SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT ON THE ISSUANCE OF AN AUTHORIZATION FOR THE INCIDENTAL TAKE OF MARINE MAMMALS, ASSOCIATED WITH CONFINED UNDERWATER BLASTING AS A DEMOLITION METHOD FOR THE REMOVAL OF BRIDGE SUPPORT STRUCTURES IN DUVAL COUNTY, FLORIDA BY THE JACKSONVILLE TRANSPORTATION AUTHORITY

December 2008

Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

1 PROJECT PURPOSE AND NEED

1.1 INTRODUCTION

On May 5, 2008, the National Marine Fisheries Service (NMFS) received an application from the Jacksonville Transportation Authority (JTA) requesting an Incidental Harassment Authorization (IHA) under section 101 (a)(5)(D) of the Marine Mammal Protection Act (MMPA). The JTA proposes to utilize confined underwater blasting (blasting) as a demolition technique for the removal of bridge support structures associated with the replacement of the Beach Boulevard Bridge, Duval County, Florida. During coordination efforts for the project in Duval County, Florida, the JTA determined that it was likely to incidentally take marine mammals, specifically Atlantic bottlenose dolphins (*Tursiops truncatus*), in the Jacksonville area by Level B harassment. The incidental harassment, injury, or mortality of marine mammals may be authorized under Section 101(a)(5) of the MMPA of 1972 (16 U.S.C. 1361 et seq.).

In a previously conducted Environmental Assessment (EA) titled "Environmental Assessment on an Authorization for the Incidental Take of Marine Mammals Associated with Confined Underwater Blasting as a Construction Method for Civil Works Projects Along the Coast of Florida by the Jacksonville District of the U.S. Army Corps of Engineers," NMFS evaluated the issuance, within Florida waters only, of authorizations under either Section 101(a)(5)(A) (5-year regulations with individual Letters of Authorization for each confined underwater blasting event) or 101(a)(5)(D) of the MMPA (Incidental Harassment Authorizations issued on a case-by-case basis for each requested confined underwater blasting event). Via the NEPA process, NMFS selected the issuance of 101(a)(5)(D) (individual IHAs) as the preferred alternative. This Supplemental Environmental Assessment (SEA) therefore evaluates issuance of an authorization under Section 101(a)(5)(D) for incidental Level B harassment of marine mammals associated with the JTA's proposed confined underwater blasting.

Section 101(a)(5)(A) of the MMPA directs NMFS to allow, upon request, the incidental, but not intentional, taking of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) with in a specified geographical region if certain findings are made and regulations are issued. Without an authorization or exemption under the MMPA, takings, including harassment of marine mammals, is prohibited. Permission may be granted if NMFS finds that the taking will be small, will have a negligible impact on the species or stocks(s) or marine mammal, will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses, and the permissible methods of taking and requirements pertaining to the monitoring and reporting of such taking are set forth. On April 30, 1994, the President signed Public Law 103-238, the MMPA Amendments of 1994. One part of this law added a new subsection 101(a)(5)(D) to the MMPA to establish an expedited process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine mammals by harassment.

Except for certain categories of activities not pertinent here, the MMPA defines "harassment" as:

> …any act of pursuit, torment, or annoyance which (a) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (b) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

In order to allow a taking under section 101(a)(5)(A) or (D) of the MMPA, NMFS must find that the taking by the applicant's activity will have a negligible impact on the species or stocks of marine mammals. A finding of negligible impact would require that the impact resulting from the specified activity cannot reasonably be expected to, and is not reasonably likely to, adversely affect the species or stock though effects on annual rates of recruitment or survival of the species or stock of marine mammal. If the potential effects of a specified activity are conjectural or speculative, a finding of negligible impact may still be appropriate provided monitoring of the activity, in compliance with this part of the MMPA, is undertaken to support or refute the negligible impact finding.

The JTA has submitted an application to NMFS, requesting authorization for the possible Level B harassment of small numbers of bottlenose dolphin incidental to construction and demolition of projects in the Jacksonville, Florida area. Previous construction of federal navigation projects by the ACOE in the Jacksonville area have demonstrated the need to employ the use of confined blasting as a technique to prepare the rock for dredging and removal. Because the pressure waves from underwater blasting during the Beach Boulevard Bridge project could potentially affect marine mammals due to disturbance by sound and pressure, and potential for injury or death of an animal, an authorization under the MMPA is warranted.

In March, 2005, an Environmental Assessment was prepared by NMFS to address the issuance of Incidental Take Authorizations for confined underwater blasting as a construction method for civil works projects along the coast of Florida by the Jacksonville District of the ACOE. This SEA supplements the analysis conducted in the 2005 EA specific to the proposed JTA activities under consideration for potential MMPA authorization.

1.2 PROJECT AUTHORITY

An authorization to take marine mammals by U.S. citizens incidental to conducting a specified activity (other than commercial fishing) in the waters of the United States or on the high seas is provided by the MMPA, as amended (16 U.S.C. 1371(a)(5)).

The Beach Boulevard Bridge spans approximately 300 ft (91.5 m) over open water. The ACOE and St. Johns River Water Management District (SJRWMD) have issued Environmental Resource Permits to JTA for the replacement of the existing Beach Boulevard Bridge over the Atlantic Intracoastal Waterway (AICWW). The ACOE issued permit SAJ-2003-9340 on November 22, 2005, to expand State Road 212 (Beach Boulevard) from San Pablo Road to Penman Road in Jacksonville, Duval County, Florida. The permit included authorization to replace Beach Boulevard Bridge over the AICWW. The permitee requested an update to the permit to allow blasting of the bridge to reduce the amount of time that tugs and barges are active in the AICWW, thereby reducing associated risks to wildlife.

1.3 PROJECT DATES, DURATION, AND LOCATION

The bi-directional bridge which is being replaced has been closed and currently is undergoing partial disassembly in preparation for demolition. Nearly all of the above water part of the bridge will be demolished via chipping. The below-water portions and a small amount of the above water portions of the bridge will be demolished by the use of explosives. The first proposed blasting event will occur on or shortly after December 1, 2008, and the subsequent two blasts will be completed by December 31, 2008.

The geographic area authorized for the use of blasting as a construction technique is depicted in Location Map, Exhibit 1 of JTA's application. The existing Beach Boulevard Bridge traverses the AICWW in Sections 36 and 38, Township 2 South, Ranges 28 and 29 East, Duval County, Jacksonville, Florida (see Exhibit 1 of the Blasting Plan in JTA's application for more information on the location). The approximate coordinates of the site are as follows: 30° 17' 17" North latitude, 81° 26' 18" West longitude. This SEA only addresses blasting only in the Jacksonville area within Florida state waters. The ACOE Jacksonville District's civil works boundaries generally follow river basins and drainage areas rather than state lines. The ACOE's Jacksonville District is responsible for all of Florida with a few exceptions.

1.4 PROJECT NEED OR OPPORTUNITY

The purpose of the blasting project is to remove twelve support structures from the old bridge by explosive demolition. The reconstruction of the bridge will help facilitate traffic flow through the Jacksonville area, by expanding the number of lanes for automobiles to travel in on the highway. While dismantling and discarding the existing bridge span will be routine, the strength and mass of the bridge footers pose a dismantling problem. After careful consideration, the bridge contractor, Superior Construction, has determined that demolishing the footers with explosives is the most practical means of destroying them, and JTA's MMPA authorization request reflects this need for explosive demolition. The new, fully permitted, bridge will consist of separate eastbound and westbound spans. The new westbound bridge, which is 100 percent constructed and in use, occurs where no bridge structure previously existed. The location of the future eastbound bridge, which has not yet been started, coincides almost exactly with the existing bridge, necessitating the full removal of the latter. The existing bridge support piers are undersized, relative to the future span's requirements, and must be removed to make room for construction equipment and the new bridge, particularly its support piles. The permitted method of removal of the old bridge allows for the footers to be removed via non-explosive means from barges. The barges would have to be relocated regularly by a large tug boat for up to three months due to the quantity of concrete involved and the limited reach of the equipment.

Under existing permits, the most practical way of demolishing the old bridge supports is to use a hydraulic hoe ram, the equivalent of a large jack hammer, mounted on a barge, maneuvered by a tug boat, and literally chip the concrete supports into tens of thousands of pieces. For demolition of the piers adjacent to the channel, a barge with a large chipper will operate from the channel and chip at an angle away from the channel. This way, nearly all of the small amount of rubble that falls toward the channel will land in the chipper barge.

There are only two practical ways of taking down the bridge supports – one method entails the aforementioned hoe ram which would chip the concrete into tens of thousands of pieces, the other involves explosives. Under hoe ram only (i.e., no blasting) scenario, the risks to wildlife stem from tugs and barges operating in the AICWW, for a total of 900 hours (90 days x 10 hours per day). An additional impact would be incurred by the protracted percussion pounding of the hammer. In a blasting scenario, risks to wildlife include the three blast events, and tug/barge activity in the AICWW totaling 400 hours (40 days x 10 hours per day). Without blasting, an additional 500 hours of permitted tug/barge activity (without trained wildlife observers) would occur. The permitee believes this represents a greater risk to wildlife than the three proposed blast events which include a Watch Plan specifically designed to minimize risk provided the suggested mitigation and monitoring is implemented by JTA. A Blasting Plan document as well as Safety and Watch Plan documents have been prepared for this proposed action (see JTA's application). A hoe ram method with no blasting activities is not analyzed under this SEA because the applicant seeks to utilize the method in which the duration of the activity is lessened (400 total estimated hours rather than 900 total estimated hours). Therefore, the appropriate range of alternatives for consideration by NMFS relates to the proposed confined blasting action and any alternative blasting scenarios.

Blasting can have adverse effects on marine mammals both directly or indirectly. Direct effects include mortality or injury as a result of the blast and indirect effects associated with the pressure and acoustic impacts that can lead to changes in marine mammal behavior. Due to the potential adverse impacts on marine mammals from the use of blasting as a construction technique, the JTA is required to obtain an authorization from NMFS, under the MMPA to utilize this construction method.

1.5 PROPOSED ACTION

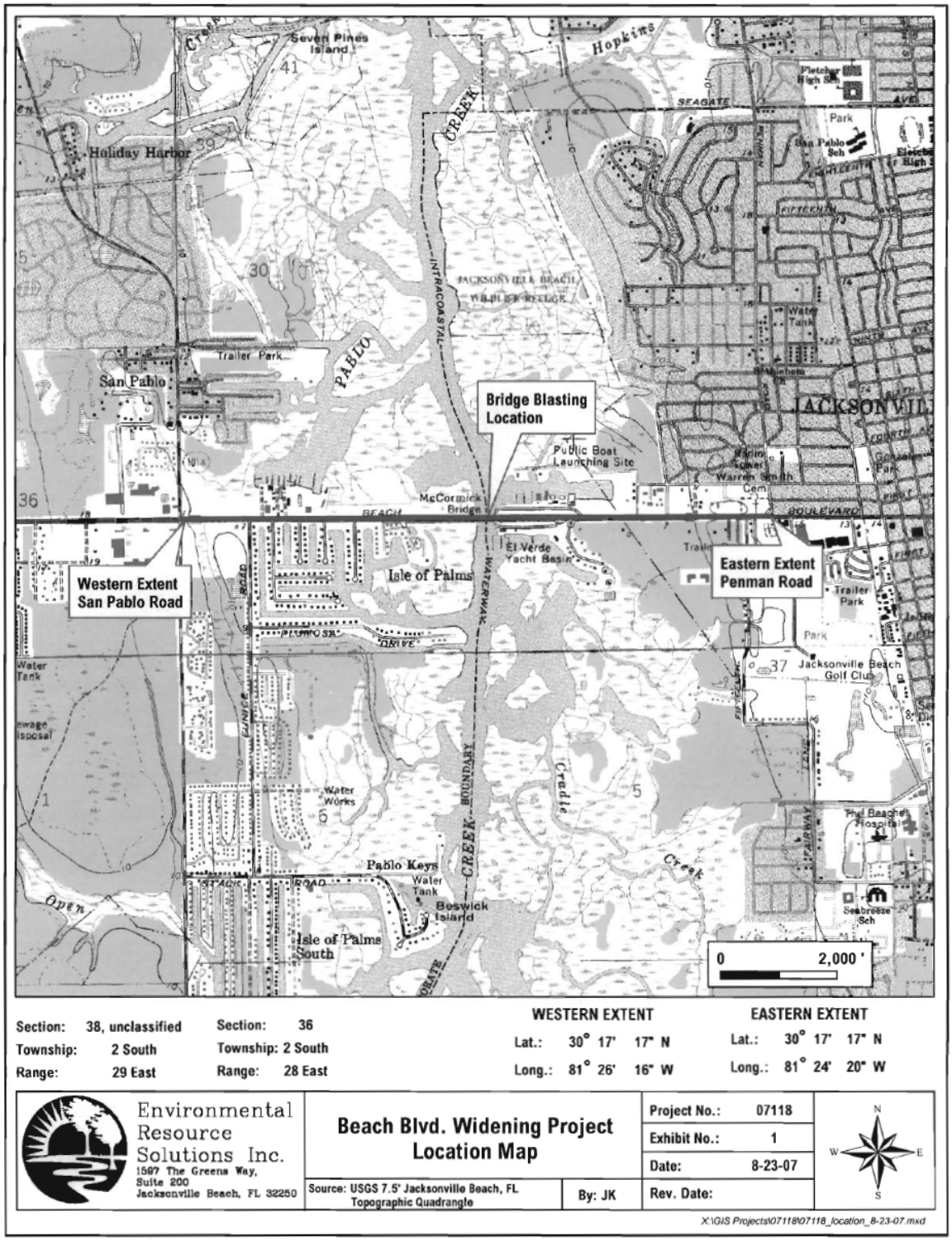
NMFS proposes to issue an IHA under the MMPA to JTA that would authorize the incidental take of marine mammals associated with blasting during construction of the Beach Blvd Bridge in Duvall County, Florida.

