

Chapter 2

ALTERNATIVES



Photograph Courtesy of: Zandy Hillis-Starr

Snorkelers at the Underwater Trail, Buck Island Reef National Monument

Buck Island Reef National Monument
Draft General Management Plan/
Environmental Impact Statement

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CHAPTER 2 ALTERNATIVES

Many aspects of the desired future conditions of Buck Island Reef National Monument are defined in the park's legislation, purpose, and significance statements, and service-wide mandates and policies (as described in Chapter 1). Within these parameters, the NPS solicited input from the public, park staff, federal, territory, and local government officials, and other organizations regarding the future long-term management and use of Buck Island Reef National Monument. Among other things, the planning team gathered information about existing visitor use tendencies, resource conditions, and facilities within the park, to help guide the decisions and recommendations presented in this plan.

The planning team developed five management zones and four management alternatives--three action alternatives and a no action alternative--to reflect the range of ideas and issues identified by park and NPS staff, interested parties, and the public. This chapter presents the management zones, management alternatives, user capacity, comparative cost analysis, mitigation measures common to all alternatives, the environmentally preferred alternative and a summary of environmental impacts of implementing the alternatives.

MANAGEMENT ZONES

Management zones prescribe how different areas of the monument would be managed and give an indication of the management priorities for various areas. The five management zones describe a range of desired future conditions for resources, visitor experiences, and types and levels of facility development. The management zones identify the widest range of potential future resource conditions, visitor experiences, and facilities for Buck Island Reef National Monument that fall within the scope of the park's legislation, purpose, significance, and special mandates and policies. In every management zone, the monument intends to preserve and protect natural and cultural resources to the greatest extent possible given available funds.

Management zones were applied in different configurations within the park's boundary, to create the three action alternatives. Appropriate types of visitor use and activities, and types and levels of development were identified for each management zone. These are summarized by zone in Table 2. The management zone prescriptions emphasize desired future resource conditions, visitor experiences, kinds, and levels of development, and similar management approaches for each zone. The five management zones are *Resource Protection Zone*, *Anchoring Zone*, *Island Discovery Zone*, *Recreation Zone*, and *Marine Hazard Zone*. These zones are described in detail in the sections that follow.

RESOURCE PROTECTION ZONE

The Resource Protection Zone represents an area that focuses on resource preservation, protection, and scientific research. This zone would allow protection of reefs ranging from shallow (north lagoon) to deep reefs, seagrass beds, shelf edge communities, and oceanic habitats. Extractive uses would be prohibited in this zone pursuant to the 2001 proclamation that prohibits extractive uses throughout the park. Vessel operators would be permitted to navigate within this zone. Moorings would be provided in designated areas near Buck Island, and up to five new designated anchor locations would be designated in deep sand for vessels from 91-150 feet. The Resource Protection Zone includes the majority of the park's marine environment.

Table 2. Management Zones and Prescriptions

Category	Resource Protection Zone	Anchoring Zone	Island Discovery Zone	Recreation Zone	Marine Hazard Zone
Visitor Use					
Boating	✓	✓		42 feet (or less) in the lagoon; up to 150 feet outside the lagoon.	NONE
Private vessels up to 150 feet in length	✓	AT DESIGNATED LOCATIONS		AT DESIGNATED LOCATIONS	
Moorings	AT DESIGNATED LOCATIONS			AT DESIGNATED LOCATIONS	
Overnight Use of Moorings by permit	✓			✓	
Day Hiking on Trail			✓	✓	
Guided Interpretive Tours	✓		✓	✓	
Picnicking (fires in NPS grills only)				✓	
Nature Observation	✓	✓	✓	✓	
Sunbathing	✓	✓	✓	✓	
Swimming	✓	✓		✓	✓
SCUBA Diving (Concession and Private)				AT SCUBA MOORINGS	
Snorkeling (Concession and Private)	✓	✓		✓	
Pets	ON BOARD VESSELS ONLY				
No Wake Zone		✓		✓	

Table 2. Management Prescriptions and Zones (Continued)

Category	Resource Protection Zone	Anchoring Zone	Island Discovery Zone	Recreation Zone	Marine Hazard Zone
Habitat Restoration	✓	✓	✓	✓	✓
Scientific Research	✓	✓	✓	✓	✓
Special use permits for large groups and special events	✓	✓	✓	✓	
National Park Service administrative use	✓	✓	✓	✓	✓
Kinds and Levels of Development					
Trails (including underwater trail)			✓	✓	
Picnic areas				✓	
Beach Access Channel	✓	✓		✓	
Anchoring by permit	AT DESIGNATED LOCATIONS	✓			
Restrooms				✓	
Kiosks			✓	✓	

- Activities prohibited or not considered appropriate include: open beach fires, collecting, camping, jet skis, water skiing, kite surfing, boogie boarding or parasailing, or motorized vehicles on Buck Island.
- Swimming is prohibited in the beach access channel for safety reasons.
- No waste receptacles are provided at Buck Island. Visitors are requested to "pack in - pack out" all refuse.
- Vessels over 151 feet in park waters by permit only.

Visitor Experience

The Resource Protection Zone would provide ample opportunities for visitors to experience solitude, tranquility, and closeness to nature. The level of encounters with other visitors and park staff would range from low in most areas of the zone to moderate in areas surrounding Buck Island. Visitors would have opportunities for a highly diverse experience in this zone. The level of challenge for some visitors could be high due to the skills necessary to safely operate a vessel.

Resource Conditions

Resource protection, habitat restoration, scientific research, and monitoring are the key elements of the Resource Protection Zone. This zone would provide improved habitat diversity through the protection of sensitive environments needed to support species, including listed elkhorn coral, staghorn coral, sea turtles, brown pelicans, migratory least terns, and numerous species of fish. A moderate level of resource and visitor management would be required to protect resources, and there would be low tolerance for resource degradation.

Appropriate Kinds of Activities or Facilities

Appropriate kinds of visitor activities in the Resource Protection Zone would include nature observation, guided interpretive tours, and boating (for vessels up to 150 feet long; vessels 151 feet and over would be required to have a permit to operate within the park boundary). Establishment of beach access channels and installation and use of moorings would be appropriate in this zone. Limited anchoring by permit (for up to 5 vessels, 91 feet to 150 feet) would be appropriate in designated, deep sand. Pets would be allowed on vessels only. Overnight use of moorings would be appropriate at designated moorings, by permit. Research, monitoring, and resource restoration activities would be appropriate in this zone.

ANCHORING ZONE

The Anchoring Zone represents areas where boaters may anchor in designated deep sand areas with a permit. Anchoring would only be appropriate to the extent that it is consistent with the 2001 proclamation and implemented regulations. The sand and seagrass area to the south of West Beach has historically been used for small vessel anchoring (dinghies to 65 feet). This is a dynamic area with constantly shifting sands from wave action and storm events. As seagrass beds recover and grow, the areas where anchoring is appropriate could change. Consequently, management strategies might need to change to adapt to changing resource conditions. In addition, use of the Anchoring Zone could change to protect nesting species such as sea turtles, least terns, or migratory shorebirds, during nesting season. Notification of beach closures and general information regarding safe visitor use and resource protection would be addressed by several means, including boater education via the anchoring permit system, distribution of information from NPS facilities in Christiansted, public service announcements, public radio and television announcements, and routine postings. Should adverse effects from anchoring activities occur, permit requirements for anchoring could be changed to accommodate the protection of sensitive resources.

Visitor Experience

The Anchoring Zone would allow a relatively high level of visitor use. At certain times during the day or in different seasons, opportunities for solitude would be available to visitors; however, generally the likelihood of encountering other visitors would be moderate to high. The degree of isolation and feeling of closeness to nature would be relatively moderate, and would be limited by the presence of other people and vessels. The level of challenge for some visitors could be high, as the skill level expected to safely anchor a vessel would require training and experience. Visitors would have opportunities for a highly diverse experience in this zone, with a high level of facilitation by park staff.

Resource Conditions

The Anchoring Zone would require a high level of management and enforcement to protect resources and visitors because of the inherent potential impacts associated with anchoring. The sights and sounds of people would be clearly evident. Seagrass beds would be regularly monitored to avoid adverse impacts.

Appropriate Kinds of Activities or Facilities

A wide variety of activities would be allowed in the Anchoring Zone. Appropriate activities would include boating and anchoring by permit, swimming, snorkeling, sunbathing, and wildlife observation. Facilities in this zone would be kept to a minimum to support appropriate activities, and would include such things as regulatory markers and buoys, and beach access channels.

ISLAND DISCOVERY ZONE

The Island Discovery Zone represents areas that provide opportunities to hike on a trail, use picnic area with barbeque grills, experience the sights and sounds of nature, learn about the island's natural and cultural features, and enjoy surrounding views. This zone allows for educational opportunities through guided tours, exploration of the island via a hiking trail, and obtaining information at kiosks (i.e., a fixed sign structure with posted information provided). The concept of this zone is to allow a range of recreational and self-discovery activities in a relatively undisturbed natural environment.

Visitor Experience

The number of visitors in this zone would vary depending on location within the management zone, allowing a moderate degree of isolation. The opportunity for feeling close to nature and experiencing solitude would be expected to be high. Due to hazardous vegetation, the degree of trail difficulty, and warm temperatures, the level of challenge for visitors would generally be high and would require moderate to high degrees of outdoor recreation skills and self-sufficiency. Visitors would have opportunities to enjoy views of the island, seascape, and St. Croix and northern Virgin Islands in the distance from the observation point. The level of contact with NPS staff or other visitors would be low.

Resource Conditions

This zone would require a moderate to high level of management to protect resources due to the presence of cultural resources, sensitive species, hazardous vegetation, and the steep slopes found on Buck Island. Some natural areas could be modified for new or improved trails and for other uses, but the overall setting would maintain existing natural conditions. There would be low tolerance for natural resource degradation, and resources would be managed to maintain natural conditions. Any trails or other facilities would be designed to harmonize with the natural environment.

Appropriate Kinds of Activities or Facilities

Appropriate visitor experiences in this zone would include nature observation, trail hiking, guided interpretive tours, vista viewing/overlook, and photography. Park facilities currently located on Buck Island would be maintained. Development of interpretive/informational kiosks and trails would be appropriate in this zone.

RECREATION ZONE

The Recreation Zone represents beach, near-shore, and off-shore areas surrounding Buck Island that offer a variety of recreational opportunities, including swimming, snorkeling, SCUBA diving at the two SCUBA moorings, vessel mooring, beach walking, picnicking, and use of picnic tables, shelter, and NPS provided barbeque grills. This zone would consist of beach and marine landscapes on the northwestern, southern, and eastern portions of Buck Island. The Recreation Zone include the north

west shoreline, West Beach to the Pier, and beyond along south shore to Turtle Bay, south lagoon inside the barrier reef, the underwater trail off the islands' eastern tip and mooring area, and two SCUBA moorings. Across all action alternatives, the Recreation Zone borders, but does not include, the barrier reef. Excluding the reef from the Recreation Zone is necessary to protect the threatened species--elkhorn and staghorn coral--from potential harm during recreational activities.

To protect sensitive species such as corals, seagrasses, nesting sea turtles, and migratory shorebirds (least terns), management actions may be necessary to adapt to changing beach conditions, variations in species nesting seasons, visitor use patterns, or other conditions. This would be addressed by several means, including boater education via the anchoring permit system, distribution of information from NPS facilities in Christiansted, public service announcements, public radio and television announcements, and routine postings. Should adverse effects from recreational activities occur, management actions would need to be taken to protect sensitive resources.

Visitor Experience

The Recreation Zone would have a relatively high amount of visitor use. At certain times during the day or in different seasons, opportunities for solitude would be available to visitors; however, the probability of encountering other visitors would be moderate to high. The degree of isolation and feeling of closeness to nature would be relatively low, and would be mostly limited by the presence of other people. The level of challenge for visitors in this zone would be moderate to high, and would depend on the level and type of recreational activity. The diversity of experiences would be greater in this zone compared to other zones, with a moderate to high amount degree of ranger led walks, talks, and ranger presence.

Resource Conditions

The Recreation Zone would require a moderate to high level of management to protect resources because of the higher number of users. Some natural areas could be modified for new or improved trails and for other uses, but the overall setting would maintain existing natural conditions. There would be a low tolerance for resource degradation, and resources would be managed to maintain natural conditions and preserve cultural sites. Trails and other facilities would be designed to harmonize with the natural and cultural environment.

Appropriate Kinds of Activities or Facilities

A wide variety of activities would be allowed in the Recreation Zone, but with specific restrictions in place to protect resources and maintain safe conditions. For example, boating would be appropriate, but within the lagoon only shallow draft vessels up to 42 feet would be allowed. Vessel size is restricted by water depth, vessel draft, and maneuverability to avoid reef damage. Buck Island barrier and surrounding reef limits large vessel access and maneuverability; vessels with drafts greater than 4 feet should not attempt to navigate Buck Island near shore areas. Outside the lagoon, the maximum vessel size allowed would be up to 150 feet. Activities in the Recreation Zone would include swimming, SCUBA, snorkeling, sunbathing, picnicking, use of tables, shelter, grills, and wildlife observation. Facilities and development in this zone would be kept to a minimum to support appropriate activities and would include such things as toilets, information kiosks, picnic areas (tables, NPS grills, shelter), and hiking trails. Moorings would be appropriate at designated locations, including the underwater trail off the island's east end, West Beach, and southwest of the pier.

