Appendix C-1

Response to Comments of **National Marine Fisheries Protected Resources Division**, dated January 16, and January 18, 2015 on SAJ-2004-12518 (SP-JCM), for the St. John Marina - Summer's End Marina in Coral Harbor on St. John

Introductory Note: The mooring field first requested has been removed from this application even though it was previously approved by the Virgin Islands Department of Planning and Natural Resources, Division of Coastal Zone Management. ("DPNR"). This idea, which was first suggested by National Marine Fisheries Service as a mitigative measure, would have helped abate on going impacts caused by poor mooring practices and unauthorized boating activities. While installation and management of a properly designed mooring field could greatly reduce the ongoing degradation currently occurring within Coral Harbor because of illegal moorings, there was strong public objection, especially by boaters within the bay. DPNR approval does not require construction of every component permitted and is contingent on receipt of all other required permits. By removing the mooring field from the ACOE permit application, Summer's End Group will not be seeking to obtain the remaining permits that would be necessary for the installation of the mooring field. Consequently, the mooring field does not need to be considered in the review of the pending application

1. An adequate alternatives analysis that includes on and offsite alternatives and alternatives to the full marina project must be completed. At this time, the alternatives analysis does include some offsite alternatives, but only considers full build out and does not adequately analyze the environmental impacts of each alternative.

Response: A detailed alternative analysis has been provided within the U.S. Army Corps of Engineers rebuttal document.

2. Sea turtles are known to use Coral Bay and areas along the most common transit routes to and from the bay proposed as part of this project but, despite several requests, no sea turtle surveys have been conducted for the project. A sea turtle survey plan should be developed in coordination with the National Marine Fisheries Service (NMFS) Protected Resources Division and implemented in order to determine the use of the project area by different species of turtles so that avoidance and minimization measures can be developed for the project. An analysis of potential vessel strikes, including the time, number and size vessels are expected to be moored (in the marina or on mooring buoys) versus outside the marina in order to determine the potential extent of impacts to sea turtles from operation of the marine and mooring field.

Response: A sea turtle survey was developed in coordination with National Marine Fisheries Service Protected Resources Division and the results of the survey are provided below:

Sea Turtle and Marine Mammal Survey
St. John Marina
The Marina at Summers End
COE Application 2004-12518 (SP-JCM)

Background

The Summers End Group, LLC is proposing to create a premier marina development to serve local needs and to attract private and charter yachts from around the world.

This project consists of construction of fixed docks to accommodate up to 144 vessels of varying length. Most of the vessels are expected to be transient, occupying a slip for a limited period of time. The project will result in increased traffic in Coral Harbor, Coral Bay and also along the transit routes to and from the marina.

Both marine mammals and sea turtles occur in Coral Harbor and more notably in Coral Bay and it is possible due to the number of boat movements that vessel strikes could occur.

The purpose of this study is to confirm which protected species use the potential impact area so that potential impact can be assessed, and protective measures can be developed.

Survey Methods

This study was designed based on a literature search of boat-based surveys and from observations made during the concurrent Vitol Sea Turtle and Marine Mammal Survey. The boat-based survey can only assess turtles surfacing to breath and turtles right below the surface. Because diving patterns vary for both marine mammals and sea turtles a direct correlation between surfacing and submerged animals cannot be made. Determining the abundance of marine mammals and sea turtles, is problematic. These animals must come to the surface to breathe and can then be counted but this represents on a proportion of the animals present. And due to difficulties with actually see the animal when it is on the surface, waves, sun glare, and direction the observer is looking in, the number of animals noted could be significantly less than what is present. There is no clear understanding of the relationship between the number of animals actually on the surface and the proportion detected by observers and the proportion visible to observers (at or near the surface), abundance data are significantly biased (Barco and Swingle, 2014). Line transect distance sampling, can be used to improve estimates. Line transect distance sampling does not require that all of the target species are detected. The data collected in line transect distance sampling includes the distance from the track line to observed targets and a measure of effort such as length of line surveyed (Buckland et al. 2001). The problem with the line transect method is that it assumes that all animals on the transect line are seen, which in the case of the boat based survey, is not always true, if a turtle were to surface right in front or under the boat it would not be seen. It also assumes that turtles under the water are seen. The fact that turtles beneath the surface are not seen does not really effect the purpose of this survey since the point of the survey is to determine impact to sea turtles or marine mammals which maybe affected by the marina. The animals which are mostly likely to be impacted by vessels will be those on or just below the surface which should be captured by the survey methods. Therefore, this survey is actually a survey of the animals which enter the impact zone (surface) within the area of potential impact.

Sea conditions have a huge impact on the ability to see sea turtles, surveys were limited to days when seas were less than 2ft. and not choppy. Choppy conditions effectively prevent sightings.

The survey focused on those areas anticipated to have the most frequent traffic, the marina site, the Coral Harbor Entrance Channel and the routes in and out of Coral Harbor through Coral Bay where vessels visiting the marina are most likely to travel or to stop. An attempt was made to include both boats on direct transit to and from the marina and those vessels sight-seeing along the coastline. Coming out of Coral Bay vessels may be sight-seeing and could follow a path along the coastline or close to the coastline so that a good view of the shoreline can be seen. The first transect (A) followed the coastline to the north out of Coral Harbor and was 9km long. It covered Hurricane Hole and Round Bay and a closer coastal travel by vessels heading to the BVI. This transect had the most sightings. The next transect (E) followed the coastline to the south, this would be the route vessels would cover if they were to be traveling around the southeastern end of St. John to either travel back to the USVI or to head further south and down island. This transect is 3.5km in length. This route passed to the west of Leduck Island and to the west of Eagle Shoals a popular dive site. A transect (D) was ran heading at 120° to cover the area vessels may travel if they are heading directly down island or plan on traveling along the south coasts of the British Islands. The most popular direction which vessels will travel will be towards to BVI and this is a relatively wide passage and therefore two transects were ran through this area. All vessels are supposed check in while going to the BVI through either West End, Road Town or Virgin Gorda. One more northerly transect was ran as if the heading were to West End (B). This transect was 6km in length and turned out of Coral Bay passing Privateer Point. The second transect (C) was a little more southerly and was along the path which would be used by vessels traveling to check in through Road Town or through Virgin Gorda and is 5km in length. The final transect was ran from the marina site out the channel towards Johnson's Reef and was 1.25km in length. This transect covers the most frequently impacted water way where all vessels must pass to enter Coral Harbor. These transects by no means cover all the area or transit routes vessels may follow. The data collected has been used in the Distance 7.1 Release 1 program which analyzes line transect data to determine catch per unit effort (CPUE; e.g., observed turtles/km). From that number, we can then determine the number of animals that may be on the surface which could be potentially impacted by a vessel at any given time within the potential impact area. The location of these survey routes is shown in Figures 1.

Based observations during previous surveys, transects can adequately cover approximately 30-40 meters of width with 2 observers and a recorder. The observers must stand at the sides of the vessel and the greater the height the better the visibility. The observers must have an unobstructed view of the survey area. A transect width of 20m for each observer was selected giving a total transect width of 40m. Turtles beyond the transect width were not counted. Visibility is best when sea conditions are under 1-2ft. wave height or swell. The worse the sea conditions the greater the chance of missing a sighting. Rough seas can easily mask surfacing sea turtles. All of the literature reviewed stated that sea conditions and turbidity effected visibility of animals. Time of day and light also play an important factor in visibility. Visibility is best midday with the sun directly overhead. Late in the day or early in the morning the observer facing the sun is limited by glare off the waves.

We realize that surveys must be carried out for years to obtain sufficient data to predict trends or to attempt to estimate population sizes. The purpose of this study is to provide an estimate of the potential for interaction between vessels, sea turtles and marine mammals. The study was conducted over a 2.5-year period and with 20 surveys being conducted.

SURVEY

"Jouvert", a 38' Scarab with two 250 Yamaha 4 Stroke Engines was used for the observations. "Jouvert" has steps near the bow which the observers can stand on and hold on to the frame of the canopy. Because of the difficulty of getting pictures of the surfaced turtles and because of the potential distracting nature "dealing" with the camera has on an observer, the observers did not take photographs.

The vessel used provided an unobstructed view for the observers. At least two observers were utilized at all times, as well as one recorder. The observers stood on the steps near the front on the vessel, one observer to the port and one to the starboard. The observers maintained the same visual corridor throughout the transect. If an observer needed a break the captain stopped the transect and resumed when the observer was ready. The observers called out the turtle, species if possible, size, activity, and distance from transect line.

