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Dated: April 8, 2026.

David Detlor,

Acting Director, Office of Science and Technology, National Marine Fisheries Service.

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648–XF473]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Francis Scott Key Bridge Rebuild Project in Baltimore, Maryland

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorizations; request for comments on proposed authorizations and possible renewal.

SUMMARY: NMFS has received a request from the Federal Highway Administration (FHWA) for authorization to take marine mammals incidental to the Francis Scott Key (FSK) Bridge Rebuild project in Baltimore, MD. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue two consecutive incidental harassment authorizations (IHAs) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on possible one-time, 1-year renewals that could be issued under certain circumstances and if all requirements are met, as described in Request for Public Comments at the end of this notice. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorization and agency responses will be summarized in the final notice of our decision.

DATES: Comments and information must be received no later than May 22, 2026.

ADDRESSES: Comments should be addressed to Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service and should be submitted via email to *ITP.Hotchkin@noaa.gov.* Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities.* In case of problems accessing these documents, please call the contact listed below.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments, including all attachments, must not exceed a 25-megabyte file size. All comments received are a part of the public record and will generally be posted online at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act* without change. All personal identifying information (*e.g.,* name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Cara Hotchkin, Office of Protected Resources, NMFS, (301) 427–8401.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the ‘‘take’’ of marine mammals, with certain exceptions. Section 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) directs the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are proposed or, if the taking is limited to harassment, a notice of a proposed IHA is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking; other ‘‘means of effecting the least practicable adverse impact’’ on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (referred to as ‘‘mitigation’’); and requirements pertaining to the monitoring and reporting of the takings. The definitions of all applicable MMPA statutory terms used above are included in the relevant sections below (*see also* 16 U.S.C. 1362; 50 CFR 216.3, 216.103).

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216–6A, NMFS must review our proposed action (*i.e.,* the issuance of an IHA) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (IHAs with no anticipated serious injury or mortality) of the Companion Manual for NAO 216–6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has preliminarily determined that the issuance of the proposed IHAs qualifies to be categorically excluded from further NEPA review.

Summary of Request

On December 9, 2025, NMFS received a request from FHWA for two consecutive IHAs to take marine mammals incidental to construction activities necessary for the FSK Bridge Rebuild project in Baltimore, MD. Following NMFS' review of the application, FHWA submitted revised versions on January 21, 2026 and March 23, 2026. The application was deemed adequate and complete on March 26, 2026. FHWA's request is for take of Tamanend's bottlenose dolphins (*Tursiops erebennus*) by Level B harassment only. Neither FHWA nor NMFS expect serious injury or mortality to result from this activity and, therefore, IHAs are appropriate.

Description of Proposed Activity

Overview

FHWA proposes to replace a pre-existing critical bridge and associated infrastructure which were destroyed during a ship collision in March 2024. The proposed project includes construction of a new bridge structure with two travel lanes in each direction designed to current roadway standards over the Fort McHenry Navigation Channel, and twelve new piers in the Patapsco River. Construction activities associated with the proposed project include vibratory and impact installation of steel pipe piles ranging from 24-inches (in) (61 centimeters (cm)) to 96-in (244 cm) in diameter for a temporary construction trestle and main span piers and associated vessel collision protection systems. Pile driving activities may be concurrent for up to four piles at a time. Due to the overall work schedule and accelerated/emergency need for the project, pile driving would occur year-round.

Dates and Duration

Construction is proposed between June 1, 2026 and May 31, 2028; thus FHWA has requested two sequential IHAs that would be effective for June 1, 2026 through May 31, 2027 and for June 1, 2027 through May 31, 2028, respectively. However, project delays may occur due to a number of factors, including availability of equipment and/or materials, weather-related delays, equipment maintenance and/or repair, and other contingencies.

The total project duration would exceed 2 years, including demolition of remaining elements of the original bridge. If necessary, FHWA intends to apply for additional incidental harassment authorizations to cover that period of work.