1.6 PROJECT DESCRIPTION

Background

The JTA currently is in the process of replacing the Beach Boulevard Bridge across the AICWW. The project area is depicted in Location Map, Exhibit 1 of JTA's application (see below). The new bridge will consist of separate eastbound and westbound spans. The new westbound bridge, which as been constructed and is in use, occurs where no bridge structure previously existed. The location of the future eastbound bridge, which has not yet been started, coincides almost exactly with the bridge that is being replaced, necessitating the full removal of the latter. The existing bridge's support piers are undersized, relative to the future span's requirements, and must be removed to make room for construction equipment and the new bridge, particularly its support piles. JTA proposes to demolish the piers with controlled explosives.

Exhibit 1 of JTA's application.



Section:	38, unclassified	Section:	36
Township:	2 South	Township:	2 South
Range:	29 East	Range:	28 East

	WESTERN EXTENT	EASTERN EXTENT
Lat.:	30° 17' 17" N	30° 17' 17" N
Long.:	81° 26' 16" W	81° 24' 20" W

Environmental Resource Solutions Inc.
1587 The Greens Way, Suite 200
Jacksonville Beach, FL 32250

Beach Blvd. Widening Project Location Map

Source: USGS 7.5' Jacksonville Beach, FL Topographic Quadrangle

By: JK

Project No.:	07118
Exhibit No.:	1
Date:	8-23-07
Rev. Date:	

N W E S

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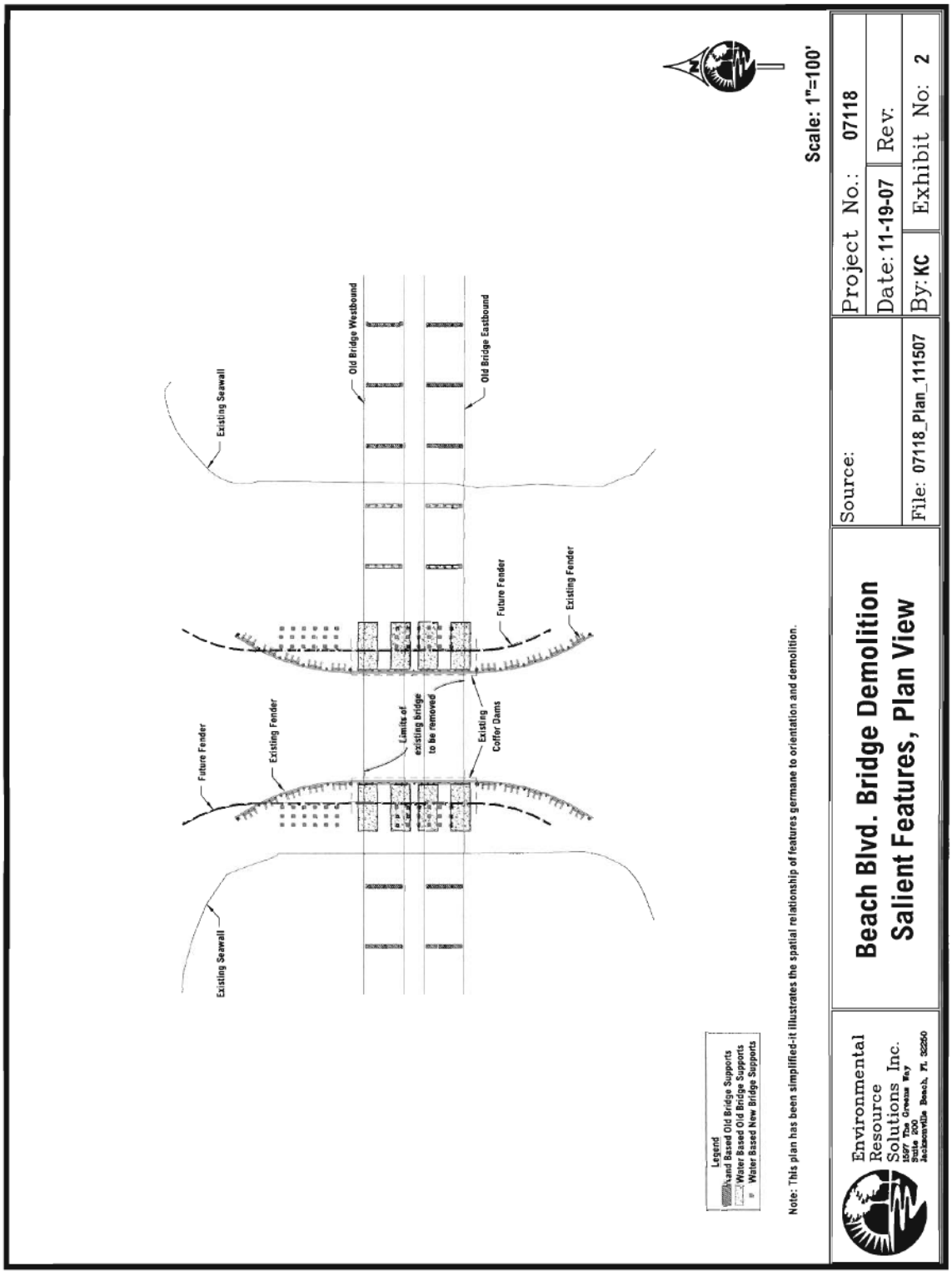
Baseline Conditions

The over water portion of the western side of the old bridge is supported by four piers of bent piles. The eastern, over water portion is supported by four similar piers and four bascule pier piles. Concrete coffer dams support the footers and both sides of the navigable channel. The below-water plan view of these twelve supports is indicated on

Salient Features, Plan View, and Exhibit 2 of JTA's application (see below). The supports on both sides are protected from erosional scour by much rip rap and numerous gabions. A navigation channel is between the two sets of bent pile piers. A protective fender system is in place. Over the years, much rock, gravel, and rip rap has been placed in the open water under the bridge.

Exhibit 2 of JTA's application.



Blasting Details

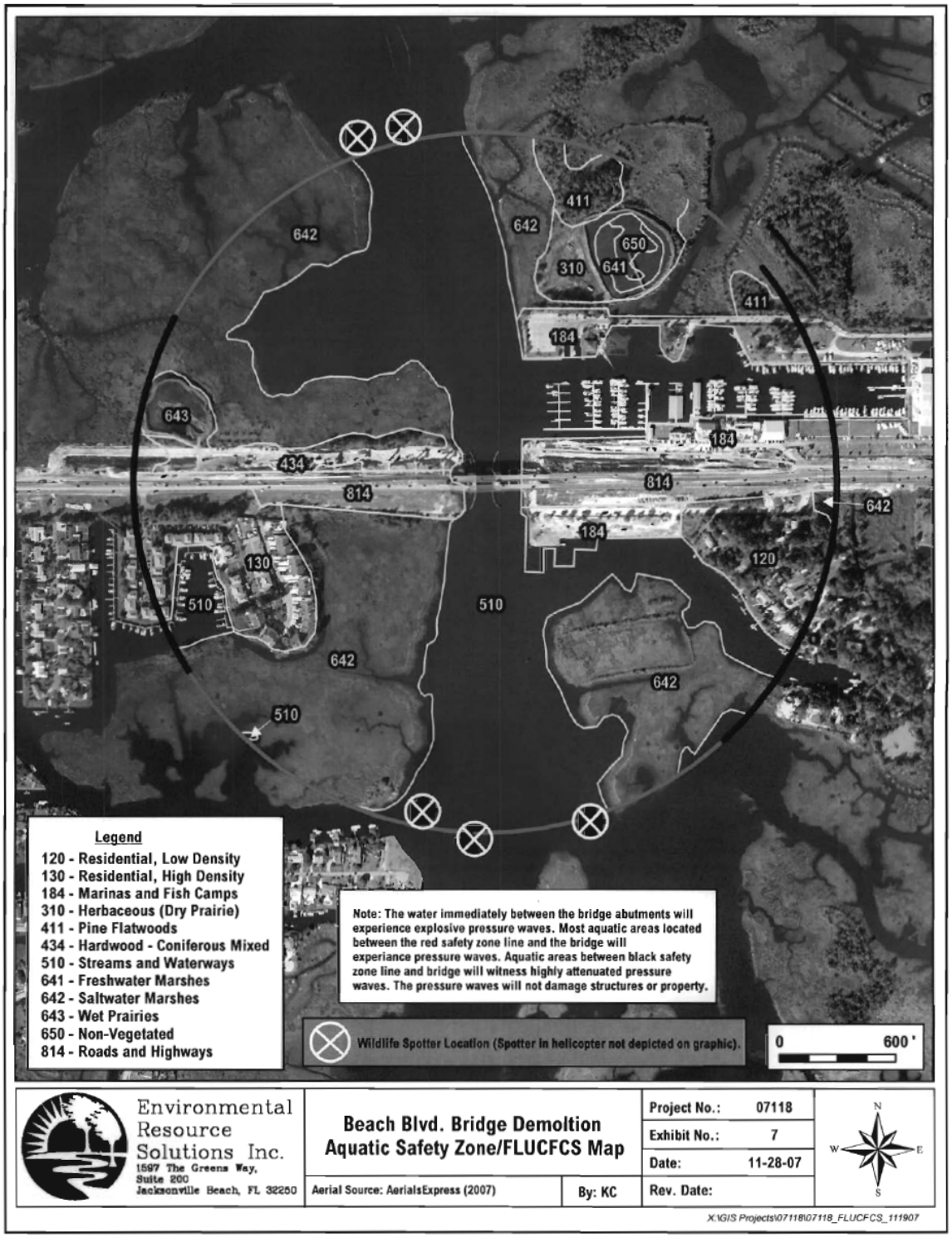
As preface to preparing the 12 structures (the number of supports below the mean low water elevation) for the explosive demolition of the bridge and consistent with the current permits, each structure will be chipped to approximately 5 ft (1.5 m) National Geodetic

Vertical Datum (NGVD) using a hoe ram and construction methods. Once the supports have been lowered to 5 ft (NGVD), the below water and remaining above water portions will be removed by explosives.

Three separate blast events would take place during the project. The locations and sequence of the blasts are indicated on Exhibit 5 of JTA's application. In preparation for each blasting event, floating turbidity curtains will be deployed within 40 ft (12.2 m) of the structures to be blasted. The curtains will minimally be 6 ft (1.8 m) long. Curtains longer than 6 ft would be torn and carried away by the currents at the bridge and ultimately become waste. Once the curtains are in place, the target concrete will be drilled, explosives will be placed in the drill holes, and the drill holes will be stemmed. Mats to contain debris will be draped over the above water portion of the supports. Only after all the measures described in the marine Wildlife Safety Plan and Manatee, Marine Mammal, Sea Turtle Survey Watch Plan have been implemented (see below for Exhibit 7 in JTA's application for the location of wildlife spotters), will the blast events occur. The duration of each event will be approximately two seconds. The first blast is tentatively scheduled for the first week in December 2008 and will focus on demolishing the four western supports and underlying coffer dam. The second event will occur about 10 days later and destroy the supports and coffer dam on the immediate eastern side of the channel. The final blast event will take place on or about December 31, 2008 and will eliminate the four supports situated east of the channel and west of the eastern bridge abutment. The existing fenders will be removed immediately prior to the final blasting event.

The radius of dangerous effect or "harm" for underwater explosives is based on the Navy Diver formula derived for human divers. Importantly, the formula is based on an uncontrolled blast suspended in the water column; the formula yields an artificially high radius in instances of controlled or contained blasts, like the kind proposed at the Beach Boulevard Bridge. The Navy Diver formula used for the Safety Zone is:
$R = [520(W)^{1/3}] + 500$ where R = Safety Zone radius and W = weight of explosives in pounds (lbs) per delay. With 16.5 lbs of dynamite the maximum explosives per delay, the Safety Zone is 1,824 ft (556.4 m). The max/delay of dynamite (16.5 lbs) is equivalent to 13.2 lbs of TNT. This radius is depicted in Exhibit 7 of JTA's application.

Exhibit 7 of JTA's application.



Demolition Debris

Approximately 3,604 cubic yards (cy) of blast debris is anticipated (8 bascule piers, 2,900 cy; 2 coffer dams, 440 cy; and the eastern four piers, 264 cy). All of the debris would also have been generated by chipping demolition. Most of the debris will remain close to its source. Some will fall along side slopes and the bottom of the AICWW channel. The

average size of the blast debris will be 6 to 9 inches. A small percentage of the debris will be finer particles, including dust. Some may become displaced by as much as 0.5 cy. The use of mats on the above water portions of the supports will prevent fragments from traveling though the air. Due to the resistance, portions of the supports will prevent fragments from traveling through the air. Due to the resistance of the water itself, none of the underwater demolition debris will be propelled beyond a 40 ft (12.2 m) radius, see Exhibit 8 of JTA's application. Unfortunately, the high water flow velocities under the bridge preclude most turbidity control measures. This problem will be largely offset by the fact that most of the debris will quickly settle due to its mass. The very fine material will not have major impacts since the AICWW continuously transports a considerable load of suspended fine materials in the water column.

A modicum of rebar is embedded in the piers. This will likely remain in place through the blasting. Some rebar may topple into the water. All accessible rebar will be removed by heavy equipment (see the Debris Removal section below). A very small percentage of the rebar may remain in the AICWW.

The non-explosive deconstruction of the bridge (above water) will yield mostly large disassembled pieces and large jack-hammered pieces. These will be removed by trucks using the remaining bridge. The existing grates, which directly overlie the navigation channel, will be easily removed, without impeding navigation. A small amount of the span pieces inevitably will fall into the water beneath the bridge, outside the channel. These will be removed during the removal of the blast rubble (see the Debris Removal section below).

Debris Removal

Quick removal of any blasting debris from the navigation channel is imperative. Any debris which affects the cross-sectional and profile integrity of the channel will be removed via the dual barge method described below, within 6-8 hours of the blasting event.