The recorder recorded the transect line, sea turtle information, time, of day, sea state, heading, direction the observer was looking and any specific notes made by the observer. Sightings of birds, fish, and vessels were recorded as well as sea temperature as recorded at the closest NOAA buoy.

All transects were run at 10 knots or less, and transects were not done seas when were greater than 2 ft., or when it was choppy. Transects were run between 9;30am and 2:30pm.

During the winter months (October – April) when whales are most common in the USVI the idea was to conduct 3 surveys a per week every two weeks as weather allows, therefore collecting 6 days of data per month. However, seas did not allow for this and the most surveys we were able to collect in any single month was 3. During the summer months when whales are usually not in VI waters surveys attempted to collect 2 sets of data a month. The study was to continue for twelve months, at this time data has been collected over eleven months and an additional month of data will be collected.

This data has been used to determine the approximate number of marine mammals and sea turtles on the surface within the area of potential impact. The data can be compared against the estimated vessel usage of the marina as it varies by season and the estimated vessel use.

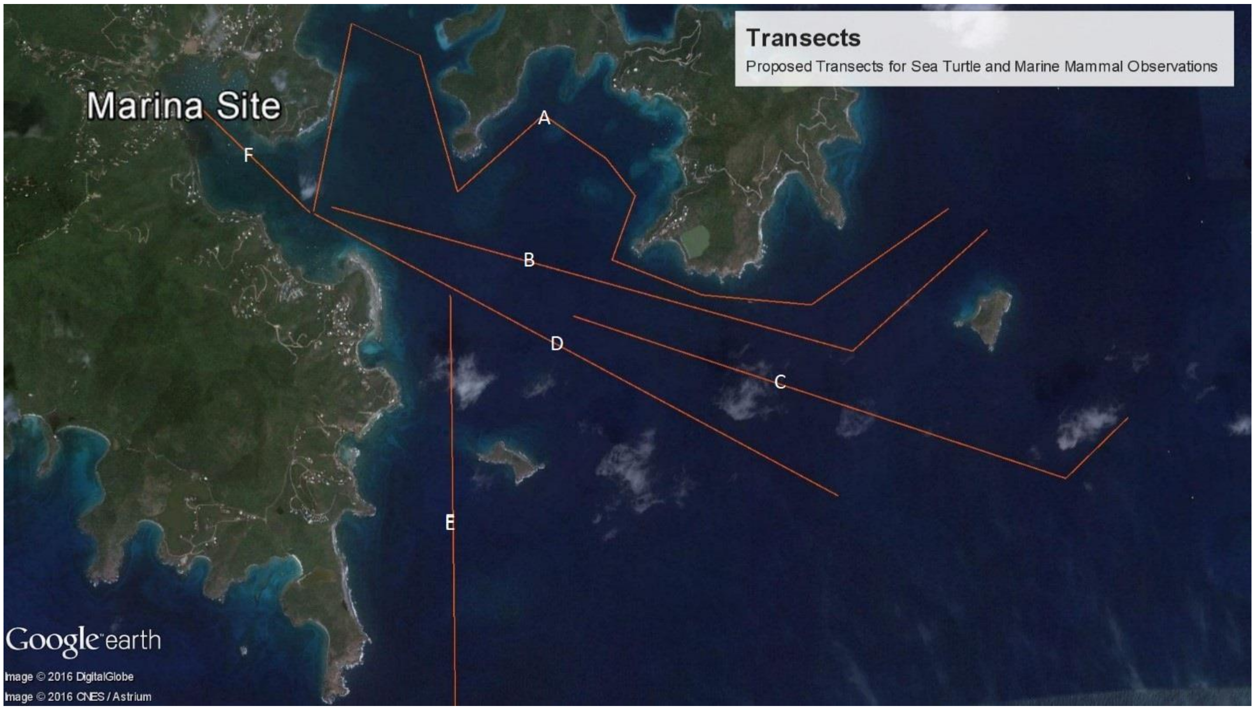

Figure 1. Transect lines assessed for the presence of sea turtles and marine mammals.

Results

The survey thus far has covered 20 days over a 2.5 year period. Table 1 summarizes the data. Although no Leatherback sea turtles were seen during the survey, they are known to occur and one was seen by the author in 2011 within southern Coral Bay (not Coral Harbor). Hawksbills were identified to species more often, with 51 turtles being identified and 35 green turtles were identified. Overall turtles were identified to species about 46.7% of the time and length could be estimated 46.7% of the time and sex could be determined about 9% of the time. The greatest number of sea turtles were seen the northern most transect and the least along the Coral Harbor transect, however these were seen at the same frequency per Km^2. Most of the sea turtle sightings on the Coral Harbor transect were seen immediately outside Coral Harbor closer to Johnson Bay. It should be noted that in inner Coral Harbor visibility is limited and transects were done weaving around vessels which could influence animals observed. The greatest number sea turtles were sighted on the transects with the shallowest depths in area of shallow reef and seagrass.

Bottlenose Dolphins were seen on 3 days during the survey, once on the eastern end of transect A in January 2016 (7 individuals), once on transect C in June 2016 (3 individuals) and once on transect D in May 2017 (4 individuals). No whales were noted within the transects although reports of whales near St. Thomas were noted during the transects in January 2016.

MONTH	# OF EVENTS	TRANSECT					
		A	B	C	D	E	F
NOVEMBER 2015	1	6	4	4	3	2	0
DECEMBER 2015	3	7	3	4	4	2	1
JANUARY 2016	3	4	2	3	2	0	1
MAY 2016	1	7	4	2	3	1	2
JUNE 2016	2	5	3	4	3	0	1
JULY 2016	1	6	4	2	3	3	1
AUGUST 2016	2	8	2	1	2	2	1
SEPTEMBER 2016	1	2	1	1	2	2	0
APRIL 2017	2	4	0	1	2	2	0
MAY 2017	2	5	3	2	0	1	1
JUNE 2017	2	3	0	2	1	1	0
	20	57	26	26	25	16	8

Table 1: Overall numbers of turtles seen per month during the surveys.

MONTH	# OF EVENTS	TRANSECT					
		A	B	C	D	E	F
NOVEMBER 2015	1	6	4	4	3	2	0
DECEMBER 2015	3	4	2	1	1	1	0
		2	0	2	2	0	0
		1	1	1	1	1	1
JANUARY 2016	3	1	1	2	1	0	0
		1	0	0	1	0	0
		1	1	1	0	0	1
MAY 2016	1	7	4	2	3	1	2
JUNE 2016	2	3	3	2	1	0	0
		1	0	2	2	0	1
JULY 2016	1	6	4	2	3	3	1
AUGUST 2016	2	7	2	1	1	1	0
		1	0	0	1	1	1
SEPTEMBER 2016	1	2	1	1	2	2	0
APRIL 2017	2	1	0	0	1	1	0
		3	0	1	1	1	0
MAY 2017	2	2	2	1	0	1	1
		3	1	1	0	0	0
JUNE 2017	2	1	0	2	0	0	0
		2	0	0	1	1	0
	20	55	26	26	25	16	8

Table 2: Sea turtles sited per sampling event.

MONTH	# OF EVENTS	TRANSECT																	
		A			B			C			D			E			F		
		G	H	unk	G	H	unk	G	H	unk	G	H	unk	G	H	unk	G	H	unk
NOVEMBER 2015	1	1	2	3	1	1	2	2	1	1	1	1	1	1	1				0
DECEMBER 2015	3	1		3		1	1		1			1				1			0
				2			0	1	1			1	1			0			0
				1		1		1			1				1				1
JANUARY 2016	3			1		1			1	1			1			0			0
		1					0			0		1				0			0
			1		1			1			0					0			1
MAY 2016	1	2	2	3	1	1	2			2	1	1	1	1				1	1
JUNE 2016	2	1	1	1	1		2			2			1			0			0
				1			0			2			2			0	1		
JULY 2016	1	1	2	3	1	2	1		1	1	1	1	1	1	1	1		1	
AUGUST 2016	2	2	2	3		1	1	1			1					1			0
				1			0			0			1	1				1	
SEPTEMBER 2016	1			2		1			1			1	1		1	1			0
APRIL 2017	2		1				0			0			1		1				0
		2	1				0	1					1			1			0
MAY 2017	2	1		1		1	1		1		0			1					1
			1	2		1				1	0					0			0
JUNE 2017	2			1			0		1	1	0					0			0
				2			0			0		1				1			0
	20																		

Table 3: Identification of turtles noted per event.

