The locations of the proposed actions are within six protected areas along the southern (Sandy Point National Wildlife Refuge, Manning Bay Wetlands and UVI Wetlands) and northern (Salt River Bay National Historic Park and Ecological Preserve, Altona Lagoon Beach Recreation Area and Southgate Coastal Preserve) coasts of St. Croix (Fig. 1, Table 1).

Buck Island Reef National Monument (BUIS) consists of approximately 19,015 land and water acres north of the island of St. Croix in the U.S. Virgin Islands. The island is located at 17° 47' N, 64° 37' W, and separated by a 1.8-mile wide channel from the north shore of St. Croix off the main island's eastern section. Buck Island Reef NM is administered by the National Park Service, U. S. Department of the Interior. The affected area is the 176 acre island including the beaches, shoreline, beach forest, and upland tropical dry forest habitats, as well as, the visitor day use facilities including the picnic areas and hiking trail. Park concession operations bring visitors to the island either on half or full-day charters which include the boat trip to the underwater snorkel trail and one or two hour visit to the island. Visitor activities include hiking the one overland hiking trail, swimming off the beach, sunbathing, snorkeling any of the numerous shoreline reefs or picnicking at one of the two picnic areas on the south side of the island. Visitor time on the island is concentrated on the open sand beach area; exploration off-trail is discouraged to prevent visitor contact with a variety of hazardous native plants (spines, thorns, and burning sap).

3.1.2 Geomorphic/Physiographic

The island's biotic communities cover the 84 square miles of mostly rolling hills and a broad central area of flat arable land with wetter forested areas in the west of St. Croix and relatively dry scrub lands in the east. Its most prominent topographic feature is Mount Eagle which has an elevation of 1,160 ft. This is the highest peak that forms part of the hilly ridgeline running approximately east-to-west. Topographic relief and variation are low.

3.1.3 Soils

Upland soils are dominated by shallow, well-drained, stony soils that cover the slopes and summits. The soils are generally 10 inches deep or less, with weathered bedrock found at depths from 10 to 30 inches (USDA 2002). The general soil map of St. Croix produced by the U.S. Department of Agriculture Natural Resources Conservation Service indicates that St. Croix is characterized by six different soil types, however where the proposed reintroduction sites along the northern coasts is comprised of the Southgate-Victory-Cramer soil type and along the southern region is Hesselberg-Sion-Arawak (USDA 2002). The Southgate-Victory-Cramer unit is described as shallow, moderately deep and shallow while the Hesselberg-Sion-Arawak is described as shallow, very deep, and shallow, well drained, nearly level to strongly sloping soils on ancient marine terraces and valleys of limestone hills and mountains (USDA 2002). Saline marshes on the island are characterized by very deep, very poorly drained soils that have been formed by alluvial and marine sediments and the remains of hydrophytic plants. These soils are high in organic matter and would commonly be called muck (USDA 2002).

3.1.4 Climate and Hydrology

The mean annual temperature in the Virgin Islands is 77° F (USDA, NRCS unpublished data). The mean monthly temperature varies only 5 to 7° F through the year (72° – 78° F), while mean daily maximum and minimum temperatures in warmest months range from 74° – 88° F and the coolest months from 68°– 82°F. Relative humidity (airport measurements are typically drier than forests) is high year-round, with mean nighttime levels at 86% and mean daytime levels at 69%. Mean monthly nighttime relative humidity ranges from 81% in the driest months to 90% in the wettest months. Mean monthly daytime ranges are 63% in January (driest) to 73% in August and September (wettest). Northeast trade winds blowing in winter months at 10-20 knots for 60% of the time, and > 20-kt winds 25% of the time (increasing periodically with northerly Christmas winds) add greatly to desiccation effects. Trades are continuous most of the year, abating somewhat by middle to late summer and returning well by middle autumn.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 Habitat/Vegetation

In pre-Columbian times it has been estimated that forest cover on St. Croix was around 90% but there have since been major changes in land use beginning with European settlers arriving in the 1600s. Today it is estimated that the island has 50% forest cover, although much of this is dominated by secondary forests that are growing in abandoned agricultural areas. Currently only about 3% of forest cover is considered mature forests. The terrestrial vegetation on St. Croix can be described as consisting of coastal vegetation, thicket vegetation, forest vegetation, or freshwater vegetation. The most relevant types of terrestrial vegetation for where the best habitats for St. Croix occur include coastal vegetation and thicket vegetation, including some portions of forest vegetation. The selected areas for reintroducing *A. polops* consist of coastal regions that contain lagoons and other saline bodies of water and vegetation in these areas will consist of mangroves along sheltered, muddy coasts and seashore vegetation. Mangrove forests are found in shallow marine waters and moist, saline soil. Mangroves in St. Croix can consist of three species which include white mangrove (*Laguncularia racemosa*), black mangrove (*Avicennia germinans*), and red mangrove (*Rhizophora mangle*). As you move away from the shoreline there is a transition to species of small shrubs such as, buttonwood (*Conocarpus erecta*) and alligator apple (*Annona glabra*).