Exhibit No. 3 in JTA's application (see below) indicates bottom contours as determined in 2006. The contours are generated with side scanning sonar that recorded continuously along the nine east/west traverses spaced 50 ft (15.2 m) apart. A new bottom contour survey will be produced a few weeks prior to any chipping demolition. The survey will result from a side-scanning sonar recording bottom depths continuously along 40 east/west traverses spaces 10 ft (3.1 m) apart. The 2008 survey will also have 5 ft (1.5 m) contours and serve as the reference for all post-demolition debris removal. The survey will be forwarded to ACOE and SJRWMD prior to any chipping demolition. Following demolitions, debris will be removed from the bottom so that only an incidental quantity remains post-development. After debris removal, a final survey of the bottom will be prepared and submitted to ACOE and SJRWMD. The survey will be generated using a side-scanning sonar which records bottom depths continuously along 40 east/west traverses spaced 10 ft apart. The contour level will be 5 ft.

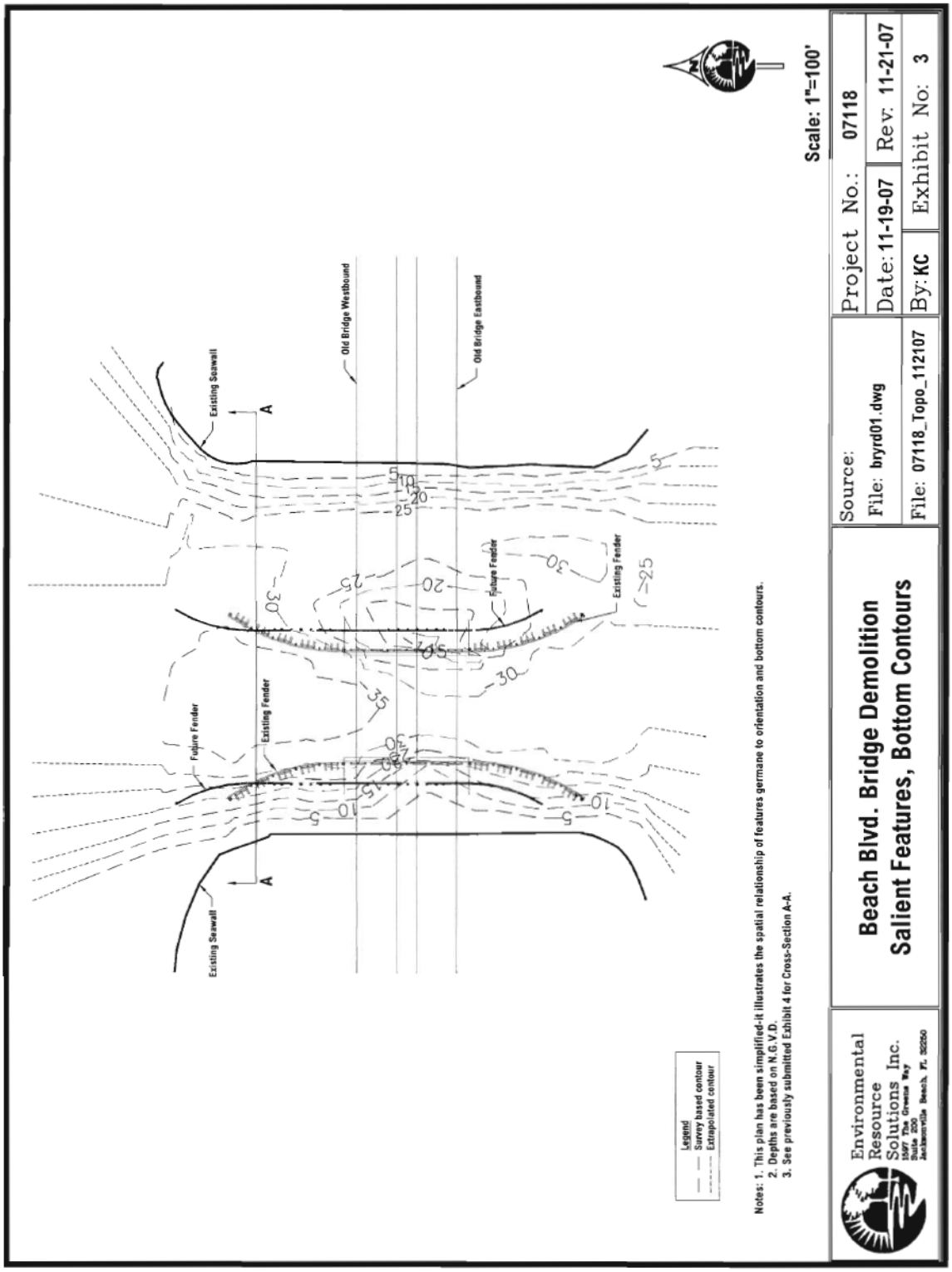
Two barges will be used during debris removal. One will have either a large back hoe or a small crane that will lift debris from the waterway. The second barge will hold the debris. Whether on the east or west side of the navigation channel, the paired barges will be oriented north/south, thereby keeping the navigation channel largely unobstructed. A land based back hoe or crane will empty the barge loads into awaiting dump trucks. Creosote soaked piles will be taken to Trail Ridge Land Fill in western Duval County, Florida. Concrete and rebar will be taken to one of several approved C & D land fills in Duval County, Florida. JTA knows of no other practical means of debris removal/disposal.

The objective of the issuance of an IHA by NMFS is to allow the JTA to take marine mammals by Level B harassment when blasting is determined to be necessary as a construction technique while minimizing adverse impacts. Underwater blasting is commonly used to loosen and remove very hard rock in the removal of structures and Federal navigation projects that require deepening and/or widening. Blasting is anticipated to be required where standard construction methods are unsuccessful and to reduce the amount of time tug/barge operations are being conducted in the AICWW for the removal and construction of the bridges.

JTA proposes to implement mitigation measures and a monitoring program that will establish a safety zone radius to ensure that marine mammals will not be injured during the blasting and that impacts will be at the lowest level practicable. No blasts may occur if animals are sighted within the safety zone. Take of marine mammals will be minimized through the incorporation of the following monitoring and mitigation measures: (1) confining explosives in a borehole with drill patterns restricted to a minimum of 8 ft separation from any other loaded borehole; (2) hours of blasting are restricted to 2 hours after sunrise to 1 hour before sunset to allow for adequate observation of the project area for marine mammals; (3) loaded blast holes will be individually delayed or staggered to reduce the maximum lbs/delay at point detonation, which in turn will reduce the radius for potential injury; (4) capping the explosives with rock in order to reduce the outward potential of the blast, thereby reducing the chance of injuring a marine mammal; (5) matching the energy needed in the “work effort” of the borehole to the rock mass to minimize excess energy vented into the water column; (6) establishing a safety zone (1,824 ft) for confined blasting based on the maximum weight of explosives detonated (16.5 lbs per 25 ms delay) and calculated using the Navy Diver Formula; (7) conducting a marine protected species watch (Marine Wildlife Safety Plan and Manatee, Marine Mammal, Sea Turtle Survey Watch Plan) will be conducted by no less than five NMFS-qualified observers from land, small water craft, and a helicopter, at least 60 minutes before and continue for 30 minutes after each detonation to ensure that there are no marine mammals in the danger zone at the time of detonation; (8) allowing animals to leave the safety zone under their own volition; and (9) conducting blasts during time periods of the year when there is low marine mammal abundance densities. Therefore, based on implementing the monitoring and mitigation measures, NMFS believes that the JTA project will not result in injury or mortality of bottlenose dolphins. JTA will count the marine mammals present and the number disturbed during each

blasting event, as well as make behavioral observations, and submit a report to NMFS upon completion of the project.

Exhibit 3 from JTA's application.



1.7 RELATED ENVIRONMENTAL DOCUMENTS

The following document has been issued previously that provides information on this and other similar activities and are incorporated by reference into this SEA:

- March 2005 – Environmental Assessment on an Authorization for the Incidental Take of Marine Mammals Associated with Confined Underwater Blasting as a Construction Method for Civil Works Projects Along the Coast of Florida by the Jacksonville District of the U.S. Army Corps of Engineers

1.8 DECISIONS TO BE MADE

This SEA will evaluate the identified alternatives of (1) issuance of an IHA, issued by NMFS, for the use of confined blasting as a construction technique within waters of Duval County, Florida and the Jacksonville area; (2) the JTA applies for an IHA for the blasting project within Florida; (3) issuance of an IHA without implemental mitigation and monitoring measures; and (4) the no action alternative. A description of the IHA process is provided in Table 1 of the EA. It should be noted that issuance of an IHA by NMFS does not authorize the use of underwater confined blasting by the JTA as a construction technique for the project within Florida. It only authorizes the incidental take of marine mammals under NMFS jurisdiction if blasting is deemed necessary as a construction technique. The JTA must go through the process of authorizing the Beach Boulevard Bridge Blasting Project.

Table 1 of the EA describes the differences between the two different MMPA incidental take authorizations (IHA/LOA).

1.9 METHODOLOGY

This SEA compiles information from a variety of sources – applications, EAs, and EISs prepared for specific projects, Stock Assessment Reports prepared by NMFS, previous consultations completed under the Endangered Species Act (ESA) by NMFS for incidental take via explosions; as well as technical documents, a Ph.D. student's dissertation, literature searches, and coordination with agencies and experts having expertise in certain areas.

1.10 PERMITS, LICENSES, AND ENTITLEMENTS

In early 2008, the JTA submitted permit modification requests to the U.S. Army Corps of Engineers (ACOE) and the St. Johns River Water Management District for authorization to change the currently-permitted removal of the old bridge to involve the requested use of explosive demolition of twelve support structures. If JTA performs the explosive demolition activity as part of the Beach Boulevard Bridge Blasting project, in accordance with Section 401 of the Clean Water Act of 1977, as amended, a Water Quality Certification will be required from the Florida Department of Environmental Protection for the proposed dredging activity. Additionally, NMFS Southeast Regional Office and JTA will conduct a review its proposed issuance of an IHA under the ESA on the

issuance of the IHA to the JTA. Should additional endangered or threatened species be in the action area, under NMFS jurisdiction, that have not been considered in previous consultations (including newly listed species or newly designated critical habitat), the JTA will be required to consult under Section 7 of the ESA.

2 ALTERNATIVES

2.1 INTRODUCTION

The Alternatives Section describes the no-action and proposed alternatives. The beneficial and adverse environmental effects of the alternatives are presented in comparative form, providing a clear basis for choice to the decision maker and the public. A preferred alternative was selected based on the information and analysis presented in the sections on the Affected Environment and Probable Impacts.

2.2 DESCRIPTION OF ALTERNATIVES

2.2.1 ALTERNATIVE A - NMFS ISSUES AN INCIDENTAL TAKE AUTHORIZATION (IHA) FOR THE JTA PROJECT UNDER MMPA REGULATIONS

The JTA has requested and Incidental Take Authorization (IHA) under the section 101(a)(5)(D) of the MMPA for the Beach Boulevard AICWW Bridge Blasting project mentioned earlier in this SEA. Sections 101(a)(5)(A-D) of the MMPA authorizes the incidental take of marine mammals provided that NMFS finds that the takings would be small numbers relative to the species and/or stock, and have no more than a negligible impact o those marine mammal species affected, and not having an unmitigable adverse impact on subsistence harvests of marine mammal species.

This IHA would authorize the JTA to incidentally take marine mammals by Level B harassment while utilizing confined underwater blasting as a demolition technique for removing bridge support structures during a three month period in 2008-2009. NMFS has been presented with project level details concerning the location of the project, species that may be affected, and other pertinent information (in an application and other supporting project specific documents). It should be noted that issuance of an IHA by NMFS does not authorize the JTA to utilize blasting as a construction technique. It only authorizes the JTA to take marine mammals, in the manner specified in the authorization if blasting is used as a construction technique. Under this alternative, once regulations are in place, NMFS can issue an IHA.

2.2.2 ALTERNATIVE B - ISSUANCE OF AN IHA WITHOUT IMPLEMENTATION OF MITIGATION MEASURES

Under this alternative, the mitigation and monitoring measures described in section 2.7 of this SEA may not be fully implemented and the number of harassments of marine mammals could potentially be greater under this alternative than under alternative A. As

this alternative violates section 101(a)(5), that takings be reduced to the lowest level practicable, further discussion of this alternative is not warranted.

2.2.3 ALTERNATIVE C – STATUS QUO (NO ACTION ALTERNATIVE)

The MMPA prohibits all taking of marine mammals unless exempted or covered by a permit, an IHA or LOA. To prohibit incidental takings that occur while conducting activities otherwise allowed by law would be to deny an exemption that is authorized by the MMPA provided the take is incidental, only small numbers of marine mammals are taken, and the impact on marine mammals and their habitat is negligible. The consequences of not authorizing incidental takes is (1) the conductors of the activity may be in violation of the MMPA if takes do occur, (2) mitigation and monitoring measures cannot be required by NMFS, and (3) mitigation measures may not be performed voluntarily by the applicant. By undertaking measures to further protect marine mammals from incidental take through the incidental take authorization program; the impacts by these activities on the marine environment can potentially be lessened.