MONTH	# OF EVENTS	TRANSECT																	
		A			B			C			D			E			F		
		G	H	unk	G	H	unk	G	H	unk	G	H	unk	G	H	unk	G	H	unk
NOVEMBER 2015	1	1	2	3	1	1	2	2	1	1	1	1	1	1	1				0
size/sex		14"/?	12"/? 18"/?		24"/F		18"	30"/M, 24"/?	30"/?		36"/?	24"/?		30"/?	24"/m?				
DECEMBER 2015	3	1		3		1	1		1			1				1			0
size/sex		30"/?				18"/F			18"/F			24"/?							
				2			0	1	1			1	1			0			0
size/sex								36"/M	24"/?			12"/?							
				1		1		1			1				1				1
size/sex						18"/?		30"/?			30"/F				12"/?				
JANUARY 2016	3			1		1			1	1			1			0			0
size/sex						24"/?			12"/?										
		1					0			0		1				0			0
size/sex		24"/?										24"/M							
			1		1			1					0			0			1
size/sex			24"/F		30"/?			30"/?											
MAY 2016	1	2	2	3	1	1	2			2	1	1	1	1				1	1
size/sex		24"/?, 30"/?	18"/?, 24"/M		30"/?	30"/?					24"/?	18"/?		18"/?				24"/?	
JUNE 2016	2	1	1	1	1		2			2			1			0			0
size/sex		24"/?	24"/M		36"/?														
				1			0			2			2			0	1		
size/sex																	36"/?		
JULY 2016	1	1	2	3	1	2	1		1	1	1	1	1	1	1	1		1	
size/sex		30"/?	18"/?24"/F		24"/F	24"/M,18"/?			30"/?		24"/?	24"/?		30"/?	24"/?			12"/?	
AUGUST 2016	2	2	2	3		1	1	1			1					1			0
size/sex		36"/M, 30"/?	18"/?, 18"/?			18"/?		24"/?											
				1			0			0			1	1				1	
size/sex														24"/?				12"/?	
SEPTEMBER 2016	1			2		1			1			1	1		1	1			0
size/sex						18"/?			24"/M			18"/?			24"/F				
APRIL 2017	2		1				0			0			1		1				0
size/sex			24"/?												30"/?				
		2	1				0	1					1			1			0
size/sex		24"/?,36"/F	18"/?					24"/F											
MAY 2017	2	1		1		1	1		1		0			1					1
size/sex		18"/?				24"/?			18"/?					30"/M					
			1	2		1				1	0					0			0
size/sex			12"/?			24"/?													
JUNE 2017	2			1			0		1	1	0					0			0
size/sex									30"/?										
				2			0			0		1				1			0
size/sex												24"/?							

Table 4: Individual data assessed during survey.

	# OF EVENTS	TRANSECT					
		A	B	C	D	E	F
	20	57	26	25	25	16	8
Area of Survey (Km2)		360	240	200	600	140	50
Total Area Observed(Km2)		7200	4800	4000	12,000	28000	1000
Surfaced Seaturtles/Km2		0.008	0.005	0.006	0.002	0.0006	0.008

Table 5. Turtles on surface at any time within a Km^2 area along route.

The occurrence of seeing dolphins, which were clusters rather than individuals were, 0.000139/Km^2 on transect A, 0.00025/Km^2 on transect C and 0.00083/Km^2 on transect D. It should also be noted that these animals were all outside of the transect area and upon encountering the boat swam into the transects.

Conclusion

Turtles are abundant in Coral Bay and turtles and vessels coming into and out of the YCSE and the possibility of sea turtle strikes exists.

As noted above the mooring field is no longer a part of this project therefore is no longer being considered. There will be 144 slips within the marina as well as 12 moorings for a total vessel count of 156. The market analysis has predicted the following occupancy for the marina.

ANNUAL OCCUPANCY CHART

DOCKS	SLIP SECTIONS	SLIP COUNT	ANNUAL OCCUPANCY %
B	A	23	80%
	B	23	85%
C	C	12	60%
	D	12	60%
D	E	14	59%
	F	14	53%
A	G	10	32%
E	H	10	39%
F	I	8	38%
	J	13	29%
G	K	5	30%
H		BOARDWALK	N/A
TOTAL SLIPS →		144	

Table 6. Estimated Slip Occupancy

A and B vessels are the smallest vessels and those which are expected to be at the marina as much as 85%. These vessels will primarily belong to residents and therefore will probably be used on weekends. C and D vessels are catamarans and 2 larger boats slips (up to 80') and these vessels are expected to be at the marina up to 60% of the time. This will probably be charter boats and day trip boats and will be used more frequently. E and F are the 45-55' power boats, probably fishing boats which are expect to be docked at the marina 53-59% of the time and these boats will go out frequently during fishing season and on charter. G and H, these are your larger pleasure yachts between 85' and 140' and they are expected to only be at dock 32-39% of the time, and will be out of the territory during hurricane season due to insurance reasons. The I vessels are 75' pleasure cruisers and are expected to be at dock 38% of the time and J and K vessels are larger yachts up to 140' and are expected to only be in port 29% to 30% of the time.

Vessels from the marina could either be going to sites within the National Park, i.e., Transect A (The nearest moorings are shown below), or they may be hearing around St. John (Transects B and E) or

Figure 2. Closest National Park moorings, red markers area signify no anchoring.

towards the BVI (Transects B and C). All these routes had turtle sightings and the possibility of strikes does exist. Along transect A and F for every 125km of vessel travel a sea turtle will be on the surface within the 1Km^2 area, and along transects C and E for every 166km of travel there will be a sea turtle on the surfaces within 1 Km^2 of the vessel. Along transect B every 200km of travel there will be a sea turtle on the surface within 1 Km^2 of the vessel, and for Transect D every 500km of travel.

To help mitigate potential sea turtle and marine mammal impacts.

The applicant will add a fee to charges levied on each slip which will be dedicated to support of a third party independent research program on vessels strikes to sea turtles and marine mammals similar to the one NOAA is currently funding in St. Croix. Information gleaned from these studies and those in the future may one day help to minimize or alleviate strikes altogether. The applicant will implement Sea Turtle and Smalltooth Sawfish Construction Conditions and Vessel Strike Avoidance Measures and Reporting for Mariners. There will be a 500-meter safety zone established around all pile driving and monitoring for sea turtles and marine mammals will occur. Bubble curtains will also be used to help abate acoustic impacts.

Literature

Barco, Susan and W. Mark Swingle, 2014. Sea Turtle Species in the Coastal Waters of Virginia:Analysis of stranding and survey data. Virginia Aquarium & Marine Science Center Foundation Prepared for the Virginia Department of Mines, Minerals and Energy, VAQF Scientific Report # 2014-07b