These include seasonal deciduous forest, beach forest, mangrove forest, thorn/cactus scrub, thicket scrub, and coastal thicket (Gibney 1996). The seasonal deciduous forest community is found on guts and ravines, on the landward edge of beach forests, and on portions of the north-facing slopes of hills. The trees that dominate the canopy in this community include gumbo-limbo (*Bursera simaruba*), chinkwood (*Bourreria succulenta*), fish-poison tree (*Piscidia carthagenensis*), water mampoo (*Pisonia subcordata*), white manjack (*Cordia dentata*), and wild lime (*Adelia ricinella*). Areas that provide more moisture include black cedar (*Tabebuia heterophylla*), black mampoo (*Guapira discolor*), and ebony (*Krugiodendron ferreum*) in the tree

layer. Gibney (1996) describes *Bursera* and *Guapira* trees that are over 100 years old in this vegetation community. Shrubs present in the understory include guayabilla (*Samyda dodecandra*), boxwood (*Schaefferia frutescens*), and broom bush (*Croton betulinus*) (Gibney 1996). The beach forest occurs on the coastline around the perimeter of much of the island but is most prevalent on the west end. The dominant tree in the beach forest canopy is the manchineel tree (*Hippomane manchinella*).

The thorn/cactus scrub vegetation community is an open shrubland that provides a transition between the seasonal deciduous forest and the thicket scrub. The community is characterized by spiny shrubs of simple leaf bushweed (*Flueggea acidoton*), with casha (*Acacia tortuosa*) and greenheart ebony (*Rochefortia acanthophora*) and the tree-like forms of organ pipe cactus (*Pilosocereus royenii*). Gibney, 1996 speculated that the dominance of thorny plants evolved due to the grazing habits of the imported goats and sheep. These animals avoided grazing on the thorny or toxic species which flourished without competition from the more palatable species. Predominant species in this community include mainly shrubby species such as *Croton* sp., sage (*Lantana involucrate*), white manjack, bushy heliotrope (*Heliotropium ternatum*), and prickly bush (*Oplonia spinosa*). These shrubs are intertwined with vines such as monarch amazonvine (*Stigmaphyllon emarginatum*) and cluster vines (*Jacquemontia* spp.), creating dense, impenetrable stands. Two cactus species are frequently found as ground cover, including brittle-jointed “sucker” cactus (*Opuntia repens*) or turk’s cap cactus (*Melocactus intortus*). The few woody species in this habitat include sea grape, black torch (*Erithalis fruticosa*), and bitter ash (*Rauvolfia viridis*) as the dominant shrubby species present, with false button weed (*Spermacoce prostrata*), beach berry (*Scaevola plumieri*), sea purslane (*Sesuvium portulacastrum*), and bay bean (*Canavalia rosea*) as the understory species

3.2.2 Threatened, Endangered and Candidate Species

St. Croix and the surrounding offshore cays provide critical nesting habitat for four species of sea turtle including threatened green turtle (*Chelonia mydas*), threatened loggerhead (*Caretta caretta*), endangered leatherback turtle (*Dermochelys coriacea*), and hawksbill turtle (*Eretmochelys imbricata*). For an example, USFWS has identified Buck Island Reef as an index beach for hawksbill sea turtle recovery where on-going research is providing critical information toward species recovery goals in the Caribbean. Current seasonal nesting estimates indicate between 40-80 nesting hawksbill females per year; 10-20 green turtles; 2-4 loggerheads; and 1-4 leatherback sea turtles. Hawksbill sea turtles primarily nest along and within the coastal beach forest habitat on the north and south shorelines to maximum depth of 13 feet from high water line.

On the islands, brown pelicans (*Pelicanus occidentalis*), and endangered least terns (*Sterna antillarum*) nest and forage. Least tern nesting success throughout the territory has been declining and USFWS refuges have conducted extensive monitoring to determine the cause.