Not issuing an authorization does not necessarily mean that construction and demolition projects within the Duval County, Florida area cannot continue, only that the taking of marine mammals is not authorized and any takings that may occur would be reviewed for consistency with the no takings provisions of the MMPA. Because NMFS does not authorize the construction project itself and does not have the engineering expertise to evaluate alternatives to blasting for structure removal, those other alternatives to blasting are beyond the scope of the EA and this SEA. If the JTA, chose not to proceed without an MMPA authorization, this project might be restricted to the use of non-blasting removal techniques. Non-blasting removal may not be as successful or take more time and effort. The evaluation of alternative construction techniques that may or may not increase the cost of the project and/or lengthen the time to complete construction is beyond the scope of this SEA. However, for the purposes of this analysis, NMFS assumes that the demolition activities associated with the no-action includes chipping, which uses a hoe ram (i.e., pneumatic hammer) for removing the bridge supports. Since an IHA for below water use of the hoe ram was not requested, this No Action analysis does not analyze the potential for effect to marine mammals associated with non-explosive underwater demolition that might occur under a No Action alternative. However, the Alternative A construction plan does involve mechanically chipping the bridge supports to an elevation of +5 ft (1.5 m) and then explosively demolishing the supports below the +5 ft elevation. An IHA was only requested for the blasting activities. The information contained in those NEPA documents (listed in section 1.7 of the EA) is incorporated by reference as appropriate in this SEA.

2.3 ISSUES AND BASIS FOR CHOICE

- The JTA and NMFS wish to maintain consistency between authorizing this action and previous ACOE actions.
- Efficient use of time for both JTA and NMFS staff.

2.4 PREFERRED ALTERNATIVE

Alternative A is the preferred alternative. Issuance of an IHA for this project allows the action to start within the dates (December 1, 2008 – February 28, 2009) allowed by NMFS, USFWS, and other regulatory agencies and organizations. USFWS has determined that this time period is the "manatee construction window" and is the only dates in which the blasting of bridge support structures in the action area will not adversely affect the manatee.

2.5 ALTERNATIVE ELIMINATED FROM DETAILED EVALUATION

Alternative B of the SEA (Alternative C of the EA) has been removed from detailed evaluation because section 101(a)(5)(D) of the MMPA requires an authorization to prescribe, where applicable, the permissible methods of taking and other means of effecting the least practicable impact on species or stocks and its habitat. This alternative is not acceptable to the JTA or NMFS because the mitigation and monitoring measures discussed in this SEA are available and therefore, adoption of this alternative would not be in compliance with the MMPA.

2.6 COMPARISON OF ALTERNATIVES

See section 4.0 Environmental Effects of the EA and this SEA for a more detailed discussion of impacts of alternatives.

2.7 CONFINED BLASTING

In confined blasting, which is being considered under the preferred alternative, the borehole (the hole in which the explosive material is placed) is capped with an inert material (Figure 2. Diagram of Stemming the Hole, in the EA). This is referred to as "stemming the hole." Stemming is the use of a selected material, usually angular gravel or crushed stone, to fill a drill hole above the explosive. Stemming is commonly used by the blasting industry to contain the explosive force and increase the amount of work done on the surrounding strata (Konya and Davis, 1978; Moxon *et al*., 1993). This technique decreases the amount of gas energy that is lost out of the drill hole and thus reduces the impact to the aquatic environment. Brinkmann (1990) has shown that approximately 50% of the explosive energy is lost if unrestricted venting is allowed to occur through the blasthole collar. Susansky (1977) found, in a series of tests in the Danube River, the absolute values of pressures were decreased by an order of magnitude by using soil for stemming. Additionally, studies conducted by Nedwell and Thandavamoorthy (1992), show that blasts that were stemmed had a greater than 90% decrease in the strength of the pressure wave released, than unconfined blasts of the same charge weight.

2.7.1 USE OF CONFINED BLASTING

For the project, the contractor selected by the JTA during the bid process would determine the construction methodology. However, certain assumptions can be made regarding various techniques that may be needed to complete construction.

Industry standards and ACOE, Safety & Health Regulations, may also call for the blasting program to consist of the following monitoring and mitigation measures:

- The lowest poundage of explosives that can adequately break the material.
- Up to three blasts per day, preparing for removal of approximately 1,500 cubic yards (cy) per blast.
- Drill patterns a minimum of 8 feet separation from a loaded hole.
- Hours of blasting from 2 hours after sunrise to 1 hour before sunset.
- Selection of explosive products and their practical application addressing vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes would be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn would reduce the mortality radius.
- Matching the energy in the "work effort" of the borehole to the structure mass or target for minimizing excess energy into the water column or hydraulic shock.

2.7.2 SAFETY ZONE

Under the preferred alternative, the JTA would establish a safety zone radius (Safety Zone) around the blasting site that will be monitored by trained NMFS-qualified observers to detect the presence of marine mammals and other protected species. A Safety Zone will be established to prevent mortality, and limit or eliminate the potential for injury or "harm." To the extent practicable, safety zones may also be established to reduce Level B harassment takings to ensure that takings are at the lowest level practicable. There are a number of methods that can be used to calculate a marine mammal Safety Zone radius. For ethical and practical reasons, little published data exists for actual measurements of sub-aqueous blasts confined to a rock layer and their impacts to marine mammals. There is some information on the impacts to fish and similar blasts. Both literature searches and actual observations from similar blasting events have been used in the EA and this SEA as a guide in establishing a safety radius that affords the best protection from harm to marine wildlife. Previous blasting projects involving NMFS-issued authorizations utilized safety radii to ensure protected species were protected during operations. As part of the preferred alternative under this SEA for the Beach Boulevard Bridge project will use confined blasting as a construction technique, the JTA will utilize standard safety protocols (see section 2.7.2 of the EA and this SEA) to be monitored by trained observers.

For the JTA project analyzed in this SEA, NMFS and JTA modified the terminology used previously and has adopted the following equation:

Safety Zone radius = $520(W)^{1/3} + 500$

Watch Zone radius = $3(260(W)^{1/3})$

The safety zone is the approximate distance beyond which injury (Level A harassment) is unlikely from an open-water explosion. These zones will be used for implementing mitigation and monitoring measures. To provide additional protection for endangered, threatened, and protected species (manatees, dolphins, sea turtles, sawfish, sturgeon, etc.), the JTA will monitor a large area around the project site. This will ensure protection of marine mammals. The USFWS has reviewed this radius for the Beach Boulevard AICWW Bridge project and have given the JTA a concurrence for the project under the ESA.

Under the preferred alternative, the JTA would incorporate this safety zone equation along with the following conditions for monitoring into the project specifications.

1) In the area covered by this SEA under the preferred alternative, where explosives are required to remove bridge support structures, for each explosive charge, detonation will not occur if a marine mammal is sighted (or known to be based on previous sightings) by a dedicated observer within the Safety Zone, a circular area around the detonation site with the radius $R = 520(W)^{1/3} + 500$ where R = radius of the Safety Zone in ft ; W = weight of the explosive charge (TNT) in lbs.

The Safety Zone radius for this proposed action is 1,824 ft (556 m).

2) A marine mammal watch will be conducted by no less than 5 NMFS-qualified observers from land, small watercraft, and aircraft, at least 60 minutes before and 30 minutes after the time of each detonation, in a large circular area around the blast area (Watch Zone). Any marine mammal(s) in the Safety or Watch Zone will not be forced to move out of those zones by human intervention. Detonation shall not occur until the animal(s) move(s) out of the Safety Zone on its own volitions and is not likely to return. In the event a marine mammal is injured or killed during blasting, the Contractors shall immediately notify the Contracting Officer as well as the following agencies:

Florida Marine Patrol “Marine Mammal Stranding Hotline” at 1-800-342-5367
National Marine Fisheries Service Southeast Regional Office at 727-570-531
USFWS Vero Beach Office at 772-562-3909

2.7.3 MITIGATION, MONITORING, AND OBSERVERS PROPOSED AS PART OF THE ACTION

Under Alternatives A and B, the JTA would will implement a set of mitigation measures to reduce the likelihood of marine mammal take. Many of these measures have been implemented in past ACOE and Federal navigation projects that utilized blasting as a construction technique and all of them are proposed to be utilized in any future blasting projects, where they can be feasibly employed. (Mitigation, Monitoring, and Reporting is further discussed in Section 5 of this SEA)

As part of the blasting project, the JTA will utilize observers trained in monitoring marine mammals. To adequately ensure the safety and protection of dolphins, manatees, and other protected species during blasting activities, a Marine Wildlife Safety Plan and

Manatee, Marine Mammal, Sea Turtle Survey Watch Plan (Watch Plan) was developed. The Watch Plan implemented will minimize the possibility of incidental take to pressure waves fro the blast to the fullest extent practicable. Agencies involved in designing this plan include USFWS, SJRWMD, Florida Fish and Wildlife Conservation Commission (FWC), and the ACOE.

A nearly identical Watch Plan was used during the demolition of the Fuller Warren Bridge, which spans approximately 3,600 ft (1,098 m) over open water in downtown Jacksonville, Florida. The Beach Boulevard Bridge spans approximately 300 ft (91.5 m) over open water. Applying the same specifications for a project that is more than an order of magnitude smaller in scale represents an effort to provide more than adequate protection for large wildlife including bottlenose dolphins.

The observer monitoring program will take place in a large circular area around the blasting site (also referred to as the Watch Zone). Any marine mammal(s) in the Safety, or Watch Zone will not be forced to move out of those zones by human intervention. Detonation shall not occur until the animal(s) move(s) out of the Safety Zone on its own volition.

Monitoring and mitigation will consist primarily of surveying and taking action to avoid detonating charges when protected species are within the Safety Zone radius. The marine wildlife safety observer team will consist of five members. The team will have a chief observer, who will be the aerial observer in a helicopter and coordinate the monitoring and mitigation measures as needed, and four other stationary ground and/or waterborne observers. Observers will be equipped with two-way radios, binoculars, a sighting log, map, signal flags, and polarized sunglasses.

Proposed monitoring requirements in relation to JTA's blasting activities will include observations made by the applicant and their associates. Information recorded will include species counts, numbers of observed disturbances, and descriptions of the disturbance behaviors before, during and after blasting activities. Observations of unusual behaviors, numbers, or distributions of marine mammals and sea turtles in the activity area to NMFS and USFWS so that any potential follow-up observations can be conducted by the appropriate personnel. In addition, observations of tag-bearing marine mammal, sea turtles, and fish carcasses as well as any rare or unusual species of marine mammals and fish will be reported to NMFS and USFWS.

If at any time injury or death of any marine mammal occurs that may be a result of the proposed blasting activities, the JTA will suspend activities and contact NMFS immediately to determine how best to proceed to ensure that another injury or death does not occur and to ensure that the applicant remains in compliance with the MMPA.

In order to provide dependable verification of presence of marine mammals within the blast zone, a detection system was designed which included several provisions. Several mitigation measures to reduce the potential for harassment from explosive demolition activities would be (or are proposed to be implemented) implemented as part of the

blasting construction activities. The potential risk of injury or mortality would be avoided with the following proposed mitigation and monitoring measures. Monitoring of the test area will continue throughout the activity until the last detonation is complete.

The activity would be postponed if:

(1) Any marine mammal is visually detected with the Safety Zone (1,824 ft). The delay would continue until the animal(s) that caused the postponement is confirmed to be outside the Safety Zone (visually observed swimming out of the range and not likely to return).

(2) Any marine mammal is detected in the Safety Zone and subsequently is not seen again. The activity would not continue until the last verified location is outside the Safety Zone and the animal is moving away from the activity area, or the animal has not been seen for at least 30 minutes within the Safety Zone.

(3) Large schools of fish are observed in the water within the Safety Zone. The delay would continue until large schools are confirmed to be outside the Safety Zone.

In the event of a postponement, pre-activity monitoring would continue as long as weather and daylight hours allow. If a charge failed to explode, mitigation measures would continue while operations personnel attempted to recognize and solve the problem, i.e., detonate the charge.

A formal Plan Coordination Meeting will be held no later than three days before the first detonation event to review the items listed above, to discuss the responsibilities of all parties, and to review and approve the schedule of events. Attendees will include the contractor's representative, the entire Marine Wildlife Safety Observer team, the blasting consultant, the USFWS, FWC, the USCG, and other interested environmental parties such as NMFS and Florida Marine Patrol. The agenda will be coordinated by Superior Construction with the blasting contractor, USFWS, and FDEP. It will include the latest information about the possible presence of marine mammals during the operation, the logistics of the detonation schedule, the communications plan, and the responsibilities of all parties involved. A summary report will be submitted to all interested parties.

Post-activity monitoring is designed to determine the effectiveness of pre-activity monitoring and mitigation by reporting any sightings of dead or injured marine mammals. Post-detonation monitoring, concentrating on the area down current of the test site, would commence immediately following each detonation and continue for at least one hour after the last detonation. The monitoring team would document and report to the appropriate organization the marine mammals killed or injured during the activity and, if practicable, recover and examine any dead animals. The species, number, location, and behavior of any animals observed by the team would be documented and reported to the project leader.

West Indian manatees, which are federally listed as Endangered under the ESA and managed by the USFWS, are not expected in the St. John's River and AICWW (Pablo Creek) during the time periods when the activities would be conducted. However, if

manatees are sighted during the activities, the JTA would follow similar mitigation and monitoring procedures in place for bottlenose dolphins to avoid impacts, suspending activities in any areas manatees are occupying.

It is the JTA's intention to continue these recommended mitigation and monitoring measures for all marine mammals under the activity specific to the IHA.

2.7.4 AERIAL SURVEYS

Aerial surveys have been conducted prior to the beginning of other confined blasting projects and are planned for the preferred alternative. Aerial surveys for monitoring purposes have been necessary under certain past IHA's (issued to the ACOE) depending upon the ability of boat-based observers to see the entire Safety Zone. The JTA intends to utilize an aerial survey component using a helicopter as a monitoring measure for its proposed blasting project.

3 AFFECTED ENVIRONMENT

The Affected Environment section succinctly describes the existing environmental resources of the area that will be affected if any of the alternatives are implemented. This section describes only those environmental resources that are relevant to the decision to be made under the MMPA. It does not describe the entire existing environment (which have been described in the supporting NEPA documents listed in Chapter 1 of the EA), but only those environmental resources that would affect or that would be affected by the alternatives if they were implemented. This section, in conjunction with the description of the "no action" alternative, forms the baseline conditions for determining the environmental impacts of the proposed action and reasonable alternatives.