A total of approximately 728 piles would be installed during Year 1 and a total of 107 piles would be installed during Year 2 (table 1). Between April 15 and October 30th of each year, work would generally be limited to daylight construction, typically consisting of a 12 hours on and 12 hours off work schedule. Pile driving activities would be initiated only during daylight hours. Concurrent driving of up to four piles at different locations along the bridge span is proposed. Table 1 shows the number of each type of pile and number of workdays planned for installation for each season. Seasons are defined as follows: 'summer' is June through August, 'fall' is September through November, 'winter' is December through February, and 'spring' is March through May.

TABLE 1—ESTIMATED NUMBER OF PILES AND WORKDAYS [a] DURING EACH SEASON FOR YEARS 1 AND 2

	24-in		36-in		48-in		96-in		Totals	
	# Piles	Days	# Piles	Days	# Piles	Days	# Piles	Days	# Piles	Days
Year 1										
Summer	44	31	20	11	0	0	92	117	156	159
Fall	33	21	139	84	0	0	57	119	229	224
Winter	29	20	115	67	0	0	65	120	209	207
Spring	42	23	40	20	16	30	36	69	134	142
Total Year 1	148	95	314	182	16	30	250	425	728	732
Year 2										
Summer	13	8	0	0	40	59	0	0	53	67
Fall	0	0	0	0	34	55	0	0	34	55
Winter	0	0	0	0	20	20	0	0	20	20
Spring	0	0	0	0	0	0	0	0	0	0
Total Year 2	13	8	0	0	94	134	0	0	107	142

[a] The number of workdays per year exceeds 365 because this calculation excludes concurrent driving. The actual number of workdays in year 1 is 311, and for year 2 is 142 days.

Specific Geographic Region

The proposed project will occur within portions of Curtis Bay, Patapsco River, and Bear Creek, near the Port of Baltimore (figure 1). The Patapsco River is approximately 1.6 kilometers (km; 1 mile) wide (between Hawkins Point and Sollers Point). United States Army Corps of Engineers (USACE) maintains the Fort McHenry Navigational Channel, which is 0.2 km (800 feet (ft)) wide and 15 m (50 ft) deep at the location of the bridge.