Two marine invertebrates elkhorn (*Acropora palmata*) and staghorn (*Acropora cervicornis*) coral are listed as threatened under the Endangered Species Act. There is a substantial population of elkhorn coral within the island's shallow hard bottom coral areas and staghorn coral is found in small patches scattered along coral barrier reefs and lagoon shorelines.

3.2.3 Other Wildlife Species

Birds in the U.S. Virgin Islands includes species which frequent salt ponds include herons (*Ardea sp.*), egrets (*Egretta sp.*), and ducks, including Bahama white-cheeked pintail ducks (*Anas bahamiensis*). Other birds which frequent the beaches and shoreline coastal areas include sandpipers (*Calidris, Tringa, and Actitis spp.*), rarely/gulls (*Larus sp.*), plovers (*Charadrius sp.*), yellowlegs (*Tringa sp.*), terns (*Sterna sp.*), and stilts (*Himantopus mexicanus*). Birds known to be permanent residents or breeders on the island include bananaquit (*Coereba flaveola*), the Antillean crested hummingbird (*Orthorhyncus cristatus*), the green throated carib (*Eulampis holosericeus*), seasonal warblers (*Dendroica sp.*), the black-throated grass quit (*Tiaris bicolor*), mangrove cuckoo (*Coccyzus minor*), white crowned pigeon (*Patagioenas leucocephala*), common ground dove (*Columbia passerina*), pearly-eyed thrasher (*Maragarops fuscatus*), and belted kingfisher (*Cerle alcyon*). There are roosting areas for magnificent frigate birds (*Fregata magnificens*), although there is no record of them consistently nesting on the island. Several raptors observed on the island, include red-tailed hawks (*Buteo jamaicensis*), american kestrels, (*Falco sparverius*), peregrine falcons (*Falco peregrinus*), and osprey (*Pandion haliaetus*).

Apart from native bat species, the introduced roof or tree rat (*Rattus rattus*), introduced white-tailed deer, and introduced Indian mongoose (*Herpestes auropunctatus*) were at one time the only mammals known to occur on the island. These destructive pests were introduced by man and were severely altering the flora and fauna on the island, including predating threatened green and endangered hawksbill sea turtles nests and disrupting least tern nesting colonies.

3.3 LAND USE

The U.S. Virgin Islands have been used by both prehistoric and historic peoples who sought to exploit its rich variety of marine fauna and terrestrial flora. Little is known about the activities of the prehistoric peoples other than seasonal use as a fish camp to harvest vast quantities of conch (*Strombus gigas*) and fish in near shore reef environments. In the 1700s-1900s different aspects of agricultural activities on the island, with a major focus being sugar cane production, occurred destroying more than 97% of forests. The islands were ceded to the United States by Denmark in 1917 and placed under the control of the Government of the Virgin Islands for public purposes.

3.4 CULTURAL/PALEONTOLOGICAL RESOURCES

The original inhabitants of the Virgin Islands included representatives of the Taino, Arawak, and Carib natives. The Spanish, English, Dutch, French, and Knights of Malta all attempted to

establish themselves permanently on St. Croix. Denmark held St. Croix the longest from 1733 until 1917. In 1917, the Danish Islands were purchased by the United States and Buck Island was part of the public, government, or crown lands ceded to the United States. The local government recognized recreational value in Buck Island and by ordinance in 1948, established the island as Buck Island Park. Appreciation of the island spread and by presidential proclamation on December 28, 1961, Buck Island Reef National Monument was established encompassing the island and its surrounding coral reefs.

Section 106 of the National Historic Preservation Act of 1966 requires the evaluation of the effects of any action on cultural resources (historic, architectural, and archeological) that are listed or eligible for listing in the National Register of Historic Places (NRHP). The activities associated with the translocation of *Ameiva polops* will cause only very minor, localized soil disturbances, and will not impact any prehistoric or historic sites.

SECTION IV – METHODOLOGY & DEFINITIONS

In addition to determining the environmental consequences of the proposed action and other alternatives, the DPNR-DFW State Wildlife Grant (SWG) requires analysis of potential effects on propagules determine if actions would impair the already conserved resources.

The purpose for which the Buck Island Reef National Monument is managed is articulated in the 1916 Organic Act establishing the National Park Service. The Organic Act tells us that the purpose is: “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as would leave them unimpaired for the enjoyment of future generations.”

The DPNR-DFW thus interprets the mandate of using propagules from Buck Island, the largest population, as a means by which to propagate the wildlife of the Virgin Islands for the enjoyment of future generations.