3.1 GENERAL ENVIRONMENTAL SETTING

The proposed authorization study area includes an approximate circular area with a radius of approximately 1.2 km (0.75 miles) of the St. John's River in Duval County, Florida. The existing land cover and land use within the project area include the two bridge abutments, the open water of the AICWW, salt marsh, a marina to the northeast, and a navigable water body to the southeast. The salt marsh, largely occurring north and south of the western bridge abutment, is dominated by grasses (*Spartina alterniflora* and *Juncus roemaerianus*). Invertebrates (mollusks, polychaetes, crustaceans, and insects) and terrestrial vertebrates (mammals and wading birds) are common marsh associates. Fish frequent the marsh at high and mid-tides. The remainder of the submerged area is mud and sand. Polychaetes, crustaceans, and mollusks likely occur in area where tidal flow velocity is not high. Fish occur over the bottoms. There is no submerged aquatic vegetation in the area.

3.2 MARINE MAMMALS AFFECTED BY THE ACTIVITY

The species of marine mammals that are likely to be present in the affected area at the time of the blasting operations is dependant on where the location of the explosive demolition is taking place. There are at least 29 species of marine mammals under NMFS jurisdiction that may be found along the Southeast Atlantic area (NMFS, 2002; Wynne & Schwartz, 1999). Species listed as Endangered under the ESA includes the humpback, sei, fin, blue, North Atlantic right, and sperm whale. The marine mammals that occur in the proposed blasting area belong to three taxonomic groups: mysticetes (baleen whales), odontocetes (toothed whales), and sirenians (the manatee). Table 2 of the EA and the table below lists the species, which coast they may be found along, their habitat, and their status under the MMPA and the ESA. General information on these species can be found in NMFS' Stock Assessment Reports (NMFS, 2007). Information in these documents is hereby incorporated by reference into this SEA. These reports are available at the following location:
http://www.nmfs.noaa.gov/pr/sars/species.htm

The two species of marine mammals likely to be found in the St. Johns River and AICWW in Duval County, Florida are the Atlantic bottlenose dolphin and West Indian (Florida) manatee. The Florida manatee is under the jurisdiction and managed by the U.S. Fish and Wildlife Service (USFWS). The manatee would not be covered by the IHA issued by NMFS, however it is important to note that the blasting is being conducted during a time period in which manatee presence is low in the action area. Manatee occurrences are extremely rare during winter months (December, January, and February) in typical years because of the colder water temperatures in the waterway and lack of warm water refuge sites nearby for thermoregulation. To minimize potential involvement with manatees from underwater explosions, the optimal timeframe to utilize explosives is during winter months of the year. The USFWS considers the timeframe the "manatee construction window" for utilizing explosives.

Table 1. The habitat and conservation status of marine mammals inhabiting the proposed study area in the Southeast U.S. Atlantic Ocean.

Species	Habitat	ESA[1]	Coast[2]
Mysticetes North Atlantic right whale (*Eubalaena glacialis*)	Coastal and shelf	EN	A
Humpback whale (*Megaptera novaeangliae*)	Pelagic and banks	EN	A
Bryde's whale (*Balaenoptera edeni*)	Pelagic and coastal	NL	A, G
Minke whale (*Balaenoptera acutorostrata*)	Shelf, coastal, and pelagic	NL	A
Blue whale (*Balaenoptera musculus*)	Pelagic and coastal	EN	A

Sei whale (*Balaenoptera borealis*)	Primarily offshore, pelagic	EN	A, G
Fin whale (*Balaenoptera physalus*)	Slope, mostly pelagic	EN	A
Odontocetes Sperm whale (*Physeter macrocephalus*)	Pelagic, deep seas	EN	A, G
Cuvier's beaked whale (*Ziphius cavirostris*)	Pelagic	NL	A, G
Gervais' beaked whale (*Mesoplodon europaeus*)	Pelagic	NL	A, G
True's beaked whale (*Mesoplodon mirus*)	Pelagic	NL	A
Blainville's beaked whale (*Mesoplodon densirostris*)	Pelagic	NL	A, G
Dwarf sperm whale (*Kogia sima*)	Offshore, pelagic	NL	A, G
Pygmy sperm whale (*Kogia breviceps*)	Offshore, pelagic	NL	A, G
Killer whale (*Orcinus orca*)	Widely distributed	NL	A, G
Short-finned pilot whale (*Globicephala macrorhynchus*)	Inshore and offshore	NL	A, G
False killer whale (*Pseudorca crassidens*)	Pelagic	NL	A, G
Mellon-headed whale (*Peponocephala electra*)	Pelagic	NL	A, G
Pygmy killer whale (*Feresa attenuata*)	Pelagic	NL	A, G
Risso's dolphin (*Grampus griseus*)	Pelagic, shelf	NL	A, G
Bottlenose dolphin (*Tursiops truncatus*)	Offshore, inshore, coastal, estuaries	NL	A, G
Rough toothed dolphin (*Steno bredanensis*)	Pelagic	NL	A, G
Fraser's dolphin (*Lagenodelphis hosei*)	Pelagic	NL	A, G
Striped dolphin (*Stenella coeruleoalba*)	Pelagic	NL	A, G
Pantropical spotted dolphin (*Stenella attenuata*)	Pelagic	NL	A, G

Atlantic spotted dolphin (*Stenella frontalis*)	Coastal to pelagic	NL	A, G
Spinner dolphin (*Stenella longirostris*)	Mostly pelagic	NL	A, G
Clymene dolphin (*Stenella clymene*)	Pelagic	NL	A, G
Sirenians West Indian (Florida) manatee (*Trichechus manatus latirostris*)	Coastal, rivers and estuaries	EN	A, G

[1] U.S. Endangered Species Act: EN = Endangered, T = Threatened, NL = Not listed

[2]Occurrence along the coast of Florida: A = Atlantic coast of Florida, G = Gulf of Mexico coast of Florida

3.2.1 BOTTLENOSE DOLPHINS

3.2.1.1 Jacksonville, Florida

Atlantic bottlenose dolphins are distributed worldwide in tropical and temperate waters, and in U.S. water occur in multiple complex stocks along the U.S. Atlantic coast. According to the 2005 NOAA stock assessment report, bottlenose dolphins inhabiting less than 66 ft (20 m) deep are divided into 36 separate inshore or coastal stocks while animals in water 66-656 ft (20-200 m) deep constitute three continental shelf stocks.

These complex stock segments of coastal bottlenose dolphins are based on a combination of geographical, ecological, and genetic research. Because the data of dolphin stock structure are complex, coastal, and continental shelf stocks may overlap, the exact structure of these stocks continues to be revised as research is completed. However, analytical results of the overall genetic variation indicate a minimum of five stocks of coastal bottlenose dolphins along the U.S. Atlantic coast.

The preferred alternative would occur inshore at a depth of less than 66 ft (20 m) and, therefore, has the potential to affect the coastal stocks. From genetic analysis, the bottlenose dolphin population around the action area in Duval County, Florida consists of part of the Western North Atlantic Coastal stock. This stock may also include demographically distinct coastal and resident estuarine populations that are defined by seasonal migratory and transient movements throughout large home ranges. The movement along the southern portion of the Atlantic coast is poorly understood and is currently under study. The resident estuarine stocks are likely demographically distinct from coastal stocks and are currently included in the coastal management unit definitions. The estimated population for the U.S. Western North Atlantic Coastal stock of Atlantic bottlenose dolphins, which are based on aerial surveys and counts conducted in winter 1995 and summer 2002, is approximately 17,466 animals; but these estimates do not include all estuarine waters and the abundance may be negatively biased (NMFS, 2007).

Based upon available data and analysis, NMFS defines 7 geographic management units within the range of the coastal morphotype of the Western North Atlantic bottlenose

dolphin have been defined, yet the population structure is probably more complex and will continue to be refined as research efforts continue (NMFS, 2007). The best abundance estimate of the Northern Florida management unit is 448 individuals (NMFS, 2007). That Atlantic bottlenose dolphin is not listed as threatened or endangered under the ESA, and the U.S. coastal migratory stock is considered depleted and the management units are considered strategic under the MMPA.

The bottlenose dolphin stocks within the Western North Atlantic population are complex, and resident estuarine stocks likely exist, but they are currently included in coastal management unit definitions. Abundance estimates do not exist for estuarine waters. Further each management unit definition likely encompasses seasonal residents and migratory or transient animals. Genetic analyses, photo-identification, radio transmitters, and stable isotope radios of oxygen were used to identify the stocks.

The AICWW Beach Boulevard Bridge project site is in the Northern Florida management unit for Atlantic bottlenose dolphin coastal morphotypes. Atlantic bottlenose dolphins are known to occur in the project area at or within a few hundred feet of the project several times a week. Dolphins, when present near the project site, usually occur in groups of two or three. Bottlenose dolphin occurrence in the Jacksonville area is year-round, however significant seasonal variation exists.

Based on photo-identification and behavioral data, Caldwell (2001) identified three behaviorally differentiated bottlenose dolphin communities in the Jacksonville, Florida area. These three distinct communities have been called Northern, Southern, and Coastal. The Northern community has year-round residency and random social affiliations, with a mean group size of 5 individuals. The Southern community has seasonal residency and non-random social affiliations, with a mean group size of 22 individuals. The Coastal community has no residency and ransom social affiliations, with a mean group size of 17 individuals. The social structure on a small geographic scale of these three distinct populations varies based on significant genetic differentiation and behavior. Although the three Jacksonville area communities use contiguous habitats, the Northern and Southern communities are primarily inshore, and the Coastal community generally uses the coastal waters of the Jacksonville area from the beach to 1.9 miles (3 km) offshore (Caldwell, 2001). The Southern and Coastal communities have partially overlapping ranges, while the Northern and Southern community's ranges may generally be separated by the St. John's River. Also, the Southern and Coastal communities are behaviorally and genetically differentiated from the Northern community (Caldwell, 2001).

In Florida and other states along the U.S. East Coast, bottlenose dolphin abundance and density is often correlated with water temperature and season. Significantly fewer dolphins were observed during the winter season when water temperature fall below 16 degrees Celsius (Caldwell, 2001).

3.3 ENDANGERED AND THREATENED SPECIES

NMFS has determined that the described proposed blasting activities and the accompanying IHA may have the potential to adversely affect species under NMFS jurisdiction and protected by the ESA. The endangered and threatened species under NMFS jurisdiction that are considered in the effects of the action include the shortnose sturgeon, smalltooth sawfish, and green, loggerhead, leatherback, Kemp's ridley, and hawksbill sea turtles. The ACOE, on behalf of JTA, requested a section 7 consultation pursuant to the ESA with NMFS. The threatened and endangered species that occur in the proposed project area are described in the Endangered Species Assessment (Florida Department of Transportation, 1999) and Supplemental Endangered Species Biological Assessment (2007), which are provided in JTA's application. In addition to describing the species that may be present in the study area, the sections below summarize the findings of the effects analysis from the Supplemental Biological Assessment (2007), which was submitted to the NMFS Southeast Regional Office for consultation under Section 7 of the ESA.

3.3.1 LISTED FISH UNDER NMFS JURISDICTION

The shortnose sturgeon (*Acipenser brevirostrum*) has been observed in northeastern inland Florida waters twice since 2000; which indicates that the St. Johns River apparently is now the extreme southern limit of its range. The recorded presence of this species closest to the project site was in the St. Johns River in 1981. However, it has never been recorded in the AICWW near the project site. Interestingly, none of the Therefore, based on this current range and distribution, the proposed project is not expected to adversely affect the shortnose sturgeon.

The smalltooth sawfish (*Pristis pectinata*) historically was found in tropical and sub-tropical areas including Africa, the Caribbean, the Gulf of Mexico, and from Virginia to Brazil. However, recent Florida records include only the southern portion of the peninsula indicating a contraction of their distribution. Their distribution is centered in Everglades National Park, including Florida Bay. Although sawfish have been sighted in northeast Florida, it is a rare occurrence and it is unlikely that an individual would be found in inshore waters of Duval County in the winter time. It is known to ascent bays and estuaries and occasionally enter freshwater rivers. The smalltooth sawfish prefers shallow sandy or muddy bottoms, and is nocturnal. Based on the current range and distribution of this species, the proposed project is not expected to adversely affect the smalltooth sawfish.

3.3.2 LISTED SPECIES UNDER USFWS JURISDICTION

The eastern indigo snake (*Drymarchon corais couperi*) may occur or travel through habitats adjacent to the project area. The presence of this species is very unlikely in the project area. As standard, procedure, the construction contract will include special provisions for the eastern indigo snake. The proposed project is not expected to adversely affect the eastern indigo snake.

The piping plover (*Charadrius melodus*) may use coastal Duval County for wintering habitat. This species normally utilizes outer beaches and tidal sand and mud flats. The area in proximity to the project is not habitat for piping plovers. The project will not reduce any potential piping plover habitat and should have no effect on the species.

Two passerine species, Kirtland's warbler (*Dendroica kirlandii*) and Bachman's warbler (*Vermivora bachmanii*), have historically been recorded in Florida very sparsely during winter migration. The occurrence of these species in the study area is highly unlikely, and the resulting the project is not expected to adversely affect these warblers.

The wood stork (*Mycteria americana*) could feed in the wetlands near the AICWW. No wood stork rookeries are located near the project area. No significant loss of foraging habitat or impact to the nesting area will occur. The project is not expected to adversely affect this species.

The red-cockaded woodpecker (*Picoides borealis*) does not have any suitable habitat within 0.5 miles (0.8 km) of the project area. The project is not expected to adversely affect this species.

The gray bat (*Myotis grisescens*) in Florida is found primarily near colonies in the panhandle, which includes the project area. The most significant colonies are located in Jackson County. However, typically, these bats are found primarily in northeastern Florida, which is not in proximity to the project area. The project is not expected to adversely affect these bats.