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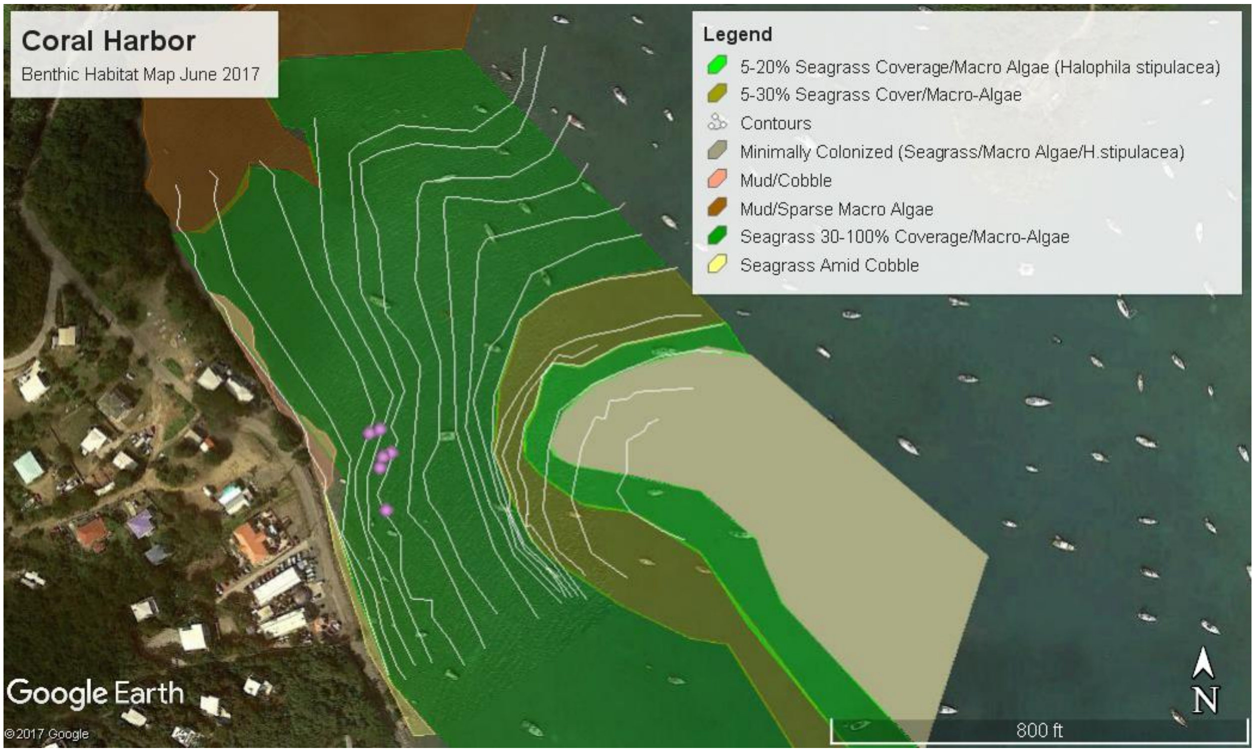
3. A complete benthic survey to include the proposed mooring field areas and transit routes into and out of the bay needs to be conducted. To date, detailed benthic information has been presented only for the immediate area of the marina.

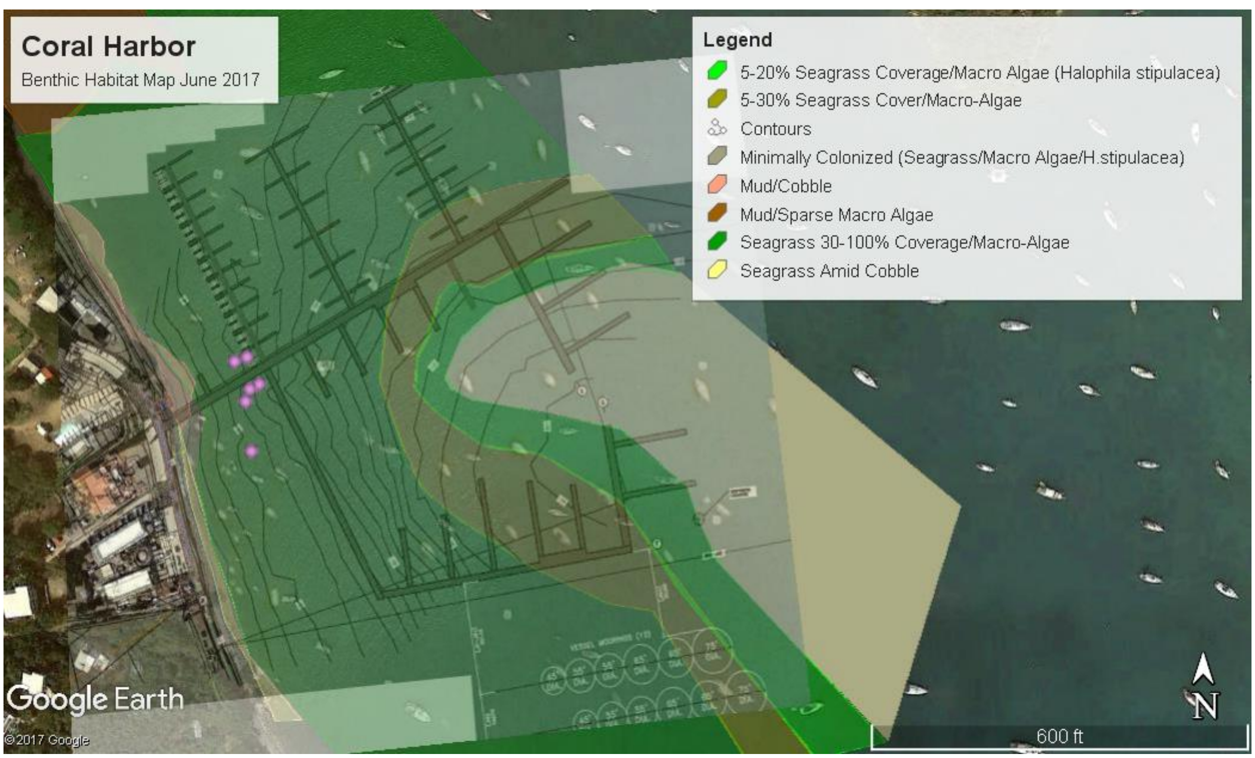
The site was resurveyed in 2015, 2016 and most recently in May and June of 2017. Transects previously undertaken were revisited. The entire site marina location, buoy locations and potential construction foot print and transit routes were surveyed. The changes noted included the appearance of *Halophila stipulacea* in the deepest areas with primarily macro-algal cover, regrowth of seagrass in some areas where there had been scars in seagrass beds from anchor and rope drags and new areas damaged by anchor and rope drags. The benthic map prepared in 2014 still accurately depicts the abundance and distribution of species accept for the addition of *Halophila stipulacea*. North of the culvert, there is a narrow muddy band of uncolonized sand which varies in width between 10 ft. and 25 ft. along the shoreline and then *Syringodium filiforme* beds which grade into abundant *Thalassia testudinum*. The seagrass beds are dense and continuous offshore with occasional blow outs which have been predominantly caused by debris, anchoring, or moorings. To the south of the existing storm water culvert, there is riprap revetment along the shoreline and there are cobbles amid the seagrass at a distance of 10 ft.– 25 ft from shore. *Thalassia* dominates the grass beds all the way into shore on the southern side of the property. These beds are extremely dense only broken by debris and anchor scars. There are six relatively large coral heads, *Solenastrea bournoni*, found offshore of the discharge point and all were found and are still healthy as of 2017. Small *Siderastrea radians* colonies found on scattered debris and cobbles in the area.

The seagrass densities between depths of 1 ft. and 11 ft. range from 30-100%. The lower densities are found primarily in areas that are recolonizing from previous disturbances. *Thalassia* represents 80% of the grass and *Syringodium* approximately 20%. *Halodule beaudettei* is present in areas of regrowth. As depth increases, seagrass densities decrease and *Syringodium* becomes more abundant and represents a greater percentage of the seagrass present. At a depth of 11 ft to 13 ft., the seagrass densities fall to 5% to 30% and at a depth of 13 ft to 14 ft the seagrass densities are no greater than 5% and macroalgae is the dominant colonizer. At 15 ft of depth there is only an occasional *Thalassia* shoot, and macroalgae is the dominant colonizer and has colonized between 10% and 70% of the seafloor. *Halimedia* is the most common algae present. *Halophila stipulacea* is patchily abundant amid the algae Also found are Caulerpa, Udotea, Avrainvillea, Penicillus capitatus, Laurencia, Hypnea and Dictyota. At a depth of greater 16-19ft. the macroalgae density decreases and only several small patches of *H. stipulacea* were present. The system is light limited at this depth. Beyond the inner harbor dense seagrass is present in depths exceeding 25ft.


100% coverage of seagrass at depths up to 10ft.



The area to the north of the project site was surveyed first in 2015 when the mooring field was still proposed and transect were run again in 2017. The most obvious change was the presence of more *Halophila stipulacea*.