MARINE HAZARD ZONE

The Marine Hazard Zone represents marine areas where resources are sensitive, and vessel navigation is hazardous due to shallow reef complexes. For safety reasons and as a means to protect coral, non-NPS vessels would not be appropriate in this zone. NPS vessels would be appropriate for research and resource monitoring, administrative use, or for enforcement reasons. This zone mainly encompasses

the marine environment northwest to southeast of Buck Island, extending to the southeast park boundary, including the coral patch reefs (see alternatives figures). The Marine Hazard Zone would provide a similar level of resource protection as in the Resource Protection Zone.

Visitor Experience

Boater access would be prohibited in the Marine Hazard Zone, thereby limiting the type and variety of visitor experiences. Visitors would be able to swim within this zone, but other recreational activities would not be appropriate.

Resource Conditions

The Marine Hazard Zone allows for resource protection, habitat restoration, scientific research and monitoring. Moderate to high levels of resource management activities would be necessary to protect resources. There would be low tolerance for resource degradation in this zone.

Appropriate Kinds of Activities or Facilities

The types of appropriate visitor experiences in this zone would be limited due to the prohibition of vessel use. Research and monitoring, habitat monitoring and resource restoration activities would be appropriate. No visitor facilities or development would be appropriate in this zone.

FORMULATION OF THE ALTERNATIVES

This *Draft General Management Plan/Environmental Impact Statement* presents four alternatives for the future management of Buck Island Reef National Monument, including the NPS preferred alternative. Alternative A, the “no action” alternative, represents a continuation of existing management direction. Alternative A is included as a baseline for comparing the consequences of implementing each of the other alternatives. The NPS is required under the National Environmental Policy Act to include the no action alternative for comparison purposes. The other “action” alternatives are Alternative B, which is the Preferred Alternative, Alternative C, and Alternative D. The three action alternatives present different ways to manage resources and visitor use and improve facilities at the park within the context of Buck Island Reef National Monument’s legislation, purpose, significance, and special mandates and policies.

Management alternatives represent the full range of what could be reasonably accomplished with regard to natural resource conditions, cultural resource conditions, visitor use and experience, and facilities and development at Buck Island Reef National Monument over the next 15 to 20 years. To the degree possible, the alternatives incorporate and reflect the concerns, comments, and issues identified during the NPS internal, stakeholder, and public scoping process. Visual representations of each alternative were developed by overlaying the management zones in different configurations on a map of Buck Island Reef National Monument. The acreage for each management zone is summarized by alternative in Table 3.

Table 3. Acreages of Management Zones by Alternative

Zone	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
Resource Protection Zone	15,609	15,609	15,597
Anchoring Zone	None	2	16
Island Discovery Zone	166	166	166
Recreation Zone	112	110	108
Marine Hazard Zone	3,128	3,128	3,128

Note: zones do not apply to Alternative A. Existing anchoring area is approximately 22 acres.

A description of each management alternative is provided below. Each alternative provides for appropriate levels of resource protection in accordance with NPS mandates, laws, and policies. As noted in the “Special Mandates and Administrative Commitments” section of Chapter 1, the NPS would continue to follow existing agreements and service-wide mandates, laws, and policies regardless of the alternatives considered in this plan. The following is a summary of the steps used to develop the alternatives:

- The NPS received written public comments over a 45-day comment period and at three separate public meetings held at the Danish West India Guinea Company Warehouse (former U.S. Post Office) in Christiansted in June 2004. All public meetings were announced via newspaper, radio, television, and through public service announcements, postings in public places, and flier distribution. The public submitted over 350 written comments.
- The comments were reviewed by the NPS planning team and then further sorted into the following categories, in accordance with NPS planning guidelines: (1) actions that cannot be done because they are inconsistent with existing NPS laws or policies; (2) actions that must be done because they are mandated by existing laws, regulations, policies, or mandates; (3) interests or concerns that are appropriate to consider in a general management plan; and (4) actions that are more appropriately addressed by other types of plans, such as an implementation plan.
- The planning team developed four preliminary alternatives within the framework of the park’s legislation, purpose, significance, and special mandates and policies.
- These preliminary alternatives were presented during public meetings conducted at the Danish West India Guinea Company Warehouse during August 2005. All public meetings were announced via newspaper, radio, television, and through public service announcements, postings in public places, and flier distribution.
- Based on comments received and input from park staff and the public during these meetings, the preliminary alternatives were changed to address additional concerns brought forward. These concerns mainly included desires for different types of experiences at West Beach, including:
 - The ability to unload people on the beach.
 - The ability to enjoy safe swimming and walking on the beach.
 - The ability to bow and stern anchor at the West Beach shoreline.
 - Safe access.

In addition, other changes were made to the zones to address resource protection and safety needs. These changes included shifting the Recreation Zone to protect elkhorn and staghorn coral species (added to the list of threatened species under the Endangered Species Act in 2006, subsequent to the public meetings), and changes to the Marine Hazard Zone to avoid impacts to threatened coral species, avert vessel groundings on shallow reef areas, and reduce hazardous navigating conditions for boaters.

The alternatives focus more conceptually on desired future resource conditions and visitor experiences, including the appropriate kinds and levels of management, use, and development. The alternatives do not go into detail on how such conditions and uses or experiences should be achieved over the next 15 to 20 years. Thus, the alternatives do not include specific details on resource or visitor use management. For example, the exact location, number, and use of moorings in the park are not detailed in this general management plan. Such information would be provided in a park vessel management plan and environmental assessment (i.e., implementation plan) upon completion of site specific surveys.

More detailed implementation plans or studies will need to be completed and implemented before most of the conditions proposed in the alternatives can be achieved. Furthermore, implementation of any alternative is largely dependent on future funding and compliance with existing laws and policies. Although the plan establishes a vision for future management of Buck Island Reef National Monument, full implementation may extend many years into the future. Many of the management actions proposed in this plan would be dependent on increased funding and staffing, which is not guaranteed. An environmental assessment would be prepared for each action or project and would specify site-specific impacts and mitigation measures needed for implementation.

Overview of the Alternatives

Each of the alternatives provides preservation and protection for natural and cultural resources, a diverse visitor experience, and limited facilities within the park. Based on public comments and NPS staff recommendations, there was a strong desire expressed for many park activities and visitor opportunities to remain the same. Therefore, many of the existing features and amenities of the park are maintained across all action alternatives. The following elements are common to alternatives B, C, and D:

- The regulations frame every alternative. The proclamation prohibits extractive use and allows for anchoring in deep sand areas.
- The location and acreage of the Marine Hazard Zone and Island Discovery Zone are the same.
- Existing facilities including toilets, picnic, pier, and trails (hiking and underwater) would continue to be provided and maintained (see Figure 4 for the locations of these facilities). There may be use restrictions to protect sensitive species; for example, during nesting season, St. Croix Ground Lizard habitat, and for protection of coral. The effects of use would be monitored, and appropriate management actions may be implemented to protect resources.
- Moorings are to be used on a first come, first serve basis. Time limits for concessioners or concession operations are in accordance with their contracts and park policies.
- Educational materials, outreach efforts, and interpretive activities would continue to be provided by the NPS from Park Headquarters located at Christiansted National Historic Site, Visitor Contact Station in Fort Christiansvaern, and the Scale House Eastern National Bookstore, by park staff, and by concessioners.
- Increases in staffing levels would allow opportunities for educational / interpretive programs that are focused on Buck Island Reef National Monument; this is an increase over present conditions.
- Concessioners would continue to operate under concessions contracts.
- Concessioners would receive information regarding park rules, regulations, and resources.
- The NPS would continue to partner and coordinate with stakeholders, partners, and research institutions to conduct research and monitoring and other programs within the park.
- Use or possession of fishing equipment is prohibited in the monument.
- All moorings and beach access channels would be located to avoid sensitive resources such as seagrass beds, bird and sea turtle nesting, and cultural resource sites. Surveys would be conducted prior to locating any additional moorings. Details of mooring locations would be developed during the implementation

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Alternative A

Buck Island Reef National Monument
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Figure 4



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phase after this *General Management Plan* is completed. Locations of proposed moorings would be provided in detail in an environmental assessment/vessel management plan.

- Anchoring permits would be required for anchoring in the Anchoring Zone (Alternatives C and D) and for the designated (up to five) deep sand anchoring locations proposed under all of the action alternatives for large vessels (91-150 feet). Permit holders would be required to attend an information session to learn about park rules, regulations, and permit conditions. Information sessions would be held on a routine basis.
- The pier at Buck Island would be available for short-term use only, including loading and unloading of visitors and gear on a first come, first serve basis. This use applies to private vessels and concessioners. Park administrative use of the pier is also to be expected.

A description of each alternative is provided in the section that follows. A comparison of the alternatives is provided in Table 4. The proposed maximum number of vessels accommodated under each alternative is provided in Table 5. The estimated costs associated with each alternative are presented in the “Comparative Cost” section.

Selecting the Preferred Alternative

Development of a preferred alternative involves evaluating the alternatives with the use of a rational analysis process called “choosing by advantages.” Choosing by advantages is a decision-making system based on determining the advantages of different alternatives for a variety of factors or goals.

Through this process, the planning team identifies and compares the relative benefits or advantages of each alternative according to the following factors:

- Provide safe visits and working conditions.
- Protect natural and cultural resources.
- Improve visitor enjoyment through better service and educational and recreational opportunities.
- Improve efficiency, reliability, and sustainability of park operations.

The advantages are scored in relation to their satisfaction of each factor and summed to help identify the preferred alternative. This process is a systematic way to perform a complicated task, provides a way to engage participants, and assists in the consensus building process. It also leads to documented and consistent decision making. The NPS’s preferred alternative for this *Draft General Management Plan/Environmental Impact Statement* is Alternative B.

ALTERNATIVE A

Alternative A is the no action alternative. National Environmental Policy Act guidelines require an assessment of the impacts of the no action alternative, which is defined as a continuation of current park management practices into the future. Under Alternative A, current management practices, policies, and park programs – such as maintenance, law enforcement, and operational practices – would continue to be implemented with no major changes. Current resource management programming would also remain unchanged from the present level. The no action alternative is used as a way to evaluate the effects of the other three action alternatives and is also useful in understanding why changes for future management of the park are necessary. The map of Alternative A (Figure 4) represents the park as it currently exists. The map shows the location of the park boundary as expanded in 2001 increasing park acreage to 19,015-acres with northern boundary extending out to the territorial 3-mile limit, single hiking trail, observation point, pier, existing anchoring area off West Beach, underwater trail and moorings and SCUBA diving at two moorings.

Table 4. Comparison of Alternatives

Feature	Alternative A	Alternative B	Alternative C	Alternative D
Zones	Not applicable	Resource Protection Zone Island Discovery Zone Recreation Zone Marine Hazard Zone Anchoring Zone/Phased out over 10 years	Resource Protection Zone Island Discovery Zone Recreation Zone Marine Hazard Zone Anchoring Zone	Resource Protection Zone Island Discovery Zone Recreation Zone Marine Hazard Zone Anchoring Zone
Anchoring in deep sand by permit in designated areas	Existing anchor area at West Beach maintained	Existing anchor area at West Beach to be phased out over 10 years as moorings installed with the exception of up to 5 new anchor locations in deep sand designated for vessels 91-150 feet	Anchoring Zone is provided for bow and stern anchoring. Existing anchor area at West Beach to be phased out over 10 years as moorings installed. Up to 5 new anchor locations in deep sand designated for vessels 91-150 feet	The majority of the existing anchoring area at West Beach is maintained as Anchoring Zone
	Shoreline bow and stern anchoring at West Beach maintained.	No shoreline bow and stern anchoring at West Beach	Shoreline bow and stern anchoring at West Beach provided for shallow draft vessels up to 42 feet.	No shoreline bow and stern anchoring at West Beach
	Up to 5 new designated anchor locations for vessels from 91 to 150 feet	Up to 5 new designated anchor locations for vessels 91-150 feet; Vessels greater than 151 feet by special use permit only.	Up to 5 new designated anchor locations for vessels 91-150 feet; Vessels greater than 151 feet by special use permit only.	Up to 5 new designated anchor locations for vessels 91-150 feet; Vessels greater than 151 feet by special use permit only.
Moorings (first come first serve)	Underwater trail – Maximum of 10 (vessels up to 42 feet) (2hr limit)	Underwater trail – up to 10 (vessels up to 42 feet) (2hr limit)	Underwater trail – up to 10 (vessels up to 42 feet) (2hr limit)	Underwater trail – up to 10 (vessels up to 42 feet) (2hr limit)
	SCUBA – 2 (vessels up to 42 feet)	SCUBA – 2 (vessels up to 42 feet)	SCUBA – 2 (vessels up to 42 feet)	SCUBA – 2 (vessels up to 42 feet)
	None off West Beach	Maximum of 45 off West Beach (majority of moorings for vessels up to 60 feet; limited moorings in deeper water for vessels 61 to 90 feet)	Maximum of 45 off West Beach (majority of moorings for vessels up to 60 feet; limited moorings in deeper water for vessels 61 to 90 feet)	Maximum of 45 off West Beach (majority of moorings for vessels up to 60 feet; limited moorings in deeper water for vessels 61 to 90 feet)