The eastern indigo snake, piping plover, Kirtland's and Bachman's warbler, wood stork, red-cockaded woodpecker, and gray bat are under the jurisdiction of the USFWS. There are no ESA-listed plants that occur in the project corridor.

3.3.1 SEA TURTLES

Five species of sea turtles are known to nest in the general Jacksonville, Florida area. Species that may be present in the St. Johns River environment (water column) during winter are the green, loggerhead, and leatherback turtles are the most commonly observed species, while the Kemp's ridley and hawksbill are less commonly observed. Information about these species is found within the recovery plan for each specific species published jointly by NOAA-Fisheries and the USFWS. These plans can be accessed on the Internet at: http://www.nmfs.noaa.gov/pr/recovery/plans.htm#turtles. Additional information can also be located within the original EA and EISs. The information in these documents is hereby incorporated into this SEA by reference.

The main effects of the action evaluated in this SEA are potential effects to sea turtles in the marine environment due to pressure wave impacts from the underwater detonation event expected for the demolition of the bridge support structures. Studies have shown that underwater explosions can injure and kill sea turtles. For sea turtles, the risk of injury can be reduced by only blasting when observations indicate that there are no sea

turtles within the impact area of the explosion, and by planning explosive demolition operations when sea turtle abundance is low in the project area (e.g., using seasonal abundance or life history characteristics). Aerial and platform-based surveys are typically used to monitor for sea turtle presence prior to explosives use, and to determine that all animals have left the impact area (NMFS believes that under normal circumstances, animals should not be harassed into leaving an impact area, and animals should be allowed to leave an area under their own volition). Observers can be used to monitor for sea turtles, before detonations, to minimize the potential for effects from underwater explosions. Based on the proposed avoidance measures in the Safety Plan and Watch Plan, NMFS has determined that the risk of injury or mortality to sea turtles from blasting activities is discountable.

The green sea turtle (*Chelonia mydas*) is largely vegetarian, weighing an average of 350 pounds. It is found in tropical and sub-tropical habitats. Approximately 100 to 1,000 green sea turtles nest on Florida's beaches annually. It feeds in lagoons. An increasing number of green sea turtles south of 29° N latitude have fibropupillomatosis. The green sea turtle is not expected to experience adverse impacts from the project.

The loggerhead sea turtle (*Caretta caretta*) is Florida's most common sea turtle, weighing an average of 275 pounds as adults. They mature sexually at about 35 years of age and nest from Virginia to Texas. Their diet is mollusks and crabs. The project is not expected to adversely affect the loggerhead sea turtle.

The leatherback sea turtle (*Dermochelys coriacea*) is the largest, most free ranging and cold tolerant sea turtle. Its chief food is jellyfish. Between 30-60 females construct nests in Florida annually. The project is not expected to adversely impact the leatherback sea turtle.

Kemp's ridley sea turtle (*Lepidochelys kempii*) is the smallest and rarest of the world's sea turtles. Its nest sites are few with Rancho Nuevo, Mexico being the main nest site. Its diet consists largely of crabs. The project is not expected to adversely affect Kemp's ridely sea turtle.

The hawksbill sea turtle (*Eretmochelys imbricate*) is a sub-tropical and tropical species which nests Florida from Melbourne to the Keys. Its diet is mainly sponges and it attains an average weight of 150 pounds (68.2 kg). No adverse impacts to the hawksbill sea turtle are expected.

3.3.2 MANATEES

The West Indian manatee in Florida and U.S. waters is managed under the jurisdiction of the USFWS and is listed as Endangered under the ESA. They primarily inhabit coastal and inshore waters. The Atlantic population of this species frequents the AICWW (Pablo Creek) project vicinity, particularly as a migration route in the spring and fall, but may be found anytime of the year. The immediate area near the project site is considered foraging habitat and animals may potentially loaf for long periods of time in the marine

basin adjacent to the site, which increases the likelihood of manatee presence during the explosive demolition of the structures.

3.4 OTHER FISH AND WILDLIFE RESOURCES

3.4.1 PREY SPECIES

The waters of the Southeast Atlantic Ocean are dynamic and highly productive. They support numerous commercial fisheries for finfish and shellfish. Generally, odontocetes prey on various types of fish and shrimp as well as cephalopod, such as squid and octopus. Most mysticete whales primarily feed on zooplankton and fishes. Information concerning the fishes found in the southeast Atlantic ocean can be found in the Essential Fish Habitat Assessment prepared by the ACOE for the Miami Harbor GRR located within Appendix F of the EA, as well as in Section 3.2.2.d of the Final EA prepared for the Navigation Study of Tampa Harbor – Alafia River completed in August 2001. The information in these documents is hereby incorporated into this SEA by reference.

Cephalopods and lanternfish are important prey species commonly found in the stomach of cetaceans (Fitch and Brownell, 1968; Perrin *et al*., 1973; Clarke, 1996; Croxall and Prince, 1996 in NSF-DOS, 2003). Cetacean species with documented evidence of myctophid fish remains in their stomachs include dwarf sperm whales, spinner dolphins, pantropical spotted dolphins, striped dolphins, striped dolphins, and clymene dolphins. The most important food items for the sperm whale are squid, followed by fish. Important squid families include the onychoteuthids, the cranchiids and the ommastrephids (NSF-DOS, 2003).

4 ENVIRONMENTAL EFFECTS

This section is the scientific and analytic basis for the comparisons of the alternatives. The following includes anticipated changes to the existing environment including direct, indirect, and cumulative effects. The alternatives will be evaluated as the issuance of an authorization with monitoring as in Section 2.7.3 and 5 (the preferred alternative) and the no action alternative.

4.1 GENERAL ENVIRONMENTAL EFFECTS

4.1.1 ISSUANCE OF AN AUTHORIZATION BY NMFS

General Effects (Injury or Death)

The effects of an underwater explosion on marine mammals are dependent upon many factors, including the size, type, and depth of both the animal and the explosive, the depth of the water column, and the distance perception, and the physical discomfort to both non-lethal and lethal injuries. Annoyance of and discomfort to marine mammals could occur under the preferred alternative as a result of non-injurious physiological responses to both the acoustic signature and the shock wave from the underwater explosion. Non-lethal injury may occur under the preferred alternative and includes slight injury to

internal organs and the auditory system; however, delayed lethality can be a result of complications from individual or trauma to internal organs as a direct result of proximity to the point of detonation. However, given that the preferred alternative (authorization of the IHA) includes sufficient mitigation and monitoring to prevent direct proximity of marine mammals (and other protected species) to the point of detonation (i.e., monitoring and ceasing activities if marine mammals are sighted), then there are no significant impacts anticipated on marine mammals. Also, it is very unlikely that injury would occur from any exposure to the chemical by-products released into surface waters (Young, 1984; Naval Surface Warfare Center, 1992).

Possible Effects of Activities on Marine Mammal Habitat

The vast majority of the debris from the demolition will be gravel size and larger, as well as a small amount of sand-sized pieces (indicated in the Demolition Debris section and Exhibit 7 of the Blasting Plan in JTA's application). The blast debris will not disperse across an area wider than 80 ft (24.4 m).

No components of the bridge will be purposefully placed in the AICWW; only those demolition fragments which are impractical to keep out of the water will end up on the bottom. The bascule grates and all of the rebar in those portions of the supports that will be chipped will undergo controlled removal. Most of the rebar in those portions of the supports that will be demolished by explosives will remain intact and in place, and therefore will be easily cut and removed with heavy machinery. Only a small portion of the support structure rebar will end up in the AICWW.

Most of the horizontal portions of the bridges (i.e., spans) will be deconstructed through the use of cranes, large chippers, and trucks. Very little of this portion of the bridge will fall into the water. The vertical supports will be shipped to an elevation of 5 ft (1.5 m), with nearly all of the concrete fragments falling into the open water away from the channel, and the steel rebar cut and hauled away for disposal or recycling. Rubble generated by the explosive demolition of the remaining above water stubs and all of the submerged portions of the supports will be removed in accordance with the Debris Removal section of the Blasting Plan.

The profile and cross-section of the channel will be re-established within 6-8 hours of each of the three blasting events, as referenced in the Debris Removal section of the Blasting Plan (see JTA's application). Debris in the project area, but outside of the channel, will be removed within 30 days of the final blasting event.

It is anticipated that the blasting events will not physically impact the marine mammal habitat in the AICWW except for the blast debris which falls to the bottom. The anticipated biological impact of the explosive demolition is that benthic and water column dwelling vertebrate and invertebrate species near the blasts will likely be killed by pressure waves. However, this impact is strictly localized to the area in direct proximity to the blasting site and will not have significant impacts on marine mammal habitat overall. Restoration of the physical habitat adjacent to the AICWW channel will begin within an hour or two of the two related blast events and will entail debris removal.

Restoration of the physical habitat at the bridge will be completed within 30 days of the final blasting and will involve re-establishing the pre-blast contours through the use of a clamshell dredge and/or large back hoe.

The activity will have a small and inconsequential impact to the physical habitat at/near the bridge. The blasting events will have an ephemeral impact on the biological component of the near bridge habitat. Temporary disturbance of the project area during the proposed blasting activities is not expected to reduce post-construction use of the area by resident and transient species. Because the disturbance is temporary in nature, the project is not expected to result in loss of bottlenose dolphin habitat. Habitat modifications, if any, are anticipated to be inconsequential and are not expected to have any effect on the dolphin species and/or stock.

The only two practical means of removing the existing footers is by chipping or explosives, with chipping the no-action alternative, in this case. Chipping while protracted, is in fact possible. However, risks to wildlife, slight risks to boat navigation and brief channel closures are all positively correlated to the demolition duration. Therefore, for these reasons explosive demolition, while not risk-free, is superior to chipping.

The location and nature of the blasting combine to indicate that impacts to the AICWW will be limited. The footprint of the bridge in the blasting area comprises a channel that experiences high scour, and shallower bottoms that are covered with rip rap, gravel, and rocks. It is highly manipulated and artificial setting. The blasting will consist of three brief shock waves and result in more rubble falling on top of the existing rubble.

Five additional factors which may contribute to the potential for impacts to marine mammal habitat also exist. First the area is tidally influenced with the normal tidal range over 4 ft (1.2 m). The constant ebb and flow limits turbidity control measures. Second, the AICWW is comparatively narrow at the bridge crossing, leading to strong currents. Third, the currents are bi-directional, eliminating any minimization measures that might be implementable at a uni-directional flow location. Fourth, interstitial gaps in the rip rap and general rubble all but prevent turbidity containment, particularly when combined with the three aforementioned complications. Finally, maintenance of navigation in the channel severely limits any possible remediation and containment of blast rubble coming from the eight footers next to the channel.

Despite these challenges, the JTA anticipates no loss or modification to the habitat used by Atlantic bottlenose dolphins in the AICWW. The primary source of marine mammal habitat impact resulting from the explosive demolition is noise, which is intermittent (maximum 3 times per year) and of limited duration. Certain levels of noise from the planned activities can affect habitat by causing marine mammals to temporarily avoid certain areas that they would normally use for reproduction, foraging, as well as their food resources. The effects of debris (which will be recovered following the proposed blasting activities), are analyzed here in the SEA and in JTA's application, and concluded that marine mammal habitat would not be affected.

NMFS anticipates that the action will result in no impacts to marine mammal habitat beyond rendering the areas immediately around the bridge support structures less desirable shortly after the blasting event. Debris removal will mitigate any potential further damage to marine mammal habitat. In addition, only three blasting events over a two to three week period are anticipated during the validity of the IHA.

Blasting impacts to the AICWW estuarine water column and bottoms will consist of three rapidly moving pressure waves. Except for a very small area (approximately 40 ft or 12.2 m) immediately around the blasts, the substrate will not be affected. The estuarine water column will be affected for a distance less than 1,824 ft (556.4 m) from the blasts (according to the commonly used blasting safety formula). The impacts will be localized and instantaneous. Therefore, the short-term, localized impacts to marine mammal habitat, as well as invertebrate and fish species, are temporary and not expected to be detrimental.

Potential Effects of Activities on Marine Mammals

In general, potential impacts to marine mammals from explosive detonations could include both lethal and non-lethal injury (Level A harassment), as well as Level B Harassment. Non-lethal injurious impacts (Level A harassment) are defined in this proposed IHA as TM rupture and the onset of slight lung injury. The threshold for Level A harassment corresponds to a 50-percent rate of TM rupture, which can be stated in terms of an energy flux density (EFD) value of 205 dB re 1 μPa^2 s. TM rupture is well-correlated with permanent hearing impairment (Ketten, 1998) indicates a 30-percent incidence of permanent threshold shift (PTS) at the same threshold). The farthest distance from the source at which an animal is exposed to the EFD level for the Level A harassment threshold is 295 ft (89.9 m).

Level B (non-injurious) harassment includes temporary (auditory) threshold shift (TTS), a slight, recoverable loss of hearing sensitivity. One criterion used for TTS is 182 dB re 1 μPa^2 s maximum EFD level in any 1/3- octave band above 100 Hz for toothed whales (e.g., dolphins). A second criterion, 23 psi, has recently been established by NMFS to provide a more conservative range of TTS when the explosive or animals approaches the sea surface, in which case explosive energy is reduced, but the peak pressure is not. The distance for 23 psi is 1,180 ft (359.8 m) (NMFS will apply the more conservative of these two distances).

In the absence of mitigation, marine mammals may be killed or injured as a result of an explosive detonation due to the response of air cavities in the body, such as the lungs and bubbles in the intestines. Effects are likely to be most severe in near surface waters where the reflected shock wave creates a region of negative pressure called “cavitation.” A second potential possible cause of mortality is the onset of extensive lung hemorrhage. Extensive lung hemorrhage is considered debilitating and potentially fatal. Suffocation caused by lung hemorrhage is likely to be the major cause of marine mammal death from underwater shock waves. The estimated range for the onset of extensive lung

hemorrhage to marine mammals varies depending upon the animal's weight, with the smallest mammals having the greatest potential hazard range.