Type	Habitat	Number	Acres	Sq. ft.
Moorings	30-100% Coverage Seagrass	9 (8 +0.5,0.5)		
Moorings	5-30% Coverage Seagrass	3 (1.5 + 1.5)		
	Total	12		
Docks			1.69	73,591.10
	Riprap (above MHW)		0.01	235.00
	Docks Less Above MHW		1.68	73,356.10
	Mud/Cobble		0.02	762.20
	30-100% Coverage Seagrass		0.90	39,258.18
	5-30% Coverage Seagrass		0.48	20,927.41
	5-20% Coverage Seagrass Macro-Algae		0.13	5,836.21
	Minimally Colonized		0.15	6,572.10
	Total		1.68	73,356.10

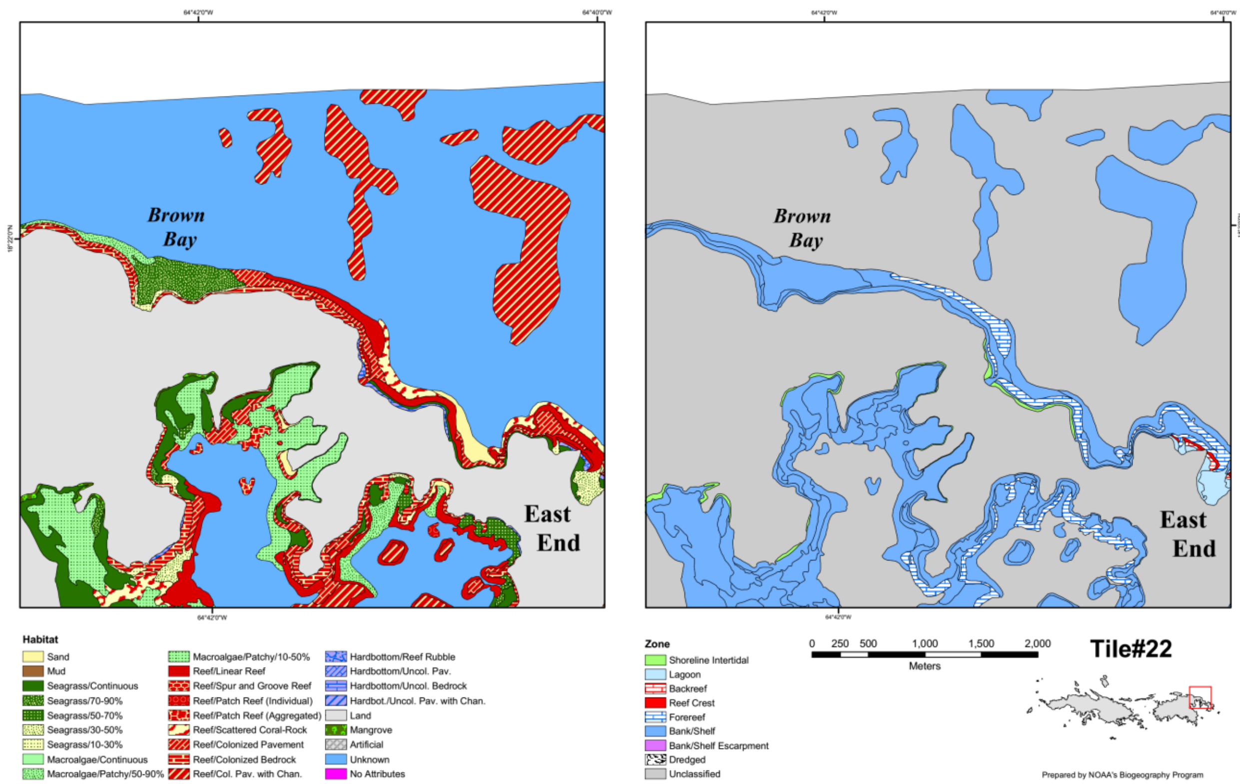
A total of 39,258.18sf of docks are over areas with SAV, the majority of which has densities between 20 and 100%. Based on a 46% survival due to shading since the Applicant is using grated decking, 21,199.42sf (0.487ac) of seagrass may be lost. At the maximum capacity and at the maximum size boat in each slip there will be 5.65 acres of shading due to vessels. It can be assumed that 50% of the seagrass in this footprint will be lost due to vessels being in placed more than 2 weeks at a time. There will be some survival due to angle of the sun and vessel types and some available light. There will be impacts due to spudding impact during construction which will probably account for between a 900-1020 sf of impact (6sf per spudding event and between 150 and 170 relocations. The operation of the marina will have an impact due to prop wash scour and you can assume another 10% loss of seagrass. In total, approximately 3.75 acres of seagrass will probably be lost as a result of the project.

In order to reduce potential impacts barges will not be used to deliver fuel. All seagrasses within the piling footprints will be transplanted. Boat lifts will be utilized in the shallowest slips to reduce shading impacts. BMPs within the Coral Harbor watershed will be maintained to improve water quality. Derelict and sunken vessels will be removed to allow recolonization by seagrasses. The mitigation plans to offset and compensate for these impacts are found in Appendix E.

As stated above the mooring area is no longer a part of this proposal. The area was however surveyed when the area was to be included and it was found to have more limit sea grass located primarily along the nearshore areas. The center of Coral Harbor is a mix of very sparse *Thalassia*, macro-algae and *Halophila stipulacea* which has become increasingly abundant since 2015.

Beyond the Coral Harbor the water quality improves and Coral Bay has abundant coral and seagrass resources as shown on the NOAA NOS habitat maps below. There are shallow reefs throughout the Coral Bay, and most support EAS listed species. *Acropora palmata* is found off most of the shallow headlands and is abundant off Johnson Reef. Orbicella is abundant in most of the reef areas, and large colonies are present in Hansen and East End Bays.

The areas most likely to be impacted by vessels are going to be those along Coral Bay has it beings to constrict into Coral Harbor. There are shallow reefs along rocky headlands and Johnson Reef extends well out into the bay and has very shallow *Acropora* species, some of which show evidence of having been struck by vessels in the past. Therefore, this is an area where YCSE is proposing to place an informational buoy to warn boaters of the shallow reef. Closer to the marina on the approach there are shallow reefs along the southern shore and some have ESA listed *Orbicella* and *Dendrogyra cylindrus* but these are out of the main transit into Coral Harbor until the constriction point and there is a shallow rocky bottom which has scattered *Orbicella annularis* and *O. faveolata*. YCSE will also place an informational buoy in this area. Fortsberg Point the north is surrounded by shallow reef and by ESA species. The closest *Acropora palmata* to the marina occurs here and there are Acropora widely scattered around the point. *Orbicella annularis* occurs in large heads out into about 15ft. of water and several *Dendrogyra* are present. Again, to help prevent impact to these shallow resources an informational buoy will be placed to keep boaters away from the shallow corals.



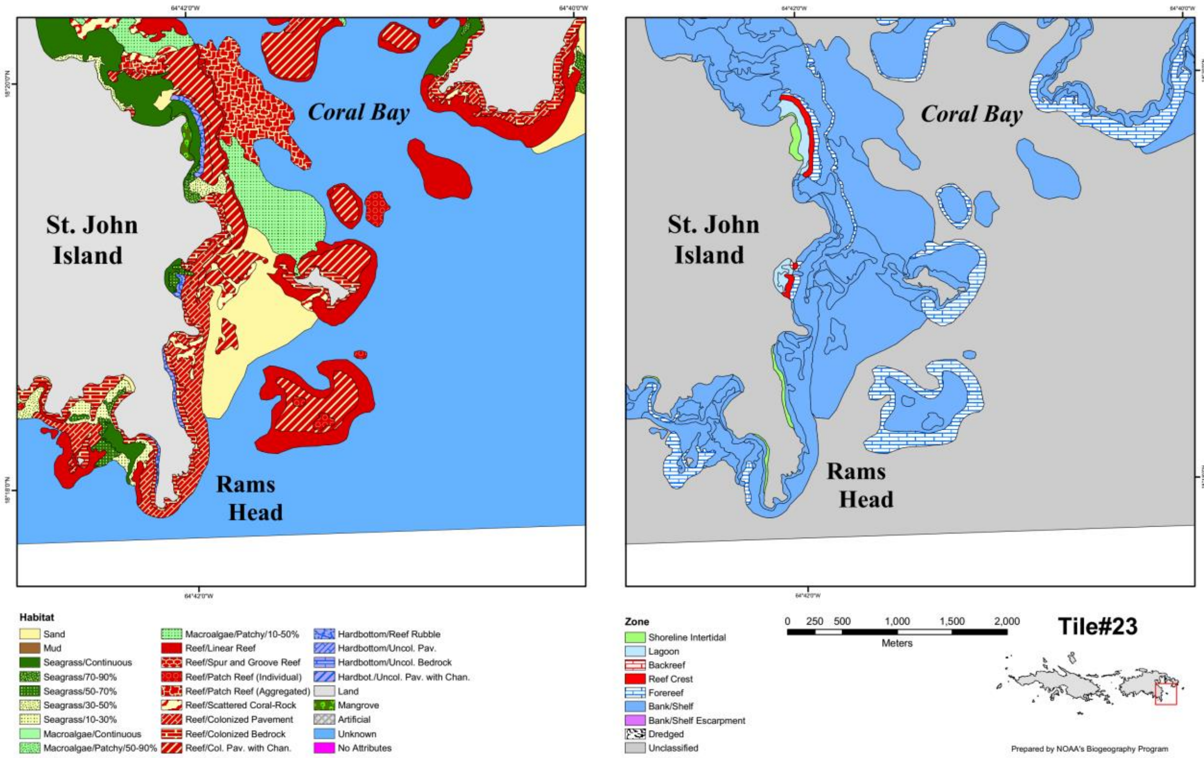


Figure 3. NOAA NOS Habitat Maps 22 and 23.