Table 4. Comparison of Alternatives (Continued)

Feature	Alternative A	Alternative B	Alternative C	Alternative D
	None southwest of pier	Maximum of 10 southwest of pier (moorings for vessels up to 60 feet)	Maximum of 10 southwest of pier (moorings for vessels up to 60 feet)	Maximum of 10 southwest of pier (moorings for vessels up to 60 feet)
Vessel Size	Limits applicable: vessels up to 42 feet within lagoon	Limits applicable: shallow draft vessels up to 42 feet within lagoon; up to 150 feet within the Resource Protection Zone. Vessels over 151 feet within park boundary by permit only	Limits applicable: shallow draft vessels up to 42 feet within lagoon; up to 150 feet within the Resource Protection Zone. Vessels over 151 feet within park boundary by permit only	Limits applicable: shallow draft vessels up to 42 feet within lagoon; up to 150 feet within the Resource Protection Zone. Vessels over 151 feet within park boundary by permit only
Education, Outreach and Partnering	Continue limited activities conducted from Christiansted and by staff and concessioners. Level of partnering expected to remain at current levels, no increase planned.	Improved with increased law enforcement ranger presence, resource management and interpretive staff activities.	Improved with increased law enforcement ranger presence, resource management and interpretive staff activities.	Improved with increased law enforcement ranger presence, resource management and interpretive staff activities.
Staffing Levels	Remain at 2008 levels (14 FTEs)	Increase by 6.5 FTEs	Increase by 8 FTEs	Increase by 9 FTEs
Resource Management	Remain at 2008 levels	Improved due to increased staff for resource management	Improved due to increased staff for resource management	Increase staff to address additional visitation and potential resource impacts; increased staff levels required to enforce and monitor

FTE: full time equivalent

NOTE: As of March 2009 Anchoring Permit Vessel list shows that out of 203 vessels 22% are over 42 feet. 10 vessels were over 60 feet (0.05 percent).

Table 5. Maximum Number of Vessels Proposed Under Each Alternative

Feature	Alternative A	Alternative B	Alternative C	Alternative D
Maximum Number of Vessels Accommodated by Anchoring Area / Zone	70 vessels Anchoring area approximately 22 acres	Not applicable Existing Anchoring area at West Beach to be phased out over 10 years as moorings installed with the exception of up to 5 new designated anchoring locations in deep sand for vessels 91-150 feet	20 vessels Anchoring Zone for shoreline bow and stern anchoring, approximately 2 acres	40 vessels Anchoring Zone approximately 16 acres
Anchoring for Vessels 91 to 150 feet	5 designated locations in deep sand	5 designated locations in deep sand	5 designated locations in deep sand	5 designated locations in deep sand
Number of Existing Moorings	10 - Underwater trail 2 - SCUBA	10 - Underwater trail 2 - SCUBA	10 - Underwater trail 2 - SCUBA	10 - Underwater trail 2 - SCUBA
Number of Proposed New Moorings	8 – Administrative Use	45 – Maximum number proposed for area off of West Beach 10 – Maximum number proposed for area southwest of pier 8 – Administrative Use	45 – Maximum number proposed for area off of West Beach 10 – Maximum number proposed for area southwest of pier 8 – Administrative Use	45 – Maximum number proposed for area off of West Beach 10 – Maximum number proposed for area southwest of pier 8 – Administrative Use
Maximum Number of Vessels Accommodated by Alternative (Anchoring and Mooring)	87 Vessels (8 Administrative moorings are not included)	72 Vessels (8 Administrative moorings are not included)	92 Vessels (8 Administrative moorings are not included)	112 Vessels (8 Administrative moorings are not included)

Note: Total number of vessels subject to change due to resource conditions (shifting sands, resource concerns, and sensitive species). Where numbers are presented, it is assumed that it is up to and including that number, i.e. a maximum.

Alternative A would involve continued use of the existing 22-acre anchoring area located off West Beach. However, additional restrictions would be required in order to comply with the 2001 proclamation, which only allows anchoring in areas of deep sand. Permits would be issued for the anchoring areas to protect sensitive resources such as seagrasses. Over time, as the seagrass beds grow, the availability of anchoring locations would be expected to be reduced. The underwater trail and mooring area (with up to ten moorings) would continue to be used and managed as they are now. Two SCUBA moorings would continue to be provided just north of the underwater trail area, and up to eight additional moorings would be installed for administrative use only. In addition, all current land-based facilities (picnic area, NPS provided grills, toilets, the pier) and marine facilities (boundary and regulatory buoys), and the existing hiking trail on Buck Island would continue to be provided and maintained at current levels. Beach use would be continued, and beach access would be allowed from the existing anchoring area.

Shoreline bow and stern anchoring practices would be expected to continue, except during certain nesting periods when areas of the beach are closed off to protect sensitive species, such as terns and sea turtles. Non-native invasive species would continue to be monitored and removed in accordance with current management documents and policies (for example, to address tree rats and non-native vegetation, and threats from non-native invasive lion fish).

Park staff conducts extensive research and monitoring, resource protection, and management activities, which would be expected to continue at existing levels. However, there is an ever-increasing demand for more research and monitoring associated with protection of threatened coral species, the effects of coral bleaching and diseases, monitoring of the globally endangered St. Croix ground lizard, threatened and endangered sea turtle nesting and foraging populations, the status of the park as a “no take” marine reserve, delineating resources within the expanded park boundaries, and numerous other projects. With these increased demands, some existing programs would be expected to be adversely affected, and the number of new programs would not be expected to increase.

The park would continue its partnerships and research activities to the extent that staffing levels would allow. For example, the park would continue to work with local scientists from the Virgin Islands Department of Planning and Natural Resources, Division of Fish & Wildlife, Coastal Zone Management, St. Croix East End Marine Park, and with partner federal agencies including Virgin Islands National Park, the South Florida/Caribbean Inventory and Monitoring Program, the U.S. Fish & Wildlife Service, and the National Oceanographic and Atmospheric Administration Biogeography Division, to inventory, assess, and monitor the status of the park’s marine ecosystem. Park staff and volunteers also monitor threatened and endangered sea turtles nesting and foraging throughout the park. The turtle research and monitoring program would be expected to continue as well as partnerships that support this effort. Efforts to work with the territorial government, other agencies, and universities to research, map, and monitor resource conditions would be expected to continue, but the levels of such activity would be expected to be maintained at current levels due to staff constraints.

Education and outreach activities would continue to be conducted primarily from NPS facilities located at Christiansted National Historic Site, as well as by park rangers and by park concessioners. Park concessioners would continue to operate by concession contracts to provide visitor access to Buck Island Reef National Monument. No new programs would be implemented, nor would there be any increase in visitor services.

The amount of ranger presence, activity, and enforcement would be expected to remain near existing levels. Ranger patrols at Buck Island and throughout the park are limited due to staffing constraints, and this condition would be expected to continue.

No new zones would be created under Alternative A. The park would continue its current management practices at the current levels of enforcement, resource management, and education and outreach / interpretive activities.

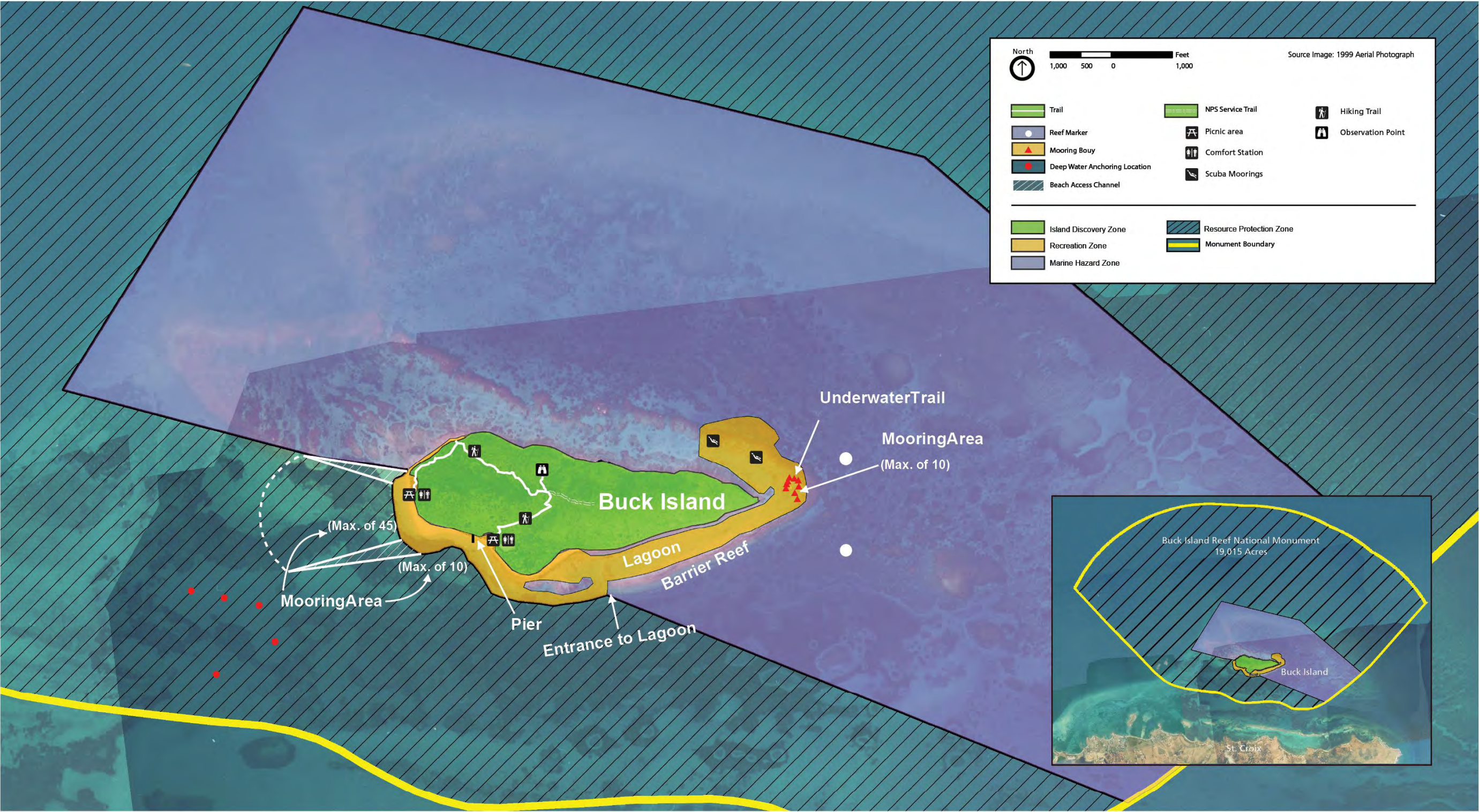
ALTERNATIVE B

Alternative B would likely result in the highest degree of resource protection while maintaining visitor use of the park. Alternative B provides for moorings and limited opportunities for anchoring in deep sand for vessels at designated locations. This alternative responds to comments that noted a desire to protect resources by removing the anchoring area and allow for moorings. Alternative B would provide increased resource protection by phasing out the existing 22-acre anchoring area along the west end of Buck Island over a 10-year period of time as moorings are installed. Opportunities for anchoring would be limited to up to five designated locations in deep sand for vessels 91 to 150 feet. Consistent with the Proclamation, anchoring could occur under emergency conditions and for NPS administrative purposes. Installation of moorings and phasing out of the majority of anchoring in the park would reduce adverse effects resulting in less stress to ecological communities and healthier marine resources that may better cope with stresses related to climate change. These projected changes, such as sea level rise, frequency and duration of storms, coastal erosion, and acidification all contribute to conditions that may change the seagrass community over time, and therefore where anchoring would be most appropriate. Alternative B provides the ability to adapt to such changes and protect seagrasses, while providing continued access.

Up to 45 new moorings would be provided off West Beach in place of the anchoring area. In addition, up to 10 new moorings would be provided southwest of the pier for vessels up to 60 feet, in response to public comments that stated the need for this type of sheltered mooring during northern swells. Vessels up to 60 feet would use the majority of the moorings. A limited number of moorings would be provided for vessels 61 feet to 90 feet. Moorings would be used on a first come, first serve basis.

All moorings would be located to avoid sensitive resources such as seagrass beds and coral. Detailed layout of the mooring field would be conducted following site specific surveys and an environmental assessment would be prepared prior to locating any additional moorings. Figure 5 depicts the management zones, mooring areas, proposed anchoring locations, and visitor facilities proposed under Alternative B.

Alternative B allows for the continued use of existing recreational moorings located at the underwater trail as well as SCUBA moorings. The underwater trail would provide up to ten moorings, and two SCUBA moorings would be maintained. Up to eight moorings would be established for NPS administrative use. The total estimated number of vessels that could access Buck Island via moorings/and limited anchoring would be approximately 72 (see Table 5).