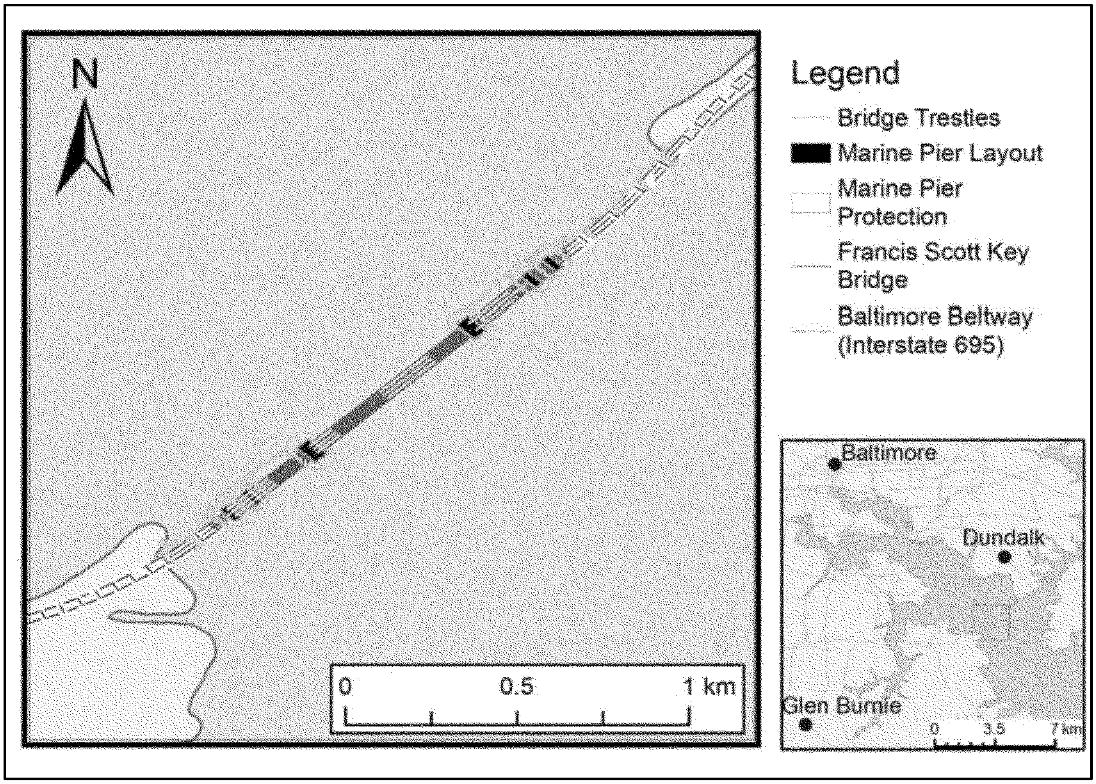

Figure 1 – Map of the FSK Bridge Project Vicinity

Detailed Description of the Specified Activity

The proposed project includes construction of a new bridge structure with two travel lanes in each direction designed to current roadway standards, a minimum vertical clearance of 70.1 m (230 ft) over the Fort McHenry Navigation Channel, a horizontal clearance of 333.3 m (1,100 ft), an anticipated main bridge span length of 504.5 m (1,665 ft), and twelve new piers in the Patapsco River. Construction activities anticipated to occur within years 1 and 2 of the project include:

- Vibratory installation of 24-in (61 cm) diameter battered steel pipe piles; and vibratory and impact installation of 36-in (91 cm) diameter plumb steel pipe piles for a temporary construction trestle;
- Vibratory and impact installation of 48-in (1.22 m) diameter plumb steel pipe piles for marine approach piers (Piers 20, 21, and 28–31); and
- Vibratory and impact installation of 96-in (2.44 m) diameter plumb steel pipe piles for main span piers (Piers 22–27) and associated vessel collision protection systems.

Construction activities that are likely to occur after the expiration of the proposed authorizations include demolition of remnants of the original bridge, including existing girders on the six remaining water spans and removing select in-water piers. Demolition may be by mechanical demolition to the mudline or by controlled blasting. Demolition is likely to be conducted after May 31, 2028, and FHWA intends to apply for additional authorizations as necessary. Blasting activities are therefore not addressed further in this notice.

On the south side of the navigation channel, construction would begin with Pier 24 and progress south to the southern shoreline to Pier 20. On the northern side of the navigation channel, construction would begin at Pier 25 and progress north to the northern shoreline towards Pier 32. Construction of the temporary trestle will occur as the piers are constructed. Concurrent pile driving is expected for up to four piles simultaneously at different locations along the bridge span.

Pile installation would be by vibratory (all sizes) and impact driving (36-in, 48-in, and 96-in piles). A typical installation scenario for a 96-in diameter pile begins with vibratory driving for approximately 5–30 minutes (min) to set each pile and then impact pile driving to complete pile installation. Impact installation of 96-in steel piles would occur for approximately 3 hours, with approximately 2,500 strikes per pile. Restriking of certain 96-in piles with an impact hammer may also occur, with approximately 200 strikes per pile. Restrikes are not anticipated for piles smaller than 96-in diameter, and it is expected that impact installation for the 96-in diameter piles represents the maximum amount of time for impact pile installation for piles of any size. A similar method of vibratory and impact pile driving would be used to install the 48-in diameter and 36-in diameter steel pipe piles. The 24-in diameter piles would require only vibratory pile driving. Table 2 shows proposed pile quantities and estimated installation times.

TABLE 2—PILE QUANTITIES AND INSTALLATION TIME FOR YEARS 1 AND 2

Year	Pile diameter (in)	Approx. number of piles	Method	Approx. time (vibratory/impact) [a]	Approx. total days [b]	Maximum piles per day
1	96	250	Vibratory and Impact	5–30 min/3 hours	425	6
	48	16			30	6
	36	314			182	8
	24	148	Vibratory	30 min	95	2
2	24	13	Vibratory	30 min	8	2
	48	94	Vibratory and Impact	5– 30 min/3 hours	134	6

[a] Estimates 2,500 strikes per pile for impact installation and 5–30 minutes of vibratory per pile for vibratory installation. Estimated number of strikes per pile based on installation of 96″ diameter piles. Smaller piles are estimated to require less strikes per pile.
[b] Some workdays will occur concurrently.

During Year 1 (June 1, 2026 through May 31, 2027), pile installation would include approximately 250 96-in diameter steel pipe piles for main span (Piers 22–