4.0 METHODOLOGY

In this document, the DPNR-DFW based its analysis of impacts and conclusions on discussions with the scientific community, a review of scientific literature and on professional judgments of technical experts and other federal and territorial agency staff. Using these data, the 2019 *Ameiva* Working Group determined which impacts would occur and assessed them according to their duration, extent, intensity, and whether the impact would cause impairment to St. Croix resources. These parameters are defined below.

4.1 Threats:

Threats are marked by a distinct change in conditions or level, and that a practical means of monitoring proximity to thresholds is available. Threats to biological or ecological impact are designated as intensity and duration.

4.2 INTENSITY

For the purpose of this analysis, intensity or severity of the impact to the resource or discipline is defined as:

- Negligible is barely perceptible, not measurable, and confined to a small area.
- Minor is perceptible, measurable, and localized.
- Moderate is clearly detectable and could have appreciable effect.
- Major is substantial and highly noticeable.

4.3 DURATION

For the purpose of this analysis, duration of the impacts to the resource or discipline is defined as:

- Short-term are those that occur during implementation of the alternative.
- Long-term are those that extend beyond implementation of the alternative and would likely have permanent effects.

4.4 DIRECT VERSES INDIRECT IMPACTS

Direct effects are impacts caused by the alternative(s) at the same time and in the same location as the action. Indirect effects are impacts caused by the alternative(s) that occur later in time or farther in distance than the action, but still reasonably foreseeable. An indirect impact could occur because of a change to another resource or impact topic.

4.5 CUMULATIVE IMPACTS

As defined by CEQ Regulations "cumulative impacts" are those impacts on the environment resulting from the incremental impacts of the proposed, past, present, and foreseeable future actions regardless of who or what agency undertakes the actions. Cumulative impacts can result from minor but collectively significant actions taking place over time both within NPS boundaries and outside those boundaries.

Cumulative impacts were assessed by combining the potential environmental impacts of the alternatives with the potential impacts of known projects that have occurred in the past, are currently occurring, or are projected to occur in the future. Cumulative impacts are addressed for each alternative in a conclusion section.

SECTION V – ENVIRONMENTAL CONSEQUENCES EACH ALTERNATIVE

5.1 ALTERNATIVE A – NO ACTION

Under this alternative, the DPNR-DFW, would stop actively pursuing the translocation and re-introduction of the St. Croix Ground Lizard (*Ameiva polops*) to the main island of St. Croix. This alternative is unlikely to achieve the recovery objectives outlined in the Recovery Plan of the species, that is “establish a self-sustaining population (500 or more individuals) on Buck Island, and obtain adequate population dispersion so the species can be considered for reclassification from endangered to threatened” (USFWS 1984).

5.1.1 Habitat Impacts

If this alternative were selected, USFWS would continue to manage Green Cay NWR for existing *A. polops* populations, and DPNR-DFW would continue the management of Protestant and Ruth Island, and the NPS would continue to manage the populations on Buck Island.

5.1.2 Biological Impacts

No *A. polops* would be captured and collected for translocation and re-introduction to Buck Island Reef NM. No new spatially segregated and self-sustaining population of St. Croix Ground lizards would be created and eventual catastrophic loss of the species could occur, species future would remain precarious due to spatial and habitat limitations, and threats to the existing populations on the four offshore cays from exotic predators and habitat disturbance. No further population growth can be expected and radical population fluctuations could be expected due to poor rainfall, reduction in prey base, storm surge, etc. which will impact population growth and survival.

5.1.3 Threatened, Endangered and Candidate Species

No impact to existing endangered *A. polops* population on offshore cays or any other federally protected species on St. Croix. NPS and USFWS have conducted extensive ESA Section 7 consultation concerning project proposed alternatives to ensure compliance with Endangered Species Act. Choosing this alternative would result in a negative impact to the St. Croix Ground Lizard because the potential catastrophic loss of the species on offshore cays would not be mitigated by spatially separated populations.

5.1.4 Predator Control Impacts

No *A. polops* would be captured or collected from Green Cay NWR; USFWS would have to continue predator control to ensure that existing *A. polops* populations would not be further negatively impacted by mongoose or tree rats. Predator control and monitoring will continue on Buck Island Reef regardless of *A. polops* translocation and re-introduction or not.