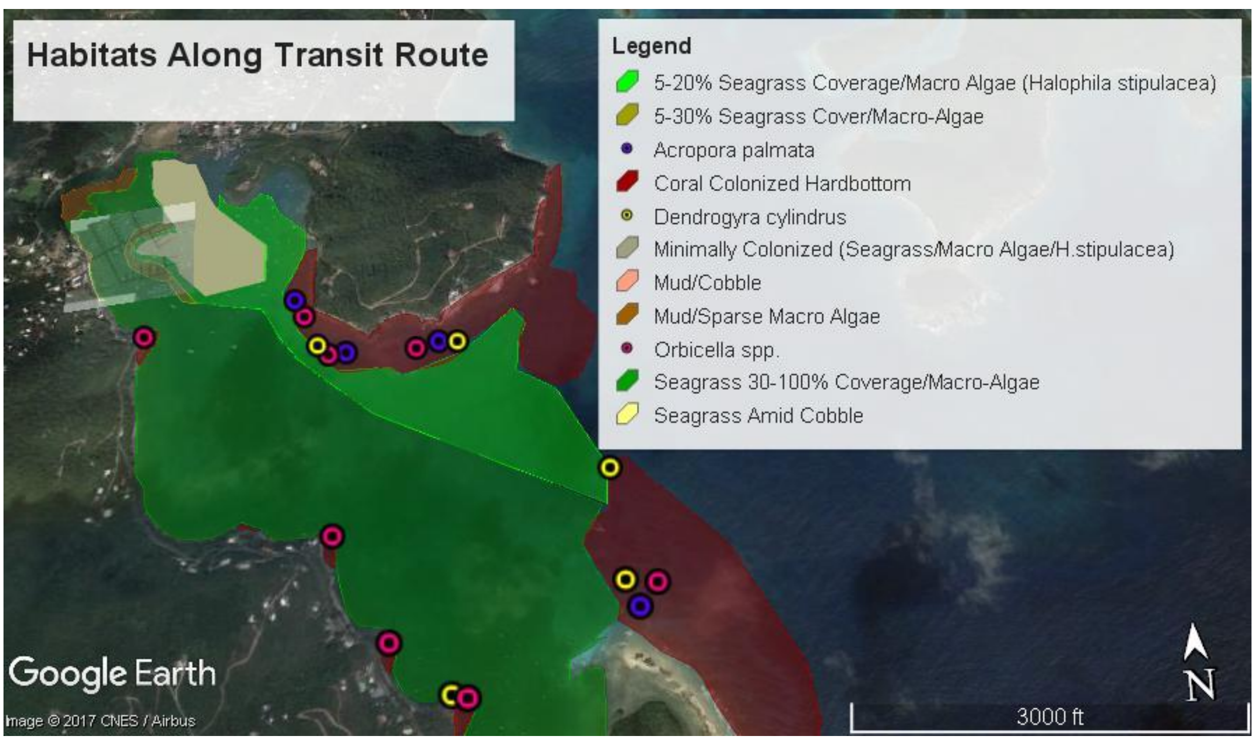


Figure 4. Habitats along the transit route.

4. Details of pile driving and quantification of potential acoustic impacts to sea turtles given that 1,333 piles will be driven in order to construct the proposed facilities, as well as proposed impact minimization measures.

These calculations and measures should be specific to the proposed marina project and should also include pile driving associated with shoreline construction as appropriate.

The project engineers have determined based on upland investigation and a review of the geology of the area that they will be able to use a vibratory hammer to set the piles, however it is probable that an impact hammer will be required to set the piles. In order to minimize acoustic impacts to species during any driving activities, bubble curtains will be installed and sea turtle and marine mammal monitoring will be implemented (Appendix E). It is estimated that each pile will require 200 strikes with the impact hammer and that 5 to 6 piles should be driven per day. This would result in 1000 to 1200 strikes a day. Pile driving should take no more than 192 days for the offshore pile. There are 64 boardwalk piles and theses will also require similar number of strikes and should take between 11 and 13 days.

US Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS), have developed threshold values, values that elicit some response from a target species, for making effect determinations for Endangered Species Act (ESA) listed species as follows:

- Detectability threshold (where the noise is detectable, but reactions are not observable).
- Alert and disturbance threshold (alert is where the noise has been identified by the target species, interest is shown; disturbance is where the target species shows avoidance of the noise by hiding, moving, or postponing feeding).
- Harassment/injury threshold (where the target species is actually injured).

NMFS's current thresholds for impulse noises (ex. impact pile driving) and non-impulse noises (ex. vibratory pile driving, dredging, etc.) for marine mammals are listed in the table below.

Criterion	Criterion Definition	Threshold
Level A	PTS (injury) conservatively based on TTS	190 dB_{rms} for pinnipeds 180 dB_{rms} for cetaceans
Level B	Behavioral disruption for <u>impulsive</u> noise (e.g., impact pile driving)	160 dB_{rms}
Level B	Behavioral disruption for <u>non-pulse</u> noise (e.g., vibratory pile driving, drilling)	120* dB_{rms}

All decibels referenced to 1 micro Pascal (re: 1μPa). Note all thresholds are based off root mean square (rms) levels.
* The 120 dB threshold may be slightly adjusted if background noise levels are at or above this level.

Based on recommendations of the Fisheries Hydroacoustic Work Group (FHWG) in June of 2008, the current sound thresholds from impulse noises (such as pile driving) that cause injury to fish are:

 206 dBPEAK

 187 dB cSELfor fish > 2 grams

 183 dB cSEL for fish < 2 grams

The threshold for behavioral impacts for all fish is 150 dBRMS (FHWG 2008).

The designation cSEL indicates the "sound exposure level in octave C". The in-water sound energy from pile driving occurs at lower frequencies between 100 Hz and 1 kHz. Typical sound levels from a single strike on a pile or hammer can range from 208 dBPEAK to 220 dBPEAK (Reyff 2003). The in-water sound is affected by hammer equipment and material (steel), the size of the hammer, the geotechnical conditions (e.g. driving resistances), and the water depth. This level is within the range of NOAA's predicted injury to whales and dolphins and injury to fish. If an attenuation system is used (e.g. bubble curtains or similar performing system), the in-water sounds produced by the hammer may be reduced.

Pile driving is required in order to set the piles and it will create a significant esonification of the area. Bubble curtains will be installed around all pile driving.

PROPOSED MINIMIZATION METHODS

The following measures will be implemented to minimize impacts to protected species of sea turtles, marine mammals and other marine organisms.

In order to minimize impacts on sea turtles and marine mammals a 500-meter protection zone will be established during pile driving.

Trained observers will be used to visually monitor the 500-meter safety zone for at least 30 minutes prior to beginning all noise creating in-water activities.

If at any time a sea turtle or marine mammal is observed in the safety zone the operation will be shut down until the animal has left the safety zone of its own volition.

Each time a pile driving hammer is started, dry-firing or ramping-up of the hammer will be conducted for at least 30 minutes to allow animals the opportunity to leave the area. Dry firing of a pile-driving hammer is a method of raising and dropping the hammer with no compression of the pistons, producing a lower-intensity sound than the full power of the hammer. Ramp-up involves slowly increasing the power of the hammer and noise produced over the ramp-up period. If bubble curtains will also be turned on at this time.

Observations for protected species will occur a throughout the day on all days when pile driving work is occurring to maintain watch for animals in the area. If at any time an animal is observed in the safety zone during the noise creating in-water activity, work shall cease until the animal has left the area of its own volition, or coordination with a DPNR representative has occurred, if the animal is injured. As part of the monitors job they will insure that all activities comply with NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions during all in-water work and that expanded safety zone monitoring is undertaken during pile-driving. NMFS's Sea

Turtle and Smalltooth Sawfish Construction Conditions are attached herewith and are a part of the monitoring requirements (Appendix E).