Alternative B

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Figure 5



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Beach access channels would be located north and south of the mooring area off West Beach to protect swimmers and snorkelers, and prevent boater and swimmer conflicts. These channels would be used to transfer people from their mooring/anchoring area to the beach without having to swim to shore. Swimming in the beach access channels would be prohibited for safety reasons. The northern beach access channel would consist of approximately 50 feet of beach frontage; the southern beach access channel would consist of approximately 100 feet of beach frontage. This allows for safe passenger drop off and pick up.

Beach use and many existing types of recreation would continue under Alternative B; however, shoreline bow and stern anchoring would not be appropriate. As with Alternative A, all current land-based facilities (hiking trail, picnic areas, NPS grills, toilets, and the pier) would continue to be provided and maintained. Only limited new trail development would be appropriate to improve visitor experience, reroute to avoid dangerous vegetation or improve resource conditions. Trails would be properly designed and maintained to avoid erosion and adverse impacts to vegetation and wildlife.

Alternative B includes four of the five management zones: Recreation Zone, Marine Hazard Zone, Resource Protection Zone, and Island Discovery Zone (Figure 5). The sizes of the Recreation Zone, Marine Hazard Zone, and the Island Discovery Zone are similar across each of the action alternatives (Alternatives B, C, and D), and vary only due to changes to the Anchoring Zone (see Table 3). The Recreation Zone is larger in Alternative B than in any of the other action alternatives since it encompasses the area off West Beach that was an anchoring area under Alternative A.

Alternative B would provide increased opportunities for partnering with local agencies and other organizations compared to Alternative A due to increased levels of resource management staff. In addition, increased levels of research and monitoring would be conducted to provide the data necessary to determine the best management practices to avoid adverse effects to rare, threatened, or endangered species. Research and monitoring of elkhorn and staghorn coral in the park would increase, as would other research needed to determine if additional measures should be taken to help protect these threatened species, as well as other resources in the park. This would involve continued partnerships with existing and potentially new organizations. Volunteer programs would continue and would have the potential to expand due to proposed increases to interpretive, enforcement, and resource management staff - an anticipated increase of 6 full time staff, or equivalents. Successful implementation of Alternative B would be dependent on the hiring of additional staff members.

Education and outreach activities would continue to be conducted from Christiansted National Historic Site by rangers and concessioners. However, under Alternative B, there would also be increased opportunities for education and outreach activities to occur at Buck Island as well as increased opportunities for guided hikes. The level of ranger presence would increase within the park as proposed positions are filled.

ALTERNATIVE C

Alternative C provides for bow and stern anchoring and new moorings off West Beach and southwest of the pier, thus allowing for both anchoring and mooring of vessels. Alternative C was created as the result of input from boaters and weekend visitors. This input was provided after the preliminary alternatives were presented to the public in August, 2005. Alternative C includes all five management zones: Resource Protection Zone, Anchoring Zone, Island Discovery Zone, Recreation Zone, and Marine Hazard Zone, as shown in Figure 6.

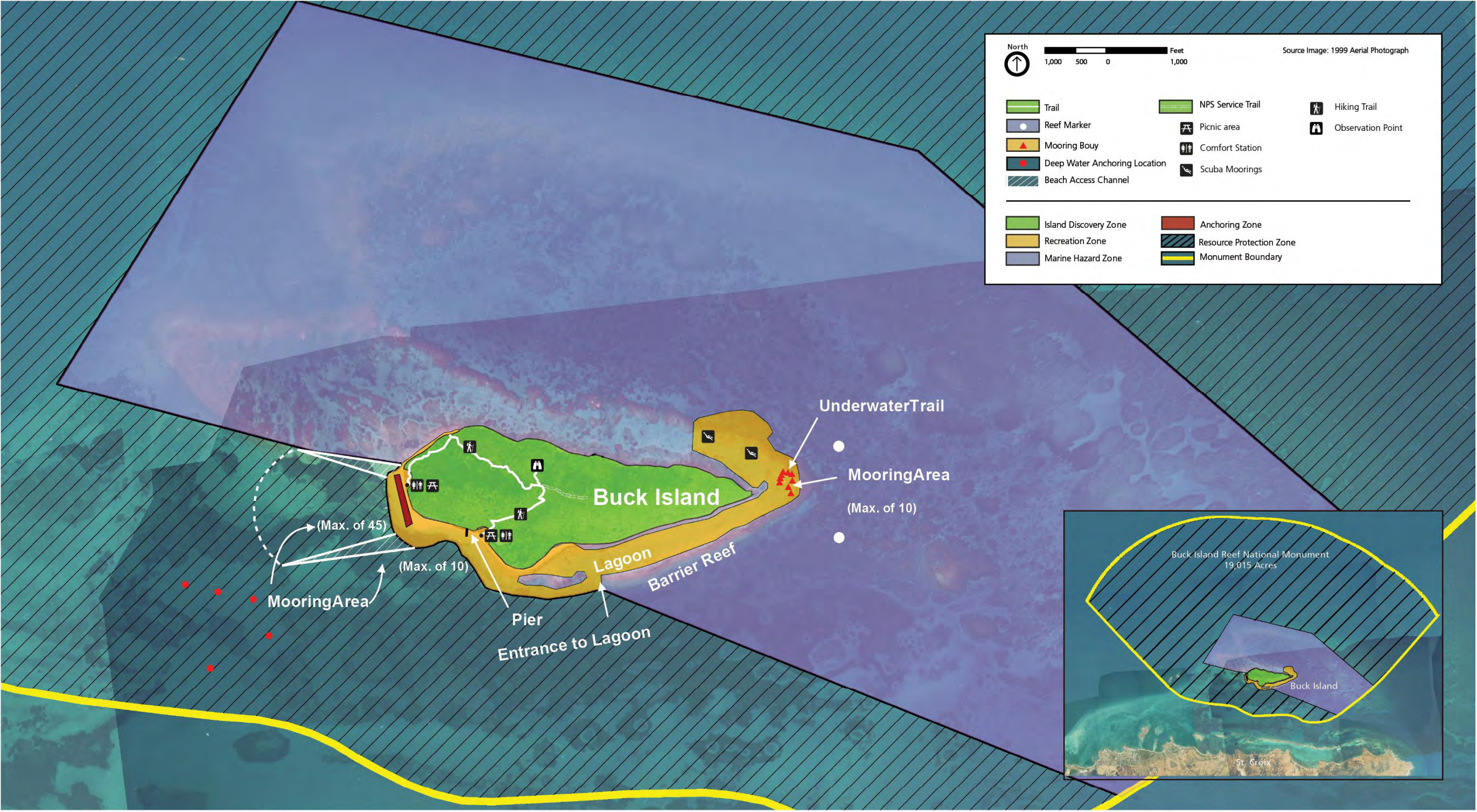
The Anchoring Zone in Alternative C would provide an approximate 2-acre bow and stern Anchoring Zone at West Beach. Due to the dynamic nature of beach conditions at Buck Island, the extent of the Anchoring Zone may shift over time. Projected changes associated with climate change, including sea level rise, frequency and duration of storms, coastal erosion, and acidification all contribute to conditions over time. Alternative C provides the ability to adapt to such changes and protect seagrasses, while providing continued access.

Anchoring in deep sand for shallow draft vessels up to 42 feet would be appropriate within this zone by permit on a first come, first serve basis. Along the shoreline all bow and stern anchors would be required to be buried in the sand to avoid visitor tripping and falling hazards. Vessels 91 to 150 feet would be able to anchor in deep sand at up to 5 designated locations. Consistent with the Proclamation, anchoring could occur under emergency conditions and for NPS administrative purposes.

Up to 45 additional moorings would be provided in a designated area beyond the Anchoring Zone at West Beach. Vessels up to 60 feet would use the majority of the moorings. A limited number of moorings would be provided for vessels 61 feet to 90 feet. Moorings would be used on a first come, first serve basis. Beach access channels would be marked to provide safe access to the beach for users mooring outside the Anchoring Zone and to protect swimmers. The beach access channels would be located north and south of the Anchoring Zone, with the northern beach access channel providing approximately 50 feet of beach frontage, and the southern access channel providing approximately 100 feet of beach frontage.

Beach use and many existing types of recreation would continue under Alternative C. As with Alternative A, all current land-based facilities (hiking trail, picnic areas, NPS grills, toilets, and the pier) would continue to be provided and maintained. Limited new trail development would be appropriate and would be properly designed and maintained to avoid erosion and adverse impacts to vegetation and wildlife.

The underwater trail mooring area would also be maintained similar to Alternative A, with up to ten moorings for the underwater trail, and two SCUBA moorings. Additional moorings (up to ten) would also be located southwest of the existing pier in response to public comments that stated the need for this type of sheltered mooring during northern swells. These moorings would be appropriate for vessels up to 60 feet. Moorings (up to 8) would also be installed for NPS administrative use. All moorings would be located in deep sand to avoid sensitive resources, such as seagrass beds and coral. Detailed layout of the mooring field would be conducted following site specific surveys and an environmental assessment would be prepared prior to locating any additional moorings. Figure 6 depicts the management zones, mooring areas, proposed anchoring locations, and visitor facilities proposed under Alternative C.



Alternative C

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Figure 6



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Similar to Alternative B, there would be increased opportunities for partnering with local agencies and other organizations due to increased levels of resource management staff. In addition, increased levels of research and monitoring would be conducted to provide the data necessary to determine the best management practices to avoid adverse effects to rare, threatened or endangered species. Monitoring of the protected species, elkhorn and staghorn coral, would increase, as would other research needed to determine if additional measures should be taken to help protect these threatened species as well as other resources in the park. This would involve continued partnerships with existing and potentially new organizations. Volunteer programs would continue and would have the potential to expand due to proposed increases to interpretive, enforcement, and resource management staff - an anticipated increase of eight full time staff, or equivalents. Successful implementation of Alternative C would be dependent on the hiring of additional staff members.

Education and outreach activities would continue to be conducted from Christiansted National Historic Site by rangers and concessioners. In addition, under Alternative C, there would also be increased opportunities for education and outreach activities to occur at Buck Island as well as increased opportunities for guided hikes. The level of ranger presence would increase within the park as proposed positions are filled.

ALTERNATIVE D

Alternative D provides for recreational opportunities similar to existing conditions under Alternative A, with the exception that shoreline bow and stern anchoring would not be appropriate. Similar to Alternative C, Alternative D includes all five management zones: Resource Protection Zone, Anchoring Zone, Island Discovery Zone, Recreation Zone, and Marine Hazard Zone, as shown in Figure 7.

Alternative D would provide vessel access via an Anchoring Zone off the shore of West Beach. Alternative D provides the largest Anchoring Zone of all the action alternatives, with approximately 16 acres in this zone. However, the size of the anchoring zone would be based upon resource conditions and would be subject to change to protect resources. The extent of the Anchoring Zone may change over time to reflect changes in the conditions in this area. Seagrass recovery and projected climate changes such as sea level rise, frequency and duration of storms, coastal erosion, and acidification all contribute to conditions that may change the seagrass and sand community over time, and therefore where anchoring would be most appropriate. Anchoring would be appropriate only in deep sand, by permit, and on a first come, first serve basis.

There would also be up to five anchoring locations designated in deep sand for vessels 91 to 150 feet, similar to Alternatives B and C. Consistent with the Proclamation, anchoring could occur under emergency conditions and for NPS administrative purposes.

In addition, up to 45 new moorings would be provided in a designated area beyond the Anchoring Zone at West Beach. Vessels up to 60 feet would use the majority of the moorings. A limited number of moorings would be provided for vessels 61 feet to 90 feet. Moorings would be used on a first come, first serve basis. Detailed layout of the mooring field, Anchoring Zone, and size of vessels appropriate for the anchoring zone would be determined following site specific surveys and an environmental assessment prepared in conjunction with a vessel management plan. Figure 7 depicts the management zones, mooring areas, proposed deep sand anchoring locations, and visitor facilities proposed under Alternative D.

The underwater trail mooring area would be maintained similar to Alternatives B and C, with up to ten underwater trail area moorings and two SCUBA moorings. Additional moorings (up to ten) would also be located southwest of the existing pier in response to public comments that stated the need for this type of sheltered mooring during northern swells. Up to eight moorings would also be installed

for NPS administrative use. All moorings would be located to avoid sensitive resources such as seagrass beds and coral. Site specific surveys would be conducted prior to locating any additional moorings.