NMFS' criteria for determining non-lethal injury (Level A harassment) from explosives are the peak pressure that will result in: (1) the onset of slight lung hemorrhage, or (2) a 50-percent probability level for a rupture of the tympanic membrane (TM). These are injuries from which animals would be expected to recover on their own.

NMFS has established dual criteria for what constitutes Level B harassment: (1) An energy based temporary threshold shift (TTS) received sound levels 182 dB re 1 μPa^2-s cumulative energy flux in any 1/3 octave band above 100 Hz for odontocetes (derived from experiments with bottlenose dolphins (Ridgway *et al*., 1997; Schlundt *et al*., 2000); and (2) 12 psi peak pressure cited by Ketten (1995) as associated with a safe outer limit for minimal, recoverable auditory trauma (i.e., TTS). The Level B harassment zone, therefore, is the distance from the mortality, serious injury, injury (Level A harassment) zone to the radius where neither of these criterions is exceeded.

The primary potential impact to the Atlantic bottlenose dolphins occurring in the St. Johns River and AICWW from the proposed detonations is Level B harassment incidental to noise generated by explosives. In the absence of any mitigation or monitoring measures, there is a very small chance that a marine mammal could be injured or killed when exposed to the energy generated from an explosive force on the sea floor, due to the close proximity the animal would need to be to the explosives and the low abundance of animals located in the proposed action area during December-February. However, NMFS believes the proposed monitoring and mitigation measures will preclude this possibility in the case of this particular activity.

Level B harassment includes behavioral modifications resulting from repeated noise exposures (below TTS) to the same animals (usually resident) over a relatively short period of times. Threshold criteria for this particular type of harassment are currently still being considered. One recommendation is a level of 6 dB below TTS (see 69 FR 21816, April 22, 2004), which would be 176 dB re 1 μPa^2 s. Due, however, to the infrequency of detonations, the short overall time period of the project, and the continuous movement of marine mammals in the AICWW, NMFS believes that behavioral modification from repeated exposures to the same animals is highly unlikely.

The Safety Zone radius of the blast is determined by using the Navy Diver Formula for an uncontrolled blast suspended in the water column. In the current instance, the formula is conservative since the charges to be used for Beach Boulevard Bridge footers will be confined within the footers, effectively reducing both the pressure and impulse of a water shock wave. In addition, boreholes will be stemmed at the in collars to further contain the pressures. The Safety Zone radius formula in feet is expressed by the following: $R = 520 (W)^{1/3} + 500$ (R = exclusion zone radius, W = weight of explosive in pounds per delay)

For the designed maximum explosives per delay of 16.5 pounds, the resulting Safety Zone is 1,824 ft. The max/delay of explosives is 16.5 lbs dynamite, which is

equivalent to 13.2 lbs TNT. A maximum psi of 23 is used to determine the TTS distance and a maximum psi of 100 is used to determine the PTS distance. Cole's equation for determining max pressures created by free-field underwater explosions used is expressed by the following: $P = 21{,}600\ (W^{1/3} / R)^{1.13}$ (P = pressure, W = TNT weight/delay, R= radius in feet)

TTS Distance:

$R = (13.2^{1/3}) / (23/21{,}600)^{0.885} = 1{,}180$ ft

PTS Distance:

$R = (13.2^{1/3}) / (100/21{,}600)^{0.885} = 295$ ft

NMFS considers the Safety Zone radius calculated using the Navy Diver Formula conservative for marine mammals when compared to the calculated distances for TTS and PTS. The calculated Safety Zone will be used for both Atlantic bottlenose dolphin and the Florida manatee. Blasting is anticipated to be completed with three shots occurring over a two to three week period. The time frame for the blasting is subject to change dependent upon weather, tides, etc.

4.1.2 NO ACTION ALTERNATIVE (STATUS QUO)

Not issuing IHAs to the JTA to take marine mammals incidental to using blasting techniques in navigation projects will have no direct or indirect effect on marine mammals, sea turtles or other marine life if the JTA does not undertake blasting.

4.2 DIRECT EFFECTS (MORTALITY AND INJURY) ON MARINE MAMMALS

4.2.1 ISSUANCE OF AN AUTHORIZATION BY NMFS

Possible direct effects on marine mammals in the project area include mortality and injury from blasting operations. Additionally, studies conducted by Nedwell and Thandavamoorthy (1992), show that confined blasts have 90 percent less pressure wave than do unconfined explosives of the same weight. By confining, the charges and utilizing a safety radius based on an unconfined blast, the JTA and NMFS do not expect any injury or mortality associated with blasting activities on marine mammals that may be near the project area. Based on a parametric evaluation of the effects of charge weight and depth using the Goertner (1982) model, Young (1991) concluded that a conservative safe range for non-injury to a small mammal (such as a dolphin calf) was approximated by $R = 578\ (W)^{0.28}$ (R is in feet and W is in pounds of explosives) for an unconfined blast.

4.2.2 NO ACTION ALTERNATIVE (STATUS QUO)

Not issuing an IHA to the JTA to take marine mammals incidental to using blasting techniques for the blasting project will have no direct or indirect effect on marine mammals, sea turtles, or other marine life if the JTA does not undertake blasting.

4.3 DIRECT EFFECTS (BEHAVIORAL HARASSMENT) ON MARINE MAMAMALS

4.3.1 ISSUANCE OF AN AUTHORIZATION BY NMFS

The JTA and NMFS believe that marine mammals that may be in the vicinity of the project area may be harassed acoustically as a result of the explosive detonations if the observers were to miss spotting these animals during the pre-blast monitoring period (approximately 60 minutes). This Level B harassment would be in the form of a temporary threshold shift (TTS), which means a change in the threshold of hearing which could temporarily affect an animal's ability to hear calls, echolocation, and other ambient sounds (NMFS, 2000). However, because of the conservative safety zone, TTS would be unlikely even if a marine mammal is missed by observers. Also, because the detonations are almost instantaneous, nothing more than startle behavioral response would occur. Momentary startle is not considered by NMFS to result in Level B harassment.

Acoustic Effects

Utilizing data from rock-contained blasts such as those at Atlantic Dry Dock and Wilmington, North Carolina, the ACOE and JTA has been able to estimate potential effects on protected species. These data can be correlated to the biological opinion issued on October 10, 2000, by NMFS for the incidental taking of listed marine mammals for the explosive shock testing of the Navy's *USS Winston Churchill* (DDG-81)(66 FR 22450) concerning blasting impacts to marine mammals. The data references in the Federal Register indicate that impacts from explosives can produce lethal and non-lethal injury as well as incidental harassment. The pressure wave from the blast is the most causative factor in injuries because it affects the air cavities in the lungs and intestines. The extent of lethal effects are inversely proportional to the animal's mass (i.e., the smaller the animal, the more lethal the effects); therefore, all data are based on the lowest possible affected mammal weight (infant dolphin). Non-lethal injuries include tympanic membrane (TM) rupture; however, given that dolphin and manatee behavior rely heavily on sound, the non-lethal nature of such an injury is questionable in the long term. For that reason, it is important non-lethal and no non-lethal injuries occur is reported to be 5 psi-m sec for the proposed activities in the action area. For the preferred alternative, using the criteria discussed (as explained previously in sections 4.1.1 and 4.2.1), the JTA and NMFS have proposed to establish a safety zone that will prevent non-serious injury to marine mammals and sea turtles.

For degradation of the pressure wave, George Young (1991) noted the following limitations of the cube root method:

> Doubling the weight of an explosive charge does not double the effects. Phenomena at a distance, such as the direct shock wave, scale according to the cube root of the charge weight. For example, if the peak pressure in the underwater sock wave from a 1-pound explosion is 1,000 lbs per square inch at a distance of 15 ft, it is necessary to increase the charge weight to approximately 8

lbs in order to double the peak pressure at the same distance. (the cube root of eight is two).

Effects on marine life are usually caused by the shock wave. At close-in distances, cube root scaling is generally valid. For example, the range at which lobster have 90 percent survivability is 86 feet from a 100-lb charge and double that range (172 ft) from an 800-lb charge.

As the wave travels through the water, it reflects repeatedly from the surface and seabed and loses energy becoming a relatively weak pressure pulse. At distances of a few miles, it resembles a brief acoustic signal. Therefore, shock wave effects at a distance may not follow simple cube root scaling but may decline at a faster rate. For example, the survival of swim bladder fish does not obey cube root scaling because it depends on the interaction of both the direct and reflected shock waves. In some cases, cube root scaling may be used to provide an upper limit in the absence of data for a specific effect."

More recent studies by Finneran *et al*. (2000, 2002), shows that temporary and permanent auditory threshold shifts (TTS and PTS), in marine mammals, were used to evaluate explosion impacts. Due to the fact that marine mammals rely heavily on sound for many important behaviors, such impacts should be taken into account when assessing harmful impacts. While many of these impacts are not lethal and this study has shown that the impacts tend not to be cumulative, significant impacts on behavior due to hearing impairment could constitute a "take" under the MMPA.

Acoustically, Level B harassment is measured in terms of TTS, a slight, recoverable loss of hearing sensitivity. TTS can manifest itself as meaningful changes in the behavior of the affected animal, such as a reduced ability to detect predators or prey. NMFS uses dual criteria for Level B harassment to address the separate effects of energy and pressure waves that result from an explosion. Based on data presented by the Navy mentioned above NMFS uses 182 dB re $1\mu Pa^2$ s maximum Energy Flux Density (EFD) level in an 1/3 octave band above 100 Hz for toothed whales (e.g., dolphins) as the energy exposure threshold for Level B harassment. Based on new and more applicable information presented in Finneran *et al.*'s (2002) publication, the pressure exposure threshold for Level B harassment (TTS) is 23 psi for explosives smaller than 1,000 lbs, which is a distance of 1,180 ft (360 m) for the proposed blasting project. The threshold for Level A harassment (PTS) is 100 psi, which is a distance of 295 ft (90 m) for the proposed blasting project

NMFS and JTA have analyzed these impacts and will implement monitoring and mitigation measures and will establish impact thresholds during the proposed blasting activities to prevent marine mammals from possible exposure to the intense sounds created by explosives. NMFS believes that the implementation of the impact distances and mitigation measures as well as the infrequency of blasting events will make behavioral modification, injury, serious injury, or mortality from exposure to acoustic

sources on marine mammal species highly unlikely and the effects on the environment from this take will not be significant.

4.3.2 NO ACTION ALTERNATIVE (STATUS QUO)

Not issuing an IHA to the JTA to take marine mammals incidental to using blasting techniques for the demolition of support structures will have no direct or indirect effect on marine mammals, sea turtles, or other marine life if the JTA does not undertake blasting. If the JTA proceeded with explosive demolition during the blasting project with an IHA, then the effects would be similar to the proposed action alternative (provided the mitigation and monitoring measures required by the IHA are implemented).

4.4 THREATENED AND ENDANGERED SPECIES

As summarized in Chapter 3, ESA-listed species are not expected to be adversely affected by the proposed activities, provided the described protected species avoidance measures for the use of explosives are implemented. A Letter of Concurrence regarding the effects analysis was issued by the NMFS Southeast Regional Office on October 9, 2008. More detail is provided below.

4.4.1 ISSUANCE OF AN AUTHORIZATION BY NMFS

Under section 7 of the ESA, the ACOE, on behalf of the JTA, completed an informal consultation with NMFS Southeast Region on October 9, 2008 and with the USFWS on April 11, 2008 for the Beach Boulevard Bridge project. Both agencies concurred with the JTA that activities associated with the JTA's blasting project in Duval County were not likely to adversely affect listed species if the proposed monitoring and mitigation measures described in their application were implemented.

However, issuance of an IHA to the JTA constitutes an agency action that is subject to consideration under section 7 of the ESA. Although the IHA does not authorize takes of listed species, it is related to activities that would result in effects to listed marine species. As the effects of the activities on listed marine species were analyzed during informal consultation under section 7 of the ESA between the JTA, USFWS, and NMFS, and as the action has not changed from that considered in the consultations, the discussion of effects that are contained in the Letter of Concurrence issued by NMFS to the JTA on October 9, 2008 and by the USFWS' informal consultation pertain also to this action. In conclusion, NMFS has determined that issuance of an IHA does not lead to any effects to ESA-listed species apart from those that were considered in the consultation on the JTA's action.

4.4.2 NO ACTION ALTERNATIVE (STATUS QUO)

If NMFS does not issue an authorization under the MMPA for the taking of marine mammals incidental to the JTA's blasting project, NMFS' action would have no affect on listed species assuming the proposed action would not go forward as planned. If the JTA

proceeded with the project without MMPA authorization, affects on listed species would presumably be as previously described providing the JTA fully implemented the mitigation and monitoring measures herein described.

4.5 FISH AND WILDLIFE RESOURCES AND ESSENTIAL FISH HABITAT (EFH)

4.5.1 ISSUANCE OF AN AUTHORIZATION BY NMFS

If NMFS issues an authorization under the MMPA for the taking of marine mammals incidental to the JTA blasting project, NMFS' action would have the same impact on fish and wildlife resources and EFH as the JTA assessed in its Biological Assessment documents and application (identified in section 1.7) for a MMPA authorization.

In 2000, the Florida Department of Transportation (FDOT) prepared an EFH analysis, copy attached, for the proposed replacement of the Beach Boulevard Bridge at the AICWW. The analysis describes temporary impacts to hard bottom and structure, and the elimination of approximately 4 acres of wetlands as related to EFH for 5 species.

The AICWW is designated EFH for Brown Shrimp (*Penaeus aztecus*), White Shrimp (*Penaeus setiferus*), Pink Shrimp (*Penaeus duorarum*), Red Drum (*Sciaenops ocellatus*), and Gray Snapper (*Lutjanus griseus*). Life histories of these species are provided in the 2000 EFH analysis.