Prior to the start of construction, a meeting will be held with all construction personal and these conditions will be explained and that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

Records will be maintained of all sea turtle and marine mammal sightings in the area. This data will include; date and time, weather conditions, species identification if possible, approximate distance from the project area, direction and heading in relation to the project area, and behavioral observations. When animals are observed in the safety zone, additional information and corrective actions taken such as a shutdown of pile driving equipment, duration of the shut-down, behavior of the animal, and time spent in the safety zone will also be recorded. Reports will be provided to NMFS, COE, and CZM on a monthly basis.

There will also be acoustic impacts due to vessels transiting into and out of the marina. This will be an increase over the existing ambient noise levels in the harbor. Sound measurements were taken in Coral Bay utilizing a Sparton hydrophone. Reading varied over 6 months between 78dB and 112dB when a vessel was entering the harbor. It is probable that the noise level will increase to 113 dB (commercial and recreational traffic) as predicted in the study conducted by Andrew et al. 2002, McDonald et al. 2006. This is below the levels identified by NMFS as high enough to cause harm for species or behavioral disturbance.

4. Details of the proposed mooring plan, type of moorings, and operation of the mooring field to ensure this will not result in additional impacts to seagrass or corals.

As stated above the mooring field is no longer proposed. There are 12 mooring proposed associated with the marina. These will be helix type moorings with floated lines so they do not impact the seafloor. Lines will not be allowed to drag on the sea floor.

5. Details of the fuel barge operation for refueling the marina facilities, including where barge will dock and its draft.

Fuel will not be delivered by barge. Fuel will be delivered over land to minimize potential impact.

6. Information regarding the number of vessels currently within the proposed marina and mooring field footprint and the relocation plan for these vessels to determine whether this will result in additional impacts to other areas of Coral Bay.

The mooring field is no longer proposed. There are currently 27 vessels anchored or moored within the footprint of the St. John Marina footprint, the majority of which are not on legal moorings. The Department of Planning and Natural Resources has indicated that they will assist in the removal of the unauthorized vessels and will assist in identifying new locations for the legal vessels and permitting the relocation. YCSE will pay for the relocation of the mooring, including the placement of a new mooring in and removal of the old mooring tackle and any debris associated with the vessel. All new moorings will be properly installed helix anchor systems which will be installed so no chains or ropes drag the bottom.

7. Details of the construction plan for in-water and shoreline construction, including sediment and turbidity control measures, maintenance and monitoring schedules for these controls, and information regarding the proposed spud barge and work vessel anchor locations, including information as to whether spud holes will be back-filled

Construction materials will be delivered and stored on site on the construction barges. Piles will be driven by a barge mounted crane. Type 2 or 3 turbidity barriers will be used around all construction activities and bubble curtains will be used around all pile driving work. Barges will use spuds in order to position themselves. There will be impacts due to spudding during construction which will probably account for between a 900-1020 sf of impact (6sf per spudding event and between 150 and 170 relocations. Monitors will assist with the placement of spuds to minimize impacts where possible. Barges will not stay in one place for more than a week at a time to minimize shading impacts. Spud holes will be refilled to minimize impact.

Once the piles are driven the pile caps will be placed and poured and then the grated decking will be placed. Turbidity barriers will be maintained throughout all construction work. Barriers will be kept from dragging on the seafloor and creating seagrass impact. Barriers will be anchored with screw anchors to minimize impact.

8. Copies of recent water quality monitoring data for the project area, including the area of the marina and mooring field, as well as the proposed water quality and sediment monitoring program to be implemented for pre-during, and post-construction and throughout project operation. This program should include the ghut as it will receive discharges from the upland portion of the project, the marina basin, the mooring field, and control sites in Coral Bay, as well as other sites that are downstream of the marina and mooring field based on current patterns in the bay.

The proposed water quality plan is attached in Appendix E and includes monitoring of water quality throughout the bay, including at ghut locations, monitoring of sediment traps and monitoring of resources. The plan includes baseline sampling, construction monitoring and long-term monitoring through the operation of the marina.

Water quality data has been collected with a YSI Multimeter over the last 2.5 years. The area has good dissolve oxygen due to the dense seagrass beds. The turbidity increases during periods of heavy wind which stir up the shallows and during periods of heavy rainfall.

DATE	Location	Depth	DO (mg/L)	pH (s.u.)	Turbidity (NTU)	NOTES
June-17	18° 20.555'N	0.5m	6.16	8.19	1.9	
	64° 42.804'W	0.5m from B	6.14	8.19	1.8	
	18° 20.598'N	0.5m	6.08	8.11	1.6	
	64° 42.824'W	0.5m from B	6.14	8.11	1.5	
	18° 20.555'N	0.5m	6.01	8.10	1.6	
	64° 42.804'W	0.5m from B	6.18	8.10	1.7	
May-17	18° 20.555'N	0.5m	5.67	8.17	2.8	0.75" rain
	64° 42.804'W	0.5m from B	5.46	8.17	2.7	
	18° 20.598'N	0.5m	5.58	8.15	4.3	
	64° 42.824'W	0.5m from B	5.56	8.19	4.3	
	18° 20.555'N	0.5m	5.56	8.13	3.3	
	64° 42.804'W	0.5m from B	5.49	8.13	2.9	
April-17	18° 20.555'N	0.5m	5.72	8.18	1.9	25kts SE
	64° 42.804'W	0.5m from B	5.82	8.18	1.9	
	18° 20.598'N	0.5m	5.71	8.16	2.5	
	64° 42.824'W	0.5m from B	5.70	8.16	2.6	
	18° 20.555'N	0.5m	5.70	8.16	3.1	
	64° 42.804'W	0.5m from B	5.72	8.16	3.6	
March-17	18° 20.555'N	0.5m	5.69	8.11	3.1	
	64° 42.804'W	0.5m from B	5.72	8.11	3.7	
	18° 20.598'N	0.5m	5.81	8.13	2.9	
	64° 42.824'W	0.5m from B	5.92	8.13	2.9	
	18° 20.555'N	0.5m	5.79	8.16	3.4	
	64° 42.804'W	0.5m from B	5.81	8.16	3.3	
September-16	18° 20.555'N	0.5m	5.99	8.19	2.2	
	64° 42.804'W	0.5m from B	5.98	8.19	2.0	
	18° 20.598'N	0.5m	5.26	8.11	1.5	
	64° 42.824'W	0.5m from B	5.37	8.15	1.5	
	18° 20.555'N	0.5m	5.62	8.14	2.2	
	64° 42.804'W	0.5m from B	5.61	8.14	2.1	
August-16	18° 20.555'N	0.5m	5.70	8.12	4.3	1" rain
	64° 42.804'W	0.5m from B	5.72	8.12	4.3	
	18° 20.598'N	0.5m	6.14	8.01	5.4	
	64° 42.824'W	0.5m from B	6.14	8.01	5.7	
	18° 20.555'N	0.5m	5.92	8.13	6.3	
	64° 42.804'W	0.5m from B	5.93	8.13	6.3	
July-16	18° 20.555'N	0.5m	5.92	8.19	1.3	
	64° 42.804'W	0.5m from B	5.69	8.19	1.1	
	18° 20.598'N	0.5m	6.03	8.14	1.1	
	64° 42.824'W	0.5m from B	6.05	8.17	1.7	
	18° 20.555'N	0.5m	6.05	8.15	1.7	
	64° 42.804'W	0.5m from B	6.05	8.10	1.7	
June-16	18° 20.555'N	0.5m	5.75	8.16	4.3	1" rain
	64° 42.804'W	0.5m from B	5.76	8.16	4.3	
	18° 20.598'N	0.5m	6.13	8.12	3.0	
	64° 42.824'W	0.5m from B	6.01	8.12	3.1	
	18° 20.555'N	0.5m	5.78	8.11	4.3	
	64° 42.804'W	0.5m from B	5.79	8.11	4.3	
May-16	18° 20.555'N	0.5m	5.75	8.14	1.0	
	64° 42.804'W	0.5m from B	5.80	8.14	1.1	
	18° 20.598'N	0.5m	5.86	8.12	1.3	
	64° 42.824'W	0.5m from B	5.78	8.11	1.2	
	18° 20.555'N	0.5m	5.88	8.14	0.8	
	64° 42.804'W	0.5m from B	5.62	8.14	0.8	
February-16	18° 20.555'N	0.5m	5.84	8.13	1.5	
	64° 42.804'W	0.5m from B	5.86	8.13	1.5	
	18° 20.598'N	0.5m	6.01	8.13	1.8	
	64° 42.824'W	0.5m from B	6.07	8.13	1.7	
	18° 20.555'N	0.5m	5.92	8.13	2.3	
	64° 42.804'W	0.5m from B	5.95	8.13	2.5	
January-16	18° 20.555'N	0.5m	5.94	8.11	1.3	
	64° 42.804'W	0.5m from B	5.86	8.11	1.7	
	18° 20.598'N	0.5m	5.70	8.18	1.5	
	64° 42.824'W	0.5m from B	5.75	8.18	1.6	
	18° 20.555'N	0.5m	5.84	8.18	1.2	
	64° 42.804'W	0.5m from B	5.96	8.18	1.2	
December-16	18° 20.555'N	0.5m	5.67	8.17	0.9	
	64° 42.804'W	0.5m from B	5.66	8.17	0.9	
	18° 20.598'N	0.5m	5.81	8.12	0.9	
	64° 42.824'W	0.5m from B	5.84	8.12	0.9	
	18° 20.555'N	0.5m	5.99	8.21	1.2	
	64° 42.804'W	0.5m from B	6.01	8.19	1.2	