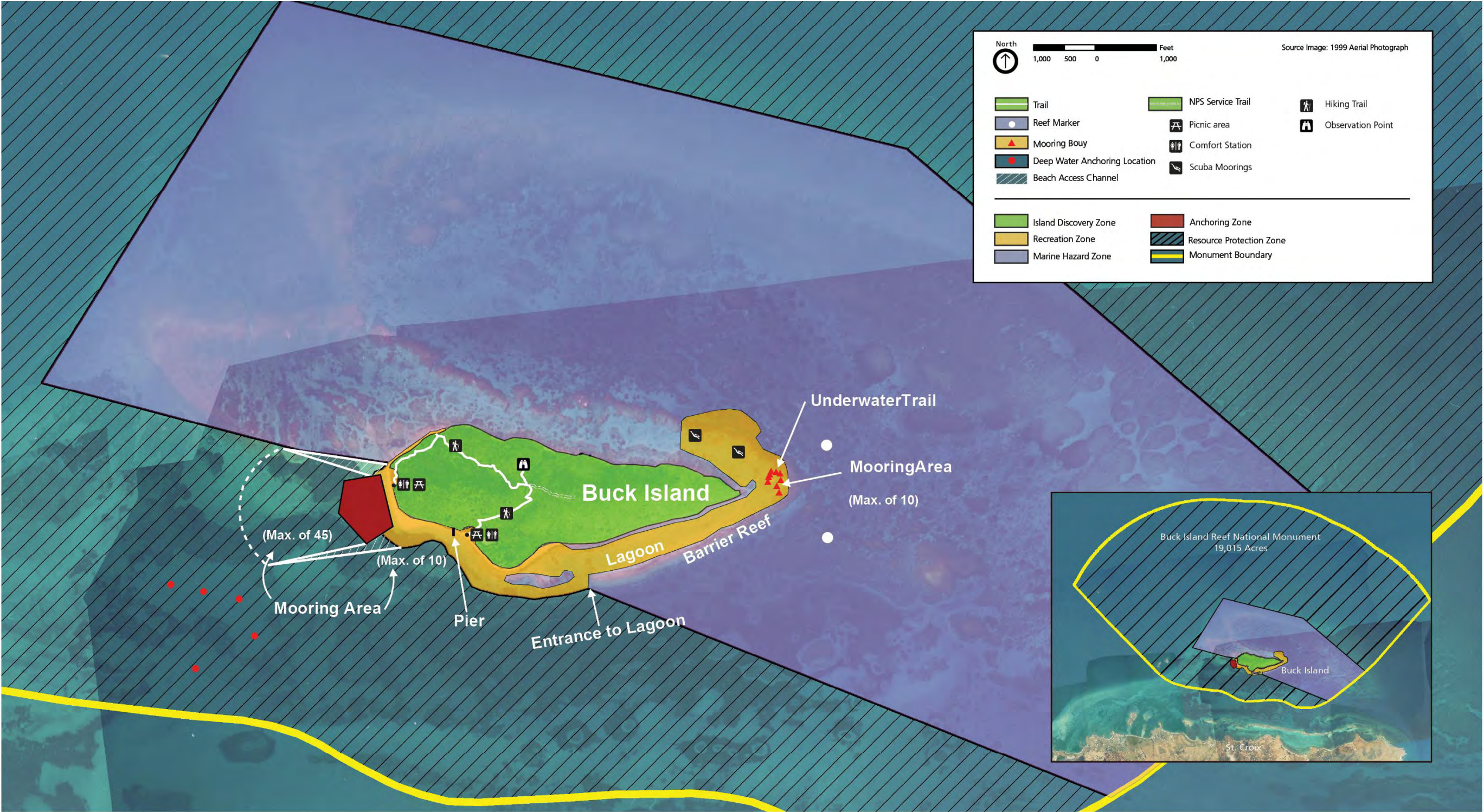
Beach access channels would be marked to provide safe access to the beach for users mooring and anchoring similar to Alternatives B and C. Swimming would not be appropriate in the beach access channels to avoid boater/swimmer conflicts and provide for safe visitor experiences.

Beach use and many existing types of recreation under Alternative A would continue under Alternative D, with the exception of bow and stern anchoring. As with Alternative A, all current land-based facilities (hiking trail, picnic areas, NPS grills, toilets, and the pier) would continue to be provided and maintained. Limited new trail development would be appropriate and would be properly designed and maintained to avoid erosion and adverse impacts to vegetation and wildlife.

Similar to Alternatives B and C, there would be increased opportunities for partnering with local agencies and other organizations due to increased levels of resource management staff. In addition, increased levels of research and monitoring would be conducted to provide the data necessary to determine the best management practices to avoid adverse effects to rare, threatened or endangered species. Monitoring of the protected species, elkhorn coral and staghorn, in the park would increase, as would other research needed to determine if additional measures should be taken to help protect these threatened species, as well as other resources in the park. This would involve continued partnerships with existing and potentially new organizations. Volunteer programs would continue and would have the potential to expand due to proposed increases to interpretive, enforcement, and resource management staff.

Alternative D provides for the greatest increase in park staff due to the projected need for more ranger support and visitor services. This alternative would require an increased degree of management due to the larger size of the Anchoring Zone combined with a mooring area compared to Alternative A. Additional staff would be needed for enforcing park regulations, conducting research and monitoring of resources, and increased public education and interpretation activities for potentially greater numbers of visitors. Successful implementation of Alternative D would be dependent on the hiring of additional staff members. Due to the estimated level of up to 112 vessels proposed under Alternative D, an anticipated increase of nine full time staff, or equivalents would be required.

Education and outreach activities would continue to be conducted from Christiansted National Historic Site by rangers and concessioners. In addition, under Alternative D, there would also be increased opportunities for education and outreach activities at Buck Island as well as increased opportunities for guided hikes. The level of ranger presence would increase within the park as proposed positions are filled.



Alternative D

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Figure 7



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USER CAPACITY

General management plans for national park system units are required by law to identify and address implementation commitments for user capacity, also known as carrying capacity. The NPS defines user capacity as the types and levels of visitor use that can be accommodated while sustaining the quality of park resources and visitor experiences consistent with the purposes of the park. Managing user capacity in national parks is inherently complex and depends not only on the number of visitors, but also on where the visitors go, what they do, and the “footprints” they leave behind. In managing for user capacity, park staff implement a variety of management tools and strategies rather than relying solely on regulating the number of people in a park area. The ever-changing nature of visitor use requires a deliberate and adaptive approach to managing user capacity in the national park system.

The foundations for making user capacity decisions in this general management plan are the purpose, significance, special mandates, and management zones associated with the park. The purpose, significance, and special mandates define why the park was established, identify the most important resources and values, and visitor opportunities within the park. Management zones in each action alternative describe the desired resource conditions and visitor experiences, including appropriate types of activities and general use levels, for different locations throughout the park. The zones, as applied in the alternatives, are consistent with, and help the park achieve its specific purpose, significance, and special mandates. As part of the NPS’s commitment to implement measures to address user capacity, the park staff would abide by the directives described above for guiding the types and levels of visitor use that would be accommodated while sustaining the quality of park resources and visitor experiences consistent with the purpose of the park.

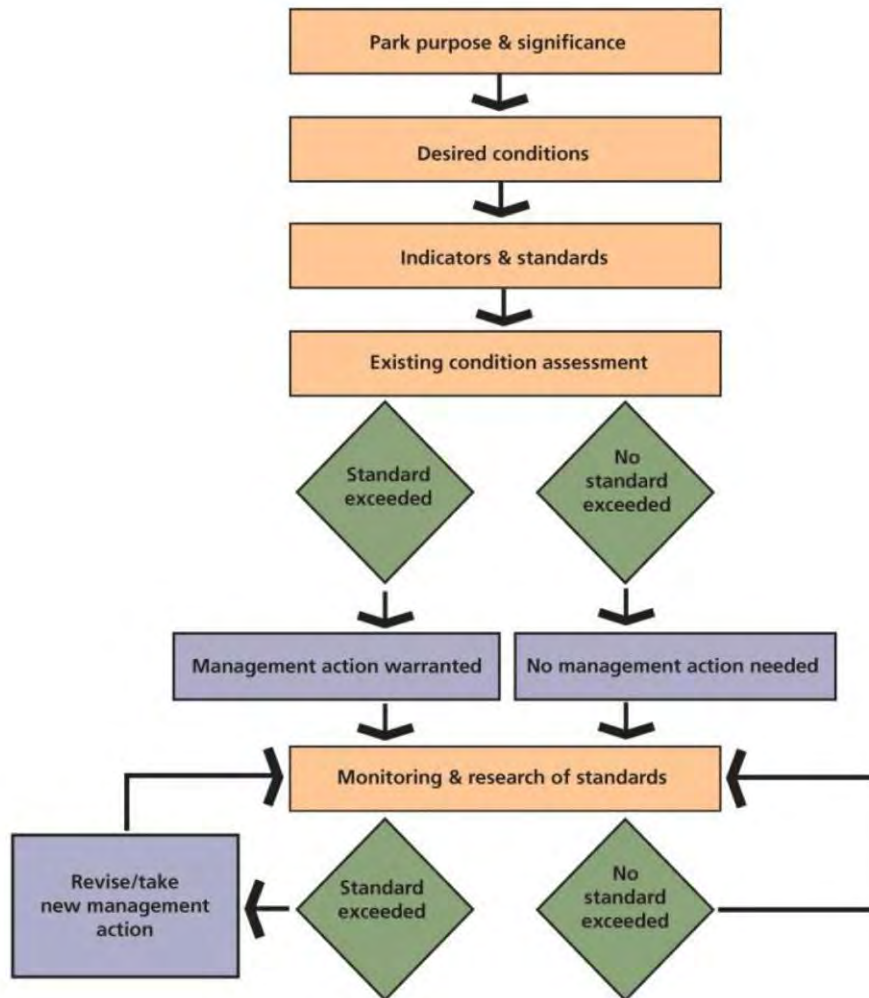
In addition to these important directives, this plan includes indicators and standards for Buck Island Reef National Monument. Indicators and standards are measureable variables that would be monitored to track changes in resource conditions and visitor experiences. The indicators and standards help the NPS make sure that desired conditions are being attained, thereby supporting the fulfillment of the park’s legislative and policy mandates. The general management plan also identifies the types of management actions that would be taken to achieve desired conditions and related legislative and policy mandates.

Table 6 at the end of this discussion includes the indicators, standards, and potential future management strategies, allocated by management zones that would be implemented as a result of this planning effort. The management strategies in Table 6 are generally listed in sequential order, i.e., strategies near the top of the list would generally be implemented first; strategies near the bottom are less preferred and may be implemented only if needed. The planning team considered many potential issues and related indicators that would identify impacts of concern for the park. Indicators and standards described in this section were considered the most significant, given the importance and vulnerability of the resource and/or visitor experience affected by use. The planning team also reviewed other parks with similar issues to help identify meaningful indicators. Standards that represent the minimum acceptable condition for each indicator were then assigned, taking into consideration the qualitative descriptions of the desired conditions, data on existing conditions, relevant research studies, staff management experience, and public preferences identified during the early planning phases of the general management plan.

User capacity decision making is a form of adaptive management (Figure 8) in that it is an iterative process in which management decisions are continuously informed and improved. Indicators are monitored, and adjustments are made as appropriate. As monitoring of conditions continues, managers may decide to modify or add indicators if better ways are found to measure important changes in resource and visitor experience conditions. Information on the NPS monitoring efforts,

related visitor use management actions, and any changes to the indicators and standards would be shared with the public.

Figure 8. User Capacity Framework



RESOURCE AND VISITOR EXPERIENCE INDICATORS AND STANDARDS

The priority indicators for Buck Island Reef National Monument are associated with the following issues (not in priority order):

- resource damage associated with vessel groundings
- resource damage associated with coral damage from visitor use
- resource damage associated with anchoring
- visitor experience and satisfaction at the underwater trail
- resource damage and visitor experiences associated with trail use
- visitor experiences at beaches and picnic areas

The condition of these resources is already being monitored and managed in various ways, but the indicators described in this section would help the park staff track specific influences to these resources as a result of visitor use.

Shallow coral reefs in the park are navigation hazards. Coral reefs are highly sensitive to a number of changing conditions, and the park continues to monitor coral reef status in the park to increase their knowledge and adapt the best management practices to protect these fragile resources while still providing opportunities for visitor enjoyment. The management strategies considered in this plan to further manage coral reefs in the park include establishing the Marine Hazard Zone that prohibits vessel use as well as the establishment of vessel size limitations. These management actions help prevent vessel groundings that could cause irreparable damage to coral reefs, especially threatened elkhorn and staghorn corals. The standard to be maintained is zero tolerance for vessel groundings to protect coral reefs.

Coral damage associated with visitor use includes such impacts as accidental touching, bumping or breakage, flipper scrapes from snorkelers getting too close to coral, and other types of related visitor use impacts, particularly at the underwater trail. Since the underwater trail is such a popular destination, protection of the resources requires special consideration to address impacts related to visitor use. The standard identified is that new coral damage does not exceed a 5% increase over baseline conditions. The baseline will be established using video / photographic footage at the underwater trail. This video/photographic coverage of the underwater trail will be developed in 2011 as the baseline for future comparisons. The NPS encourages the use of adaptive strategies to help reduce impacts from visitor use, including education, training, working with concessioners to adjust visitation patterns / levels, increasing the presence of park staff, altering mooring use or setting limitations at the underwater trail.

Impacts on seagrass from visitor activities include scarring from anchors. These impacts are primarily related to visitor use off West Beach. Increased boating activity and anchoring at times by boaters with no or only limited experience make the area off West Beach susceptible to further seagrass scarring. Anchoring adversely affects seagrasses by destroying their underground system of stems (rhizomes), which in turn causes sediments to destabilize and erode. Some seagrasses, such as turtle grass, have a relatively slow rate of growth, and recovery of damaged stems can take several years. Other species such as manatee grass have a relatively rapid rate of growth. For example, rapid regrowth of this species in the Buck Island channel was observed between 1971 and 1999 (Kendall et al. 2004a). However, over time, continued use of anchors in seagrass beds destroys existing beds and also prevents damaged beds from reestablishing themselves. The loss of seagrass from anchoring is a significant concern because seagrass beds in the park are highly productive and provide areas of habitat for recreationally and commercially important fish and invertebrates. Although active restoration of damaged seagrass communities is technically possible, it is expensive and time-consuming.