5.1.5 Socio-Economic Impacts

No *A. polops* would be captured and collected. If this alternative was chosen, the people of St. Croix and its countless visitors would lose the opportunity for education related to restoration

of a globally endangered species and related to on-going resource management programs to provide safe and successful habitat for the St. Croix Ground Lizard. If *A. polops* is not successfully translocated and a viable population established, the public would lose the opportunity for further environmental education and interpretation, and potential wildlife observations and photography. There are no impacts to socio-economic or cultural resources through this no action alternative.

5.1.6 Conclusion – Alt A: Cumulative Impacts / Summation of Cumulative effects for various resources and impairment finding for this alternative

Under Alternative A, there will be no impact to the offshore cays as no *A. polops* will be captured or collected for translocation. *A. polops* population will continue to be impacted and potentially impaired due to reduced reproductive success from resource limitations and reduced habitat quality. There will be no long-term impacts to the ecosystem of St. Croix as no *A. polops* will be re-introduced. The ecosystem will continue to exist with reduced number of herpetofauna species due to no re-introduction of native St. Croix Ground Lizards.

5.2 ALTERNATIVE B – Capture, collect, translocate, and re-introduce *A. polops* to St. Croix (preferred alternative)

This alternative reduces the risk of species extinction and foster the recovery of the species. The translocation population and habitat would be managed to increase the likelihood of a successful reintroduction of *Ameiva polops*. This alternative requires continued implementation of existing programs including non-native predator monitoring and control (Witmer, 2002) and non-native invasive plant management program (NPS Exotic Plant Program 2006). This alternative will require using a monitoring program to ensure documentation of species successful translocation and establishment on St. Croix. By translocating *A. polops* to federal and locally protected areas in St. Croix it will reduce the likelihood of *A. polops* extinction. St. Croix has a much larger land area than the four surround off-shore cays that currently support *A. polops*; the relief and size of St. Croix will reduce the potential hurricane and storm surge impact to the translocated population and provide habitat protected from non-native predators and development where *A. polops* populations can recover undisturbed in the Virgin Islands.

Translocation of lizards into the St. Croix terrestrial ecosystem is anticipated to have no long-term impacts on terrestrial habitat. Installation of temporary enclosures (10 x 10 ft) to hold translocation population is required to test predator control methods and enable monitoring of translocated individuals. There will be no long-term impact to existing herpetofauna, sea turtles and various small lizards, and various crabs. These areas will only be temporarily closed to other ground dwelling animal movement and will be consistently monitored post-translocation to ensure no harm to other wildlife (birds, lizards, crabs) during project use. Enclosures are not in primary sea turtle nesting habitat and are located more than 20 meters above high water in beach forest. In the event a nesting sea turtle encounters the enclosures the sea turtle will be able to move around enclosures to other suitable nesting areas. During post-translocation

monitoring, staff will be walking through and around enclosures; foot traffic will have no long-term impact on beach forest floor which is covered with heavy leaf litter and dead trees.

5.2.2 Biological Impacts

This alternative does not represent a threat and should not have an adverse impact on resident herpetofauna or on any other biological resource (Waddle, 2002). The St. Croix Ground Lizard, *Ameiva polops*, is an endemic species and was a part of the natural faunal community on St. Croix up until the late 1960's until it was extirpated due to changes in land use and the introduction of the exotic mongoose in 1912 (Philibosian and Riubal, 1971).

5.2.3 Threatened, Endangered and Candidate Species

Choosing this alternative will restore an endemic species that has gone extinct from the main island of St. Croix, U. S. Virgin Islands and now only remains on four small offshore cays, with limited habitat and continued threat from exotic predators and habitat degradation. Introduction of *Ameiva polops* will have no impact to threatened and endangered sea turtles nesting either on the islands open beaches or in the littoral or beach forest nor to the protected seasonal migratory least tern (*Sterna antillarum*) nesting. The NPS and USFWS have conducted extensive ESA Section 7 consultation previously and the biological opinion is to collect and re-introduce *A. polops* to St. Croix. No impact to other federally protected species is anticipated through this action.

5.2.4 Predator Control Impact

To ensure successful translocation and re-introduction that will result in a successful translocated population of *A. polops* DPNR-DFW will continue predator monitoring and control for mongoose and tree rat populations. Monitoring of *A. polops* success will include observations of any potential impact from non-native mammals on the island to ensure no adverse impact on translocated *A. polops* populations. To prevent any potential impact on lizards in enclosures from opportunistic predation by pearly-eye thrashers, temporary control of pearly-eyed thrasher (*Maragarops fuscatus*) may be conducted only during the enclosure phase of translocation. We will be testing antipredator enclosures to protect introduced populations from potential mammalian and avian predators.