9. Current data for Coral Bay, including tidally-influenced and wind-driven transport patterns, as well as patterns during large storms such as hurricanes and tropical storms.

Water movement in Coral Bay is sluggish with the circulation being both tidal and wind driven. Current measurements were made in the project footprint over the last 2 years and the studies show a sluggish exchange affected by tidal range (during spring and neap tides) and when strong consistent winds push water into the bay from the southeast. Circulation decreases to the north and this was also reported in Sirius Marina's EAR studies which showed the southern portion of the harbor (YCSE site) as well agitated (sic) (mixed). Currents were primary tidally influenced and influenced by the wind. The highest current recorded was 0.6ft/sec but the average was less than 0.3ft/sec.

A detailed wave wind analysis was undertaken by Technomarine USA in 2016 and their wave models conclude that most of the wave energy is refracted towards the surrounding shorelines before reaching Coral Harbor, and the maximum modeled wave heights reaching the south side of the proposed marina are approximately 11 percent of the offshore wave height. They used SWAN (Simulating Waves Nearshore) models to estimate the extreme wind waves that can occur from wind wave growth over the fetch to the southeast of the project site during hurricane events. The wave and wind analysis is provided in Appendix D with the Rebuttal.

Storm waves and winds will push water into Coral Harbor and will flood the lowlands surrounding the harbor.

Month/Year	CURRENTS			Tidal State	Winds
	18° 20.649'N 64° 42.847'W	18° 20.598'N 64° 42.824'W	18° 20.555'N 64° 42.804'W		
June-17	0.3ft/sec SW	0.3ft/sec W	0.3ft/sec SW	falling	E
	0.4ft/sec SW	0.2ft/sec SW	0.3ft/sec SW	falling	E
	0.3ft/sec SW	0.2ft/sec SW	0.3ft/sec SW	falling	E
	0.3ft/sec SW	0.2ft/sec SW	0.3ft/sec SW	falling	E
May-17	0.4ft/sec NNW	0.5ft/sec NNW	0.5ft/sec NNW	rising	SE
	0.4ft/sec NNW	0.6ft/sec NNW	0.5ft/sec NNW	rising	SE
	0.4ft/sec NNW	0.2ft/sec NW	0.5ft/sec NNW	rising	E
	0.6ft/sec NW	0.5ft/sec NW	0.4ft/sec NW	rising	E
April-17	0.2ft/sec SW	0.3ft/sec SW	0.3ft/sec SW	falling	NE
	0.2ft/sec SW	0.2ft/sec SW	0.3ft/sec SW	falling	NE
	0.1ft/sec W	0.1ft/sec W	0.3ft/sec NW	rising	E
	0.2ft/sec W	0.1ft/sec NW	0.3ft/sec NW	rising	E
	0.2ft/sec SW	0.2ft/sec W	0.3ft/sec SW	falling	SE
March-17	0.3ft/sec NW	0.4ft/sec NW	0.3ft/sec NW	rising	NE
	0.2ft/sec NW	0.2ft/sec NNW	0.4ft/sec NW	rising	NE
September-16	0.5ft/sec NNW	0.4ft/sec NNW	0.4ft/sec NNW	rising	E
	0.3ft/sec W	0.3ft/sec W	0.3ft/sec SW	falling	E
	0.4ft/sec NNW	0.3ft/sec NW	0.3ft/sec NNW	rising	SE
August-16	0.1ft/sec W	0.1ft/sec SW	0.1ft/sec NW	slack	SE
	0.1ft/sec SW	0.0ft/sec	0.2ft/sec NW	slack	SE
	0.5ft/sec NNW	0.5ft/sec NNW	0.5ft/sec NNW	rising	SE
	0.4ft/sec NW	0.5ft/sec NNW	0.5ft/sec NW	rising	SE
	0.2ft/sec W	0.2ft/sec SW	0.2ft/sec SSW	falling	E
July-16	0.5ft/sec NW	0.5ft/sec NW	0.4ft/sec NW	rising	SE
	0.3ft/sec SW	0.3ft/sec SW	0.3ft/sec SW	falling	SE
	0.2ft/sec SW	0.2ft/sec SW	0.2ft/sec SW	falling	SE
	0.1ft/sec SW	0.1ft/sec SSW	0.2ft/sec SSW	falling	E
June-16	0.3ft/sec SW	0.2ft/sec SW	0.4ft/sec SW	falling	SE
	0.4ft/sec NNW	0.5ft/sec NNW	0.7ft/sec NNW	rising	SE
	0.3ft/sec NW	0.4ft/sec NW	0.5ft/sec NNW	rising	E
May-16	0.4ft/sec NW	0.2ft/sec NW	0.4ft/sec NW	rising	E
	0.6ft/sec NW	0.5ft/sec NNW	0.4ft/sec NNW	rising	SE
	0.3ft/sec SSW	0.3ft/sec SSW	0.3ft/sec SSW	falling	SE
	0.2ft/sec SW	0.2ft/sec SSW	0.2ft/sec SSW	falling	SE
February-16	0.3ft/sec SSW	0.2ft/sec SSW	0.3ft/sec SSW	falling	ESE
	0.3ft/sec SW	0.2ft/sec SW	0.4ft/sec SW	falling	NE
January-16	0.4ft/sec WNW	0.5ft/sec NW	0.5ft/sec NNW	rising	NE
	0.4ft/sec NW	0.4ft/sec NW	0.4ft/sec NNW	rising	NE
	0.5ft/sec NW	0.5ft/sec NNW	0.4ft/sec NW	rising	NE
December-16	0.2ft/sec SW	0.3ft/sec SW	0.3ft/sec SW	falling	NE
	0.2ft/sec SW	0.3ft/sec SW	0.3ft/sec SW	falling	NE
	0.3ft/sec SW	0.3ft/sec SW	0.3ft/sec SW	falling	NE
	0.3ft/sec SW	0.3ft/sec SW	0.3ft/sec SW	falling	E
	0.4ft/sec NW	0.5ft/sec NNW	0.5ft/sec NW	rising	NE
	0.3ft/sec NNW	0.4ft/sec NW	0.5ft/sec NW	rising	NE
	0.4ft/sec NW	0.4ft/sec NNW	0.3ft/sec W	rising	NNE
	0.4ft/sec SSW	0.5ft/sec SW	0.4ft/sec SW	rising	NNE

11. Details of the anticipated transit locations of users of the marina and mooring field to determine the potential extent of impacts to ESA resources due to the introduction of up to 235

new vessels to the area given the locations of ESA-listed corals, acroporid coral critical habitat, and habitat for ESA-listed sea turtles, as well as the presence of ESA-listed sea turtles in relation to the proposed project and likely transit routes and use of different areas around St. John.

The proposed transit routes area present in Figure 1, which was used for the turtle transects. The ESA coral locations of those on the immediate approach route are found in Figure 4 above.

Nassau Groupers have been seen in the project footprint has have Hawksbill turtles. *Acropora palmata, Orbicella annularis, O. faveolata*, and *Dendrogyra cylindrus* all occur within 0.10 miles of the project site and are along transit routes. The Scalloped hammerhead and manatees have not been seen within Coral Harbor. In order to protect manatees the Manatee Construction Conditions will be followed.