The area off of West Beach is highly dynamic, and the shifting sands in this area make it impossible to permanently designate an anchoring area without affecting seagrass growth and recovery. Minimizing the extent and severity of impact on the seagrass beds has been the focus of ongoing management concern. The Proclamation dictates that anchoring is prohibited; however the NPS may permit exceptions for emergency or authorized administrative purposes, and may issue permits for anchoring in deep sand bottom areas to the extent that it is consistent with the protective purposes of the monument. The indicator included in Table 6 for seagrass scarring would encourage the use of adaptive management strategies to help reduce impacts.

The goal/standard of these efforts would be to achieve at least a 5% per year reduction in the total area scarred at West Beach over 2010 baseline conditions. The management strategies being considered in this plan to further manage this impact include designating anchoring locations in deep sand by permit only, reducing or eliminating the anchoring area, and establishing moorings to replace anchoring. Further strategies include increased education, interaction with park staff, training, and use of regulatory buoys and other aids to navigation.

Resource damage at the picnic areas, the beaches, and trail at Buck Island may be caused by a variety of visitor uses and practices such as moving picnic tables, cutting back vegetation, or clearing areas. Disturbances from such practices include trampling or removal of vegetation, removal of ground cover that could impact threatened and endangered species such as the St. Croix ground lizard, and disturbance of nesting areas (sea turtles and least tern). The indicator reported on Table 6 for resource damage is the number of incident reports. It is anticipated that as anchoring practices shift over time and moorings are installed, and as NPS staff increase their presence in the park, the number of incident reports may also change in the initial 3 to 5 years. Therefore, a baseline would be established in 2016, and the percent decrease in number of incident reports would equal 1 percent per year thereafter. Management strategies would include increased education and awareness of low impact practices and compliance with park policies and regulations, increased interaction with park staff, consider use during off-peak days, restrict or limit activities in designated areas, use a reservation system for selected facilities, or area closures.

The underwater trail at Buck Island Reef National Monument is the number one tourist destination for visitors to St. Croix. Visitors to the underwater trail experience premiere snorkeling and have the opportunity to be immersed directly into coral grottos. Maintaining high levels of visitor satisfaction with these experiences is an important management goal. Because the underwater trail is so popular, crowding and conflicts may become a problem particularly as the economy recovers, and the number of potential cruise ship passengers increase. The indicator related to these concerns helps track trends (through random surveys and annual visitor satisfaction surveys) in visitor satisfaction levels specific to visitors' experiences at the underwater trail. The standard would help ensure that most visitors (85 percent) have a high satisfaction level. If the satisfaction levels are not meeting the established standard, park staff would further investigate the source of the crowding or conflict and implement appropriate management strategies such as increased education, encourage concession use during off-peak times, and consider developing alternative mooring use patterns.

The priority visitor experience concerns for the beaches, trail and picnic areas are: crowding and conflicts, facility use, and maintenance. Similar to the resource indicators, visitors' opportunities and related experiences in the park are already being monitored and managed in various ways. The indicators described below would help the park staff track these specific issues more systematically to ensure that desired conditions are being achieved.

Disturbance to soils, vegetation and wildlife (including threatened and endangered species) along trails is a concern due to the fragile condition of these resources on Buck Island. The indicator and standard in Table 6 would be based on maintaining the existing trail to a width of 2 feet to prevent resource damage. Trail maintenance and protection of resources would help ensure that quality visitor experiences along the trail are also maintained. Education, increased enforcement, signs, or use of barriers are some of the management tools that would be used to address this issue.

Currently, use levels along the trail are relatively low, and encounters between hiking groups are infrequent. To maintain these conditions over the long term, an indicator of the number of encounters per day between groups on hiking trails would be monitored. A standard of no more than two groups (with approximately 6 people per group) encountered per day helps to disperse use and allow visitor opportunities for solitude within the interior trail portion of Buck Island.

Maintaining high satisfaction levels may be monitored by tracking the number of registered complaints. Registered complaints would be monitored, with a standard of no increase in registered complaints compared to 2010 baseline conditions. Potential management strategies include increased education, encouraging use at less busy times, increased interaction with park staff and law enforcement, and possible implementation of a reservation system.

In order to maintain visitor satisfaction with facilities, the park would monitor the number of work orders issued. Park facilities include the picnic area, trails, comfort station, pier and future moorings. Potential management strategies include education regarding low impact practices and compliance with park rules and regulations, increasing interaction with park staff and law enforcement, and encouraging use to off-peak days. These measures would help park staff maintain desired conditions at high use locations, such as the beach, trail and picnic area.

For both on-the water and hiking activities, park staff would continue to educate visitors and concessioners on times of peak use in hopes of redistributing use to off-peak times. If needed, the park may use other management strategies, including re-evaluation of mooring use. Education about peak use times, real time information about current use, and enforcement would help park staff maintain desired conditions at high use locations, such as the underwater trail and beaches.

Table 6. User Capacity Indicators, Standards, and Management Strategies for Action Alternatives

Management Zone	User Capacity Indicator	User Capacity Standard	Potential Management Strategies
Recreation Zone; Resource Protection Zone; Marine Hazard Zone	Occurrence of vessel groundings reported by NPS, US Coast Guard, visitor or other reports	Zero tolerance for vessel groundings	<ul style="list-style-type: none"> • Educate to increase awareness of park regulations and sensitive resources • Establish mooring guide • Increase interaction with park staff • Train volunteers to provide information • Provide training for appropriate vessel use in the park • Increased park regulatory buoys and/or other aids to navigation, and signage (including electronic chart updates) • Conduct damage assessment

Table 6. User Capacity Indicators, Standards, and Management Strategies for Action Alternatives (Continued)

Management Zone	User Capacity Indicator	User Capacity Standard	Potential Management Strategies
Recreation Zone; Resource Protection Zone	New coral damage (breakage, flipper scrapes, or other related visitor use impacts)	New coral damage does not exceed 5% increase over baseline conditions from video baseline in 2011	<ul style="list-style-type: none"> Educate concessioners, visitors and businesses to increase awareness of park regulations and sensitive resources Increase outreach regarding park policies and regulations on a routine and recurring basis (at a minimum on annual basis) Provide training for appropriate vessel use (including anchoring) in the park Provide training - snorkeling do's and don'ts Track visitation levels and resource damage occurrences Conduct routine training for concessioners Increase interaction with park staff and law enforcement Increase park regulatory buoys and other aids to navigation, or signage Encourage alternative mooring use patterns Establish limitations on underwater trail use levels Encourage reporting of damage by visitors, concessioners and park staff; track and analyze information gathered Conduct damage assessment
Recreation Zone; Resource Protection Zone; Marine Hazard Zone	Percent reduction in total area of anchor scars at West Beach	Percent decrease in total area damaged by anchor scars equals 5 percent per year over baseline conditions in 2010 at West Beach	<ul style="list-style-type: none"> Educate to increase awareness of sensitive resources and park regulations Establish moorings and mooring guide Increase interaction with park staff Train volunteers to provide information Provide training for appropriate vessel use (including anchoring) in the park Increase park regulatory buoys and/or other aids to navigation, or signage
Recreation Zone; Island Discovery Zone	Number of incident reports of resource damage	Initial (3 to 5 year) increase in reports due to increased staff presence. Establish baseline in year 2016. Percent decrease in number of incident reports equals 1% per year over baseline conditions	<ul style="list-style-type: none"> Educate to increase awareness of low impact practices and compliance with park rules and regulations Develop educational videos/multi-media presentations for cruise ship passengers, hotels, travel venues, etc. Increase interaction with park staff and law enforcement Restrict visitor activity at designated areas Redistribute use to off-peak days Institute reservation system for moorings/beach use Close areas (seasonal, temporary, permanent)

Table 6. User Capacity Indicators, Standards, and Management Strategies for Action Alternatives (Continued)

Management Zone	User Capacity Indicator	User Capacity Standard	Potential Management Strategies
Recreation Zone	Percent satisfaction with park underwater trail experiences (using random survey instrument and annual visitor survey results)	Achieve and maintain at least 85 percent satisfaction level	<ul style="list-style-type: none"> • Educate concessioners, visitors and businesses to increase awareness of sensitive resources; • Increase outreach regarding park regulations on a routine and recurring basis (at a minimum on annual basis) • Encourage use during times that are less busy; consider alternative mooring use patterns • Increase interaction with park staff and/or law enforcement
Island Discovery Zone; Recreation Zone	Mean trail width of 2 feet	Mean trail width does not exceed 2 feet	<ul style="list-style-type: none"> • Educate to increase awareness of park regulations and sensitive resources • Improve interpretive signs of designated trail, use areas, and park regulations • Use barriers and other restrictive measures • Establish access limitations (closure; reduction of number of users; trail permits); • Establish reservation system for large group use of trails.
Island Discovery Zone; Recreation Zone	Number of people encountered per day (over 6 hours) along designated trail	No more than two groups (approximately 6 people per group) per day along designated trail	<ul style="list-style-type: none"> • Educate to increase awareness of park regulations and sensitive resources • Improve interpretive signs of designated trail, use areas, and park regulations • Implement use of barriers and other restrictive measures • Establish access limitations (closure; reduction of number of users; establish trail permits); • Establish reservation system for large group use of trails.
Recreation Zone; Island Discovery Zone	Number of registered complaints	No increase in registered complaints over 2010 baseline condition	<ul style="list-style-type: none"> • Educate to increase awareness of resource sensitivity, low impact practices and compliance with park rules and regulations • Educate to encourage use at less busy times • Increase interaction with park staff and law enforcement • Redistribute use to off-peak days • Reservation system for moorings/beach use

Table 6. User Capacity Indicators, Standards, and Management Strategies for Action Alternatives (Continued)

Management Zone	User Capacity Indicator	User Capacity Standard	Potential Management Strategies
Recreation Zone; Island Discovery Zone	Number of work orders	Negative impact to facilities (picnic area, trails, comfort station) from visitor use (for example, damage to picnic area, movement of picnic tables into sensitive areas, sign damage) as reflected by an increase of 5% of emergency work orders for facilities over 2010 baseline condition	<ul style="list-style-type: none"> • Educate to increase awareness of low impact practices and compliance with park rules and regulations • Increase interaction with park staff and law enforcement • Redistribute use to off- peak days

LONG-TERM MONITORING

Park staff would continue monitoring use levels and patterns throughout the park. In addition, park staff would monitor these user capacity indicators. The intensity of monitoring the indicators (e.g., frequency of monitoring cycles, amount of geographic area monitored, staff availability) might vary considerably depending on how close existing conditions are to the standards. If the existing conditions are far from exceeding the standard, the rigor of monitoring might be less than if the existing conditions are close to or trending towards the standard.

Initial monitoring of the indicators would determine if the indicators are accurately measuring the conditions of concern and if the standards truly represent the minimally acceptable condition of the indicator. Park staff might decide to modify the indicators or standards and revise the monitoring program if better ways are found to measure changes caused by visitor use. Most of these types of changes should be made within the first several years of initiating monitoring. After this initial testing period, adjustments would be less likely to occur. Finally, if use levels and patterns change appreciably, park staff might need to identify new indicators to ensure that desired conditions are achieved and maintained. This iterative learning and refining process, a form of adaptive management, is a strength of the NPS user capacity management program.

COMPARATIVE COST ANALYSIS

The actual cost of implementing the approved general management plan will ultimately depend on future funding and service-wide priorities over the life of the plan, as well as the ability to partner with other agencies or groups. Approval of a general management plan does not guarantee that funding and staffing needed to implement the plan will be forthcoming. Funding for capital construction improvements is not currently shown in NPS construction programs. It is not likely that all capital improvements will be totally implemented during the life of the plan. Larger capital improvements may be phased over several years.

Cost estimates were developed through an evaluation of capital and annual operating costs for each of the alternatives. The estimates in this section regarding the general costs of implementing the alternatives were developed based on fiscal year 2008 dollars using NPS and industry standards to the extent available. These estimates are not intended for budgeting purposes.

Range of Annual Costs

The range of annual costs includes personnel, maintenance, and operations costs. The park's operations costs for fiscal year 2008 were \$1,728,600. The existing staffing level is approximately 14 full time permanent employees (Table 7).

The costs for staffing for each of the alternatives have been adjusted to address the need for additional fulltime employees, or equivalents, to provide essential protection, maintenance, and visitor services for the proposed new facilities at the park.

The annual costs for Alternative A would be approximately \$1,728,600, while the annual costs for Alternative B, Alternative C, and Alternative D would be approximately \$2,272,700, \$2,356,700, and \$2,379,200, respectively. The actual cost of staffing each alternative would vary according to the government service rating, experience level, and education and professional certifications as well as the deployment of staff needed to provide minimum levels of satisfactory park services.

One-Time Costs

The range of initial one-time costs including construction, facility modifications, general improvements and natural and cultural resource studies and plans identified for each alternative are outlined on Table 7.