5.2.5 Socio-Economic Impacts

Enclosure presence will not adversely impact the public access to trails or effect hiking trail experiences. The St. Croix community has been provided with public education about the translocation and have expressed interest and excitement for the project. Translocation areas will be posted for the public to prevent any accidental damage to enclosures. No maintenance will be necessary during the translocation/holding period. Public opportunities such as environmental education and interpretation, and wildlife observation and

photography could be offered, under DPNR-DFW supervision during translocation / holding periods.

5.2.6 Conclusion – Alt B: Cumulative Impacts / Summation of Cumulative effects for various resources and impairment finding for this alternative

Under Alternative B, there will be minor, short term impacts to offshore cays during capture and collection of *A. polops* for translocation to St. Croix.

There will be a long-term beneficial impact to St. Croix with the re-introduction of *A. polops*. The terrestrial ecosystem will have a historic species of Teiid lizard re-introduced to the island. No impact to existing herpetofauna is anticipated. Beach forest habitat has ample space and prey density to support translocation populations and to support anticipated population growth. No other wildlife will be impacted by re-introduction of *A. polops*. There will be limited short term visual impact to the public using beach forest hiking trails that will be mitigated by education and signage identifying *Ameiva* enclosure areas.

5.3 Alternative C – Translocation to other United States owned Caribbean island location

Under this alternative, individuals of *A. polops* from offshore cays would be collected and translocated to another offshore island with suitable habitat located in the Virgin Islands or Puerto Rico.

5.3.1 Habitat Impacts

If this alternative were selected, there would be no impact to habitat on St. Croix Virgin Islands but unforeseeable impacts of a non-native species on the northern Virgin Islands and other Caribbean islands.

5.3.2 Biological Impacts

If this alternative was selected, areas selected for translocation of *A. polops* would have to be fully assessed and extensive management actions undertaken to prepare area for successful introduction of the St. Croix Ground Lizard. Most other areas, specifically offshore cays in Virgin Islands, do not have the appropriate habitat requirements, many still have threats from development, non-native predators, and all would be logistically prohibitive.

5.3.3 Threatened, Endangered and Candidate Species

Choosing this alternative would result in an adverse impact to the St. Croix Ground Lizard separating the lizard from its ancestral home and may impact other unknown Teiid lizards through genetic mixing if *A. polops* is successfully established. In addition, the other islands potentially available are on the Puerto Rican Bank and are presently occupied by *Ameiva exsul*.

Introduction of *A. polops* into *A. exsul* range would risk reduction of available resources for each species, as well as present the possibilities of disease introduction and genetic hybridization (Cunningham, A., 1996; Stockwell, C. A. et al, 1996; Species Survival Commission, 1987).

5.3.4 Predator Control Impacts

Extensive assessment and control actions would be necessary to ensure predator control on selected islands.

5.3.5 Socio-Economic Impacts

If this alternative was chosen, the opportunity to provide the St. Croix community with environmental education and interpretation about their St. Croix Ground Lizard, and potential wildlife observation would be eliminated.

5.3.6 Conclusion – Alt C: Cumulative Impacts / Summation of Cumulative effects for various resources and impairment finding for this alternative

Under Alternative C, there will be minor, short term impacts to offshore cays during capture and collection of *A. polops* for translocation to the predetermined locations on St. Croix, Virgin Islands. Consideration has been taken regarding effects of removal of individuals from the parent populations. Researcher capture activities will have short term minor impacts to island vegetation during capture events. Efforts will be made to capture individuals from a range of locations reducing the impact to any one location on the island. No other impacts to wildlife should occur during capture activities. Other wildlife, crabs and lizards, will not be impacted by the capture of *A. polops*. There are no impacts to socio-economic or cultural resources (limited archeological sites; all subsurface) anticipated through capture and collection process.

Alternative C may adversely affect the species because *A. polops* captured on offshore cays and re-introduced to another Virgin Island or Puerto Rican island would present a non-native Teiid lizard into the native environment; limited likelihood of successful introduction due to competition and possible predation from other Teiid species and presence of non-native predators, and habitat differences. No island in northern Virgin Islands or Puerto Rico currently meets the criteria for safe translocation of *A. polops* without extensive site preparation, conservation measures, and continual management of non-native predators. DPNR-DFW has determined that Alternative C will not benefit the species recovery.

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