Blasting impacts to the AICWW estuarine column and bottoms will consist of three rapidly moving pressure waves. Except for a very small area (approximately 40 ft) immediately around the blasts, the substrate will not be affected. The estuarine water column will be affected for a distance less than 1,824 ft from the blasts (according to the commonly used blasting safety formula). The blast debris will be gravel size and larger (with a small amount of sand-sized and smaller pieces), and is not expected to disperse across an area wider than 80 ft (24.4 m). The remaining debris will be removed from the action area in the weeks following the blasts. The impacts from the pressure waves and debris associated with the blasts will be localized and instantaneous. Impacts to the Penaeid shrimp species and 2 fish species are not expected to be detrimental.

4.5.2 NO ACTION ALTERNATIVE (STATUS QUO)

If NMFS does not issue an authorization under the MMPA for the taking of marine mammals incidental to the JTA blasting project, NMFS' action would have no affect on fish and wildlife resources and essential fish habitat. If the JTA proceeded with the project without the MMPA authorization, effects on fish and wildlife resources and essential fish habitat as the JTA assessed in its Biological Assessment documents and application (identified in section 1.7) for a MMPA authorization.

4.6 CUMULATIVE IMPACTS

Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

The marine mammals, sea turtles, and their prey that occur in the proposed action area are regularly exposed to natural and anthropogenic sounds. The cumulative effects and impacts of these activities cannot be predicted with absolute certainty, however as evaluated in the original EA and this SEA, the cumulative acoustic effects are predicted using the best available information. Potential impacts may be chronic as well as sporadic effects like behavioral changes that can stress the animals and ultimately lead to increased vulnerability to parasites and disease (MMS, 2000). The net effect of disturbance is dependent on the size and percentage of the population affected, the ecological importance of the disturbed area to the animals, the parameters that influence an animal's sensitivity to disturbance or the accommodation time in response to prolonged disturbance (Geraci and St. Aubin, 1980).

Several projects have been identified by NMFS that might result in cumulative impacts to affected marine mammal species. These include activities for which IHAs/LOAs have been, or are being sought and fisheries activities that are subject to the MMPA. Such actions are commercial fishing, recreational fishing and boating, naval exercises off the east coast of Florida, present and future oil and gas seismic activities, and Air Force test and training activities using explosives. Additional activities may also be conducted for which an authorization under the MMPA is not being sought. These include recreational and commercial shipping, and port and harbor construction activities that are not under the JTA's jurisdiction. Confined blasting as a construction technique has been used in recent history by the ACOE in the Jacksonville District: (1) the San Juan Harbor Deepening Project completed in 2000; and (2) the Port Everglades deepening completed in the early 1980's. Other Federal navigation projects that have been completed include the Miami Harbor GRR; Tampa Harbor – Alafia River; Tampa Harbor – Port Sutton Channel; Port Everglades Feasability Study; Manatee Harbor GRR; and Jacksonville Harbor Feasibility Study.

The following proposed actions (described below) have requested or begun consultation with NMFS for a MMPA authorization:

<u>Atlantic Fleet Active Sonar Training (AFAST) and Jacksonville Range Complex</u>
The Navy conducts mid- and high-frequency active sonar training activities along the U.S. Atlantic coast and in the Gulf of Mexico as described in the Draft EIS for "Atlantic Fleet Active Sonar Training" (AFAST) released February 15, 2008 (73 FR 8856, 8869). Components of this active sonar training occur within the vicinity of the proposed action area in the Atlantic Ocean. In addition, the Navy is seeking to designate areas where mid- and high-frequency active sonar and the improved extended echo range (IEER) system training, maintenance, and research, development, test, and evaluation (RDT&E) activities will occur within and adjacent to existing operating areas, and to conduct these activities. The proposed AFAST activities may cause various impacts, include Level A

and Level B harassments, to marine mammals species in the study area. NMFS has received an application from the Navy for the AFAST exercises and issued a proposed rule in October 2008, and is in the process of rulemaking.

The Navy additionally is seeking MMPA authorization associated with other military training and testing activities in the Jacksonville Range Complex. Activities in the range complex that are subject to MMPA authorization include various explosive ordnance used during training and testing activities. The Draft EIS for the Jacksonville Range Complex was released in June 2008.

GX Technology (GXT) Marine Geophysical Survey off the U.S. Southeast Coast
GXT has requested a MMPA authorization incidental to the conduct of a two-dimensional marine seismic survey off the U.S. southeast coast during the summer-fall 2009. The proposed survey would occur from ~39° N off New Jersey to ~28.5° N off Cape Canaveral, Florida, and from 23-68 km from the coast to 280-750 km from the coast and consist of a total of ~13,250 km of survey lines including turns. The seismic survey proposes to use a 36 airgun array with a total volume of ~7,740 in^3. The purpose of the proposed study is to collect seismic reflection data that reveal the sub-bottom profile as a basis for assessments of petroleum reserves in the area. Ultra-deep 2-D lines such as those to be collected are used to better evaluate the evolution of the petroleum system at the basin level, including identifying source rocks, migration pathways, and play types. NMFS has received an application from GXT requesting an IHA for their proposed seismic survey in 2009.

ACOE Port Everglades Sand Bypass Project
The ACOE's Port Everglades Sand Bypass Project, which is planned for September 2009, proposes to create and modify inlet infrastructure on the north side of the Port Everglades Inlet sufficient to facilitate the economical collection of littoral materials that will be available for future mechanical bypassing to the beaches south of the inlet. The project will include the creation of a sand trap, modification to and improvement of the existing north jetty, removal of a portion of the rubble spoil shoal north of the inlet, construction of a rock rubble barrier at the western extent of the remaining shoal, and construction of a small interior on the western end of the north jetty "notch." Dredging and confined underwater blasting will be utilized as effective and efficient construction methods during the expansion project. NMFS has received an application from the ACOE, which requests and IHA for their proposed underwater blasting activities in the Ft. Lauderdale action area

These authorized and proposed activities are dispersed both geographically and temporally from each other. In particular, many of the actions are offshore and do not affect coastal dolphins. Authorized activities have been found to have no more than a negligible impact on affected species/stocks of marine mammals, provided the proper monitoring and mitigation measures are implemented. The cumulative impacts of the project themselves were discussed in their supporting NEPA documents. Additional projects may come to the forefront in the future and would be included in IHA/LOA authorizations, but at this time no other known activities are planned or known for the

U.S. Florida Atlantic Coast area. The Beach Boulevard authorization would be short-term (3 total explosive events occurring within a maximum 3 month period) in duration and would have only a temporary impact, by Level B harassment, on a small number of one species (Atlantic bottlenose dolphin, *Tursiops truncatus*) of marine mammals. Additive or synergistic effects with other MMPA current or future authorizations are not anticipated, therefore, the preferred alternative and the no-action alternative are not anticipated to result in impacts that cumulatively have an impact on the marine environment.

The commercial, scientific, military, and recreational activities, as described above and in the original EA, which occur around and/or off the U.S. Florida Atlantic Coast, would not occur within the immediate Beach Boulevard Bridge Blasting project area. Furthermore, given the small scale and infrequent occurrence of the proposed activity, and its anticipated minimal environmental effects, the proposed blasting activities, as described in JTA's application and this SEA, would not contribute significantly or measurably to the overall environmental effects of other human activities in the project area long the U.S. Florida Atlantic coastline. Therefore, NMFS has determined that the proposed explosive demolition activities would not produce any significant cumulative impacts to the human environment.

5 MITIGATION, MONITORING, AND REPORTING

Mitigation

With regard to the use of blasting as a construction technique under the preferred alternative, NMFS and JTA will include specific mitigation measures to reduce the likelihood of marine mammal take incidental to the proposed action:

- Use of qualified observers:
    - Boat and land based – a marine mammal watch will be conducted by no less than five qualified observers from small watercraft, at least an hour before and 30 minutes after the time of each detonation, in a large circular area greater than the radius of the Safety Zone (this is called the Watch Zone).
    - Aircraft based – the JTA intends to utilize an aerial survey with the use of a helicopter where and when it is feasible for the proposed blasting project.
- A Safety Zone based on the weight of explosive delays and the Navy Diver formula for unconfined explosions.
- Monitoring – underwater pressure wave monitoring.
- Lowest poundage of explosive necessary to adequately break the support structures.
- No more than 3 blast events over a maximum three month period.
- Blasting limited to daylight hours (2 hours after sunrise and 1 hour before sunset).
- Use of confined charges.
- Drill patterns a minimum of 8 ft (2.4 m) separation from a loaded hole.

- Selection of explosive products and their practical application addressing vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes would be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn would reduce the mortality radius.
- Any marine mammal(s) in the Safety Zone and/or Watch Zone will not be forced to move out of that zone by human intervention. Detonation shall not occur until the animal(s) move(s) out of the respective zone on its own volition.

As a proposed mitigation measure, the weight of the explosives to be used in each blast will be limited to the lowest poundage explosives that can adequately break the support structure material. In preparation for the removal of the bridge support structures, blasting would consist of up to three blasts over a maximum three month period, each blast lasting approximately 2 seconds in duration. During preparation of the Beach Boulevard Bridge project, the specific areas that will require blasting have been identified.

Monitoring

The JTA will be implementing a Marine Wildlife Safety Plan and a Manatee, Marine Mammal, and Sea Turtle Watch Plan that will minimize the possibility of incidental take to pressure waves from the blast to the fullest extent practicable. JTA is working on the Watch Plan with USFWS, SJRWMD, Florida Fish and Wildlife Conservation Commission (FWC), and ACOE. The Watch Plan has been prepared to ensure the protection large enough to be located visually within the zone of blasting activities influence.

A nearly identical Watch Plan was used during the demolition of the Fuller Warren Bridge, which spans approximately 3,600 ft (1,097.6 m) over open water in downtown Jacksonville, Florida. The Beach Boulevard Bridge spans approximately 300 ft (91.5 m) over open water. Applying the same specifications for a project that is more than an order of magnitude smaller in scale represents an effort to provide more than adequate protection for large wildlife including bottlenose dolphins.

The observer monitoring program will take place in a large circular area around the blasting site (also referred to as the Watch Zone). Any marine mammal(s) in the Safety or Watch Zone will not be forced to move out of those zones by human intervention. Detonation shall not occur until the animal(s) move(s) out of the Safety Zone on its own volition.

Monitoring and mitigation will consist primarily of surveying and taking action to avoid detonating charges when protected species are within the Safety Zone radius. The marine wildlife safety observer team will consist of five members. The team will have a chief observer, who will be the aerial observer in a helicopter, and four other stationary ground and/or waterborne observers. Observers will be equipped with two-way radios, binoculars, a sighting log, map, signal flags, and polarized sunglasses.

Proposed monitoring requirements in relation to JTA's blasting activities will include observations made by the applicant and their associates. Information recorded will include species counts, numbers of observed disturbances, and descriptions of the disturbance behaviors before, during, and after blasting activities. Observations of unusual behaviors, numbers, or distributions of marine mammals and sea turtles in the activity area to NMFS and USFWS so that any potential follow-up observations can be conducted by the appropriate personnel. In addition, observations of tag-bearing marine mammal, sea turtles, and fish carcasses as well as any rare or unusual species of marine mammals and fish will be reported to NMFS and USFWS.

If at any time injury or death of any marine mammal occurs that may be a result of the proposed blasting activities, the JTA will suspend activities and contact NMFS immediately to determine how to best proceed to ensure that another injury or death does not occur and to ensure that the applicant remains in compliance with the MMPA.

In the event of a postponement, pre-activity monitoring would continue as long as weather and daylight hours allow. If a charge failed to explode, mitigation measures would continue while operations personnel attempted to recognize and solve the problem, i.e., detonate the charge.

A formal Plan Coordination Meeting will be held no later than 3 days before the first detonation event to review the items listed above, to discuss the responsibilities of all parties, and to review and approve the schedule of events. Attendees will include the contractor's representative, the entire Marine Wildlife Safety Observer team, the blasting consultant, USFWS, FWC, USCG, and other interested environmental parties such as NMFS and Florida Marine Patrol (FMP). The agenda will be coordinated by Superior Construction with the blasting contractor, USFWS, and FDEP. It will include the latest information about the possible presence of marine mammals during the operation, the logistics of the detonation schedule, the communications plan, and the responsibilities of all parties involved. A summary report will be submitted to all interested parties.

Post-activity monitoring is designed to determine the effectiveness of pre-activity monitoring and mitigation by reporting any sightings of dead or injured marine mammals. Post-detonation monitoring, concentrating on the area down current of the test site, would commence immediately following such detonation and continue for at least one hour after the detonation. The monitoring team would document and report to the appropriate organization the marine mammals killed or injured during the activity and, if practicable, recover and examine any dead animals. The species, number, location, and behavior of any animals observed by the team would be documented and reported to the project leader.

Reporting

After completion of all detonation events, the Chief Observer will submit a summary report to regulatory agencies. This report will contain the observer's logs, provide the

names of observers, and their positions during the event, the number and location of marine mammals sighted during the monitoring period, the behavior observations of the marine mammals, and the actions that were taken when the animals were observed in the project area.

The JTA will notify NMFS and the Southeast Regional Office prior to initiation of each explosive demolition session. Any takes of marine mammals other than those authorized by the IHA, as well as any injuries or deaths of marine mammals, will be reported to the Southeast Regional Administrator, within 24 hours. A draft final report will be submitted to NMFS within 90 days after the conclusion of the blasting activities. The report will include a summary of the information gathered pursuant to monitoring requirements set forth in the IHA, including dates and times of detonations as well as pre- and post-blasting monitoring observations. A final report will be submitted to the Regional Administrator within 30 days after receiving comments from NMS on the draft final report. If no comments are received from NMFS, the draft final report will be considered to be the final report.

Use of these mitigation and monitoring measures will ensure that no injury or mortality would occur to marine mammals and that the impact would be at the lowest level practicable and have no more than a negligible impact on the affected species and stocks.

6 LITERATURE CITED

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