One-time costs for Alternative A include maintenance of vehicles and vessels necessary for law enforcement activities and resource management actions; removal of fishing gear that has been abandoned at Buck Island Reef, presenting risk to park resources; installation of boundary and regulatory buoys for the expanded boundary to delineate the park boundary to allow for enforcement of park regulations and for visitor awareness; installation of 8 new administrative moorings to support resource management and monitoring needs as well as serve law enforcement needs; and a study of submerged culture resources. These projects are estimated at \$1.1 million and are common to all alternatives.

One-time costs for Alternative B, Alternative C, and Alternative D are all estimated to be \$1.3 million. When compared to Alternative A, these Alternatives include installation of additional public moorings at the park, terrestrial trail stabilization, and signage to include descriptions of the management zones. In addition, a 22 foot vessel would be purchased to provide access for maintenance staff to Buck Island. This vessel would be equipped to accomplish routine maintenance activities at Buck Island. In addition to these project costs, Alternative C would also include costs to install new signage delineating and educating visitors about bow and stern anchoring and appropriate uses in the Anchoring Zone.

All cost estimates are for recommended improvements and for education and visitor services; they do not reflect cost sharing anticipated from other federal, state, territory, or municipal agencies or from the private sector.

Table 7. Comparison of Costs Estimated for Each Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Annual Operating Costs (ONPS)	\$1,728,600	\$2,272,700	\$2,356,700	\$2,379,200
Staffing (FTE)	14	20	22	23
Total One-Time Costs	\$1,142,900	\$1,258,400	\$1,268,400	\$1,258,400
Facility Costs	\$994,900	\$1,110,500	\$1,120,500	\$1,110,500
Non-Facility Costs	\$121,000	\$121,000	\$121,000	\$121,000
Other Costs	\$27,000	\$27,000	\$27,000	\$27,000
Projects	<ul style="list-style-type: none"> • Maintain vehicles and vessels • Remove fishing gear at Buck Island Reef • Install boundary and regulatory buoys for expanded boundary • Install 8 new moorings for administrative use • Conduct submerged cultural resource investigation 	<ul style="list-style-type: none"> • All projects listed under Alternative A • Purchase a 22 foot boat for maintenance staff, equipped to conduct routine activities at Buck Island. • Purchase and install a maximum of 63 new moorings • Install information signs describing management zones • Stabilize terrestrial trail 	<ul style="list-style-type: none"> • All projects listed under Alternatives A and B • Increase signage for bow and stern anchoring / Anchoring Zone 	<ul style="list-style-type: none"> • All projects listed under Alternatives A and B
<p>Additional Assumptions:</p> <ol style="list-style-type: none"> 1. The base year for all cost estimates is 2008. 2. The cost estimates have been developed using NPS and industry standards to the extent available, and are not intended for budgeting purposes. 3. Annual operating costs are inclusive of personnel, equipment, vehicles, materials and supplies, utilities, and other services. Cost and staffing estimates assume that the alternative is fully implemented as described in the narrative. One-time non-facility costs include actions for the preservation of cultural or natural resources not related to facilities, the development of visitor use tools, and other park management activities that would require substantial funding above park annual operating costs. 				

MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES

Congress charged the NPS with managing the lands under its stewardship “in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (NPS Organic Act, 16 USC 1). As a result, the NPS routinely evaluates and implements mitigation measures whenever conditions occur that could adversely affect the sustainability of resources in the national park system.

To ensure that implementation of the action alternatives protects natural and cultural resources unimpaired while providing a high quality visitor experience, a consistent set of mitigation measures would be applied to actions proposed in this plan. The NPS would prepare and process appropriate environmental compliance reviews (i.e., those required by the National Environmental Policy Act, National Historic Preservation Act, and other relevant legislation) for these future actions. As part of the reviews, the NPS would avoid, minimize, or mitigate adverse impacts where practicable. The park could consider implementing a compliance-monitoring program that would apply these mitigation measures and also include reporting protocols.

The following mitigation measures and best management practices would be applied to avoid or minimize potential impacts from implementation of the management alternatives. Mitigation measures summarized in Table 8 would apply to all action alternatives.

Table 8. Mitigation Measures and Best Management Practices

Natural Resources	
<ul style="list-style-type: none"> • Best management practices would be implemented to control the amount of disturbance during mooring installation, trail construction, maintenance, or other activities. These practices would include erosion control measures, controlling the presence and distribution of exotic species, and avoidance of seagrass beds and other sensitive marine plants and animals. • Any ground disturbing activities would require compliance with park guidelines and requirements for control of exotic species. • Marine engines would be operated and maintained in accordance with recommended manufacturer operation and maintenance procedures. • Use of public education materials, revegetation of disturbed areas with native plants, and placement of barriers would be used to control potential adverse impacts from trail erosion, use of facilities, or recreational activities. • Efforts to document and protect rare, threatened, and endangered species would include completing environmental compliance prior to any activity, preparation of species-specific management plans, and agency coordination, research, and monitoring for these species. Management plans would include methods for implementation, performance standards, monitoring criteria, and adaptive management techniques. • Resource stewardship strategies would be developed for natural and cultural resources. • Additional interpretive, educational and outreach activities would promote understanding among park visitors. Maintaining partnerships, volunteer programs, and increasing partnerships, where feasible, would also help with the promotion of shared park values, quality visitor experiences and protection of resources. 	
Cultural Resources	
<ul style="list-style-type: none"> • Ground-disturbing actions or actions that could disturb submerged cultural resources would be designed to avoid known archeological sites and historic features. • Before any ground disturbing activity such as trail building, installation of moorings, buoys, etc. occurs, the proposed project area(s) would be surveyed for cultural resources, and identified resources would be evaluated under National Register of Historic Places criteria. Protective measures, including site avoidance, would be developed and implemented in accordance with 36 Code of Federal Regulations, part 800. 	

Table 8. Mitigation Measures and Best Management Practices (Continued)

Cultural Resources (Continued)
<ul style="list-style-type: none"> • Until such time as the appropriate cultural landscape inventories/evaluations have been conducted, trail work on Buck Island would be preceded by identification and documentation of “marker” plant species (either exotic or native species) for prehistoric and historic archeological sites. Plants that potentially could have ethnographic or cultural landscape value also would be documented and, wherever possible, left undisturbed. • Under authority of the Archaeological Resources Protection Act and the National Historic Preservation Act, publicly disseminated information about location, nature, and ownership of shipwrecks discovered within the park boundaries would be of a general nature to avoid possible vandalism, pilfering, or other damage. • If previously undiscovered archeological resources are unearthed, or in the unlikely event that human remains are discovered, work would be stopped in the area of the discovery, resources would be protected, and the park would follow procedures in accordance with 36 Code of Federal Regulations part 800. • Known archeological sites would not be disturbed by trail or sign installation activities and equipment staging areas would be located away from known resources. Construction crews would be briefed on avoidance of known archeological resources. • Contractors and construction crews would be informed of the federal policies and penalties regarding the illegal collection of artifacts or disturbance of plants and animals in the park.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

According to the Council on Environmental Quality, regulations implementing the National Environmental Policy Act, and NPS guidelines (Director’s Order No. 12), an environmentally preferred alternative must be identified in environmental documents. The environmentally preferred alternative would cause the least damage to the biological and physical environment, and would best protect, preserve, and enhance historical, cultural, and natural resources. Section 101(b) of the National Environmental Policy Act identifies six criteria to help determine the environmentally preferred alternative. Alternative B has been determined to be the environmentally preferred alternative due to its ability to best meet the Section 101(b) criteria as described below:

Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

Alternative B would best protect the environment by limiting anchoring within park boundaries and providing moorings as an alternative means of accessing Buck Island for recreational use. Alternative B has a larger Resource Protection Zone due to the absence of an Anchoring Zone, providing greater protection for seagrasses and other marine plants and animals. Mooring causes fewer adverse environmental effects than anchoring. Installation of moorings and phasing out of the majority of anchoring in the park would reduce adverse effects resulting in less stress to ecological communities and healthier marine resources that may better cope with stresses related to climate change. These projected changes, such as sea level rise, frequency and duration of storms, coastal erosion, and acidification all contribute to conditions that may change the seagrass community over time, and therefore where anchoring would be most appropriate. Alternative B provides the ability to better adapt to such changes and protect seagrass and sand communities, while providing continued access. Due to these factors, all other alternatives would fulfill this criterion to a lesser degree.

Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.

Alternative C would best meet this criterion because it provides vessel access to the beach and allows for close access to personal vessels for visitors who prefer not to swim, or are unable to swim easily to the shore. However, the practice of shoreline bow and stern anchoring under Alternative C also creates trip and fall safety hazards for beach goers due to vessel anchor lines. The beach access channels provided under the other action alternatives provides other means of accessing the beach from moored vessels. Therefore, the other alternatives would fulfill this criterion, but to a lesser degree. The alternative with the greatest challenge to meet this criterion is Alternative A since no new personnel would be proposed to help enforce regulations and protect resources in the park.

Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.

Alternative B would attain the widest range of beneficial uses of the environment, without degradation, risk to health or safety, or other undesirable and unintended consequences. Of all the alternatives, Alternative B would do the most to minimize inadvertent or unintentional damage to park resources. Under Alternatives C and D, there is greater potential for unintentional or inadvertent damage with the greater use of anchors. In addition, fewer vessels would have access to Buck Island under Alternative B compared to Alternatives A, C or D. Therefore, the level of recreational use would be less, resulting in lower potential for inadvertent or unintentional damage to resources associated with hiking trail use on Buck Island, disturbance of marine animal life or vegetation, or disturbance to corals and other sensitive species.

On balance, both Alternatives B and C would attain the widest range of beneficial uses of the environment without risk of safety. Whereas Alternative B would require visitors mooring off West Beach to use the beach access channel to reach the shore, Alternative C would allow bow and stern anchoring along the shoreline. For visitors who prefer to shoreline bow and stern anchor, Alternative C would provide for safer access to Buck Island. However, anchor lines along the shoreline would create a safety trip hazard for visitors and increase number of vessels in close proximity to the beach causing potential disturbances to seasonal nesting birds and turtles. The presence of up to 20 shallow draft vessels up to 42 feet anchored bow and stern at the beach causes noise and activity levels that impact seasonal nesting birds. However, the bow and stern anchoring is at its highest level on weekends and long holiday weekends. During the week visitation levels are lower, and disturbances are less frequent. The proposed increase in ranger presence within the park under Alternatives B, C and D would increase the level of enforcement and ability to promote the values of the park. This would help reduce the potential for inadvertent or unintentional damage to resources, as compared to Alternative A. Overall, Alternative B would best meet the objective of this criterion.

Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choices.

Each of the alternatives preserves important historical, cultural and natural aspects of the nation's heritage and maintains, wherever possible, an environment which supports diversity and variety of choice. In terms of access to areas that may allow greater choice in the fulfillment of this experience, Alternative C offers the greatest variety to access Buck Island by providing opportunities for shoreline bow and stern anchoring and mooring.

Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities.

Each of the action alternatives provide equal opportunity for commercial services to operate in the park in the future. Opportunities for sharing park resources and facilities are also similar under Alternatives B, C and D. Therefore there are no major discernable differences across alternatives with regard to this criterion.

Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative B would best meet this criterion, as it would improve renewable resource conditions for wildlife and vegetation. All the other alternatives would maintain existing conditions or result in reductions in the quality of renewable resources through alteration or loss of habitat or inadvertent damage to resources. None of the alternatives proposes long-term changes in the use of depletable resources; therefore, no discernable difference exists between the alternatives for this component of the criterion.

Some specific actions under Alternative B may achieve similar, or in some cases greater, levels of protection for cultural and natural resources than under Alternatives C or D. Based on potential resource and visitor impacts and on proposed mitigation for impacts to natural and cultural resources, Alternative B best meets the six criteria. Whereas Alternative C integrates resource protection with greater variety for visitor access to Buck Island for recreational use, Alternative B provides an advantage for the protection of cultural and natural resources while attaining the widest range of beneficial uses of the environment without degradation or other undesirable and unintended consequences.

ALTERNATIVES AND ACTIONS CONSIDERED BUT DISMISSED FROM DETAILED EVALUATION

Some aspects of the preliminary alternatives presented to the public in 2005 were changed or dismissed from further evaluation as a result of public input and the May 2006 listing of elkhorn and staghorn coral as threatened species under the Endangered Species Act. The changes made to the alternatives include the following:

- The size of the Recreation Zone was increased at the east end of Buck Island to accommodate a SCUBA diving area while also clearly defining the area for monitoring listed coral species.
- The size of the Marine Hazard Zone was increased to address marine hazards and protection of major portions of reef habitat. Boating in this zone was eliminated due to boater safety concerns associated with marine hazards and dangers to shallow reef resources, especially threatened coral species.
- The Anchoring Zone was changed to reflect the desire of visitors to maintain shoreline bow and stern anchoring at Buck Island. The size of the zone was adjusted in Alternative C to reflect current use patterns. In Alternative D, the shape of the zone was changed to reflect avoidance of seagrass beds while allowing for the addition of moorings beyond the zone. The number of potential moorings was increased for each of the action alternatives.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

A summary of environmental consequences is provided in Table 9. The summary shows each alternative's potential effects by impact topic. Detailed descriptions of the context, intensity, and duration of impacts--called thresholds--are provided in Chapter 4 Environmental Consequences.

Table 9. Summary of Impacts of the Alternatives

Impact Category	Alternative A	Alternative B: Preferred Alternative	Alternative C	Alternative D
Natural Resources				
Soil/ Sand	Long- and short-term, minor, adverse Cumulative: Long- and short-term, minor, and adverse	Long- and short-term, negligible, adverse Cumulative: Long- and short-term, minor, and adverse	Long- and short-term, minor to moderate, and adverse Cumulative: Long- and short-term, minor to moderate, and adverse	Long- and short-term, minor to moderate, and adverse Cumulative: Long- and short-term, minor to moderate, and adverse
Water Resources	Long- and short-term, minor, adverse Cumulative: Long- and short-term, minor, and adverse	Long- and short-term, minor, beneficial Cumulative: Long- and short-term, minor, and beneficial	Long- and short-term, negligible, adverse Cumulative: Long- and short-term, negligible, and beneficial	Long- and short-term, minor, adverse Cumulative: Long- and short-term, negligible, and adverse
Vegetation	Short-term, minor, and adverse Cumulative: Long-term major beneficial	Long-term, negligible to minor adverse Cumulative: Long- and short-term, major, and beneficial	Long-term, minor, and adverse effect Cumulative: Long- and short-term, moderate, beneficial	Long-term, moderate, adverse Cumulative: Long- and short-term, moderate, and beneficial
Wildlife	Short- and long-term, negligible to minor, and adverse Cumulative: Long-term, moderate, and beneficial	Long-term, minor benefit Cumulative: Long-term, moderate to major, and beneficial	Long-term, negligible beneficial Cumulative: Long-term, moderate to major, and beneficial	Long-term, negligible adverse effects Cumulative: Long-term, moderate to major, and beneficial
Marine and Coastal Resources				
Shallow Water Coral Reef Community	Long-term, moderate, and adverse Cumulative: Long-term, major and adverse	Long- and short-term, moderate to major, and beneficial Cumulative: Long-term, major and adverse	Long- and short-term, negligible, and beneficial Cumulative: Same as Alternative B	Long-term, minor, adverse Cumulative: Same as Alternative B
Sand Bottom Community	Long-term, moderate, and adverse Cumulative: Long-term, major and adverse	Long-term, moderate to major beneficial Cumulative: Long-term, major and adverse	Long-term, minor, adverse Cumulative: Same as Alternative B	Long-term, minor, and adverse Cumulative: Same as Alternative B
Seagrass and Algal Plain Community	Long-term, moderate, and adverse Cumulative: Long-term, major and adverse	Long-term, moderate to major beneficial Cumulative: Long-term, major and adverse	Long-term, moderate to major, beneficial Cumulative: Same as Alternative B	Long-term, moderate, adverse Cumulative: Same as Alternative B

Table 9. Summary of Impacts of the Alternatives (Continued)

Impact Category	Alternative A	Alternative B: Preferred Alternative	Alternative C	Alternative D
Deep Reefs and Wall Reefs	Long- and short-term minor, and adverse Cumulative: Long-term, major and adverse	Long-term, minor and beneficial Cumulative: Long-term, major and adverse	Long-term, minor, beneficial Cumulative: Same as Alternative B	Long-term, minor, beneficial Cumulative: Same as Alternative B
Deep Water Abyssal Bottom Community	Long- and short-term, negligible, and adverse Cumulative: Long-term, major and adverse	Long-term, negligible, beneficial Cumulative: Long-term, major and adverse	Long-term, negligible, beneficial Cumulative: Same as Alternative B	Long-term, negligible, beneficial Cumulative: Same as Alternative B
Deep Water Oceanic/ Pelagic Community	Long- and short-term, minor, and adverse Cumulative: Long-term, major and adverse	Long-term, minor, beneficial Cumulative: Long-term, major and adverse	Long-term, minor, beneficial Cumulative: Same as Alternative B	Long-term, minor, beneficial Cumulative: Same as Alternative B
Fish/Aquatic Life				
Fish	Long-term, minor, beneficial Cumulative: Long-term, major and adverse	Long-term, moderate to major, beneficial Cumulative: Long-term, major and adverse	Long-term, minor to moderate, beneficial Cumulative: Long-term, major and adverse	Long-term, minor to moderate beneficial Cumulative: Long-term, major and adverse
Other Marine Animals	Long-term, minor, beneficial Cumulative: Long-term, major and adverse	Long-term, moderate to major, beneficial Cumulative: Long-term, major and adverse	Long-term, minor to moderate, beneficial Cumulative: Long-term, major and adverse	Long-term, minor to moderate, beneficial Cumulative: Long-term, major and adverse
Species of Concern				
Elkhorn and Staghorn Coral	May affect, likely to adversely affect Cumulative: may affect/ likely to adversely affect	May affect, not likely to adversely affect Cumulative: same as Alternative A	May affect, not likely to adversely affect Cumulative: same as Alternative A	May affect, not likely to adversely affect Cumulative: same as Alternative A
Sea Turtles (Green Turtle, Hawksbill Turtle, Leatherback Turtle, and Loggerhead Turtle)	May affect / not be likely to adversely affect Cumulative: may affect/ not likely to adversely affect	May affect, not likely to adversely affect Cumulative: same as Alternative A	May affect, not likely to adversely affect Cumulative: same as Alternative A	May affect, not likely to adversely affect Cumulative: same as Alternative A
St. Croix Ground Lizard	May affect / not likely to adversely affect Cumulative: may	May affect, not likely to adversely affect Cumulative: same as	May affect, not likely to adversely affect Cumulative: same as	May affect, not likely to adversely affect Cumulative: same as

Table 9. Summary of Impacts of the Alternatives (Continued)

Impact Category	Alternative A	Alternative B: Preferred Alternative	Alternative C	Alternative D
	affect/ not likely to adversely affect.	Alternative A	Alternative A	Alternative A
Brown Pelican	Short-term, negligible adverse effects Cumulative: long-term, major, and adverse.	Long-term, minor, beneficial effect Cumulative: same as Alternative A	Long-term, minor, beneficial effect Cumulative: same as Alternative A	Long-term, minor, beneficial effect Cumulative: same as Alternative A
Least Tern	Long-term, minor, adverse effects Cumulative: long-term, major, and adverse	Long-term, negligible, adverse effects Cumulative: same as Alternative A	Long-term, minor, adverse effect Cumulative: same as Alternative A	Long-term, minor adverse effect Cumulative: same as Alternative A
Territory Listed Plant Species	Long-term, minor, and beneficial Cumulative: long-term, moderate, and adverse	Long-term, minor, beneficial Cumulative: same as Alternative A	Long-term, minor, beneficial effect Cumulative: same as Alternative A	Long-term, minor, beneficial effect Cumulative: same as Alternative A
Cultural Resources				
Archeological Resources	Long-term, moderate, and adverse effects due to human activities, natural processes, and lack of data Park management, interpretation, and visitor education efforts would have long-term, minor benefits Cumulative: Long-term, minor to moderate, and adverse	Long-term, minor adverse effects due to human activities, natural processes, and lack of data Long-term moderate benefits would accrue from NPS management, interpretive, preservation, and protection efforts Cumulative: Long-term, minor, and adverse	Long-term, minor, and adverse effects from human activities Moderate benefits resulting from management efforts, management zones, mitigation measures for development, proactive management and enhanced opportunities for visitor education Cumulative: long-term, minor, and adverse	Impacts from human activities are the same as Alternative B Effects from NPS Management, interpretive, preservation, and protection efforts would be the same as Alternative B Cumulative: Same as Alternative B
Soundscape				
Soundscape	Long- and short-term, negligible to moderate and adverse Cumulative: Long- and short-term, negligible to minor, and adverse	Long- and short-term, negligible to minor and beneficial Cumulative: Long- and short-term, minor, and beneficial	Long- and short-term, minor, and adverse Cumulative: Long- and short-term, negligible, and adverse	Long- and short-term, minor to moderate, and adverse Cumulative: Long- and short-term, negligible, and adverse

Table 9. Summary of Impacts of the Alternatives (Continued)

Impact Category	Alternative A	Alternative B: Preferred Alternative	Alternative C	Alternative D
Scenic Resources				
Scenic Resources	Long- and short-term negligible, and adverse Cumulative effects on viewshed and seascape would be long- and short-term, minor, and adverse. Cumulative effects on underwater scenic resources would be long-term, major and adverse	Long-term, minor, and adverse Cumulative: Same as Alternative A	Same as Alternative B Cumulative: Same as Alternative A	Same as Alternative B Cumulative: Same as Alternative A
Visitor Use and Experience				
Visitor Use and Access	Long- term, major, beneficial effects for visitors who value accessing Buck Island via both anchoring at West Beach and existing moorings near the underwater trail Long-term, moderate, adverse effects for visitors who prefer a substantially anchorless park and/or a change to the current visitation trends Cumulative: Long-term, minor, and beneficial	Long-term, major, adverse effect for visitors who value accessing the park via both anchoring and mooring Long- and short-term, moderate, beneficial effects for visitors who prefer a substantially anchorless park and/or a change to the current visitation trends Cumulative: Long-term, major, adverse effects for visitors who value accessing the park via both anchoring and mooring Long- and short-term, moderate, beneficial effects for visitors who prefer a substantially anchorless park and/or a change to the current visitation trends	Long-term, minor to moderate, and beneficial effects for visitors who value accessing the park via moorings and anchoring Long- and short-term, moderate, and adverse effects to visitors who prefer a substantially anchorless park and a change in visitation use trends Cumulative: Long-term, minor to moderate, and beneficial effects for visitors who value accessing the park via moorings and anchoring Long- and short-term, moderate, and adverse effects to visitors who prefer a substantially anchorless park and a change in visitation use trends	Long-term, minor, and adverse for visitors who value accessing the park via both anchoring and mooring and appreciate a more social experience Long- and short-term, major, and adverse for visitors who prefer a substantially anchorless park, fewer vessels and therefore fewer visitors Cumulative: Long-term, minor, and adverse

Table 9. Summary of Impacts of the Alternatives (Continued)

Impact Category	Alternative A	Alternative B: Preferred Alternative	Alternative C	Alternative D
Recreational Opportunity	Long-term, minor, and beneficial Cumulative: Long-term, minor, and beneficial	Long- and short-term, major, beneficial effects on visitors who prefer a substantially anchorless park and limitations on recreational opportunities to provide greater resource protection Long- and short-term, major, adverse effects on visitors who prefer to anchor and enjoy similar recreational opportunities and access provided under current conditions Cumulative: long- and short-term, major, beneficial effects on visitors who prefer a substantially anchorless park and limitations on recreational opportunities to provide greater resource protection long- and short-term, major, adverse effects on visitors who prefer to anchor and enjoy recreational opportunities provided under current conditions	Long- and short-term, moderate, and beneficial Cumulative: Long- and short-term, moderate, and beneficial	Long- and short-term, minor, and beneficial Cumulative: Long- and short-term, minor, and beneficial
Access to Orientation Information and Interpretation	Long- term, minor to moderate, and adverse Cumulative: Long-term, minor, and adverse	Long- and short-term, major, and beneficial Cumulative: Long- and short-term, major, and beneficial	Long- and short-term, major, and beneficial effects Cumulative: Long- and short-term, major, and beneficial	Long- and short-term, moderate, and beneficial Cumulative: Long- and short-term, moderate, and beneficial

Table 9. Summary of Impacts of the Alternatives (Continued)

Impact Category	Alternative A	Alternative B: Preferred Alternative	Alternative C	Alternative D
Park Operations and Facilities				
Park Operations	Long- and short-term, moderate, and adverse Cumulative: Long- and short-term, moderate and adverse	Long- and short-term, major, and beneficial Cumulative: Long- and short-term, major, and beneficial	Long- and short-term, moderate, and beneficial Cumulative: Long-term, moderate, and beneficial	Long- and short-term, minor, and adverse Cumulative: Long- and short-term, negligible, and adverse
Public Health and Safety				
Public Health and Safety	Long- and short-term, minor, and adverse Cumulative: Long- and short-term, minor, and adverse	Long- and short-term, minor, and beneficial Cumulative: Long- and short-term, minor and beneficial	Long- and short-term, negligible, and beneficial Cumulative: Long- and short-term, negligible and beneficial	Long- and short-term, negligible, and adverse Cumulative: Long- and short-term, negligible and beneficial
Sustainability and Long-Term Management				
Unavoidable Adverse Impacts	No major adverse effects	No major adverse effects for natural and cultural resources. Unavoidable adverse effects for visitors who prefer opportunities for bow and stern anchoring.	No major adverse effects	No major adverse effects
Irreversible and Irretrievable Commitments of Resources	With the exception of fuels and raw materials, none	Some consumption of energy and materials	Some consumption of energy and materials	Some consumption of energy and materials
Relationship of Short-term Uses and Long-term Productivity	Visitor access and use would continue; NPS continues to manage for natural and cultural resource preservation.	Limited new facilities proposed would have short-term use; mitigation and best management practices would ensure long-term productivity of park resources.	Limited new facilities proposed would have short-term use; mitigation and best management practices would ensure long-term productivity of park resources.	Limited new facilities proposed would have short-term use; mitigation and best management practices would ensure long-term productivity of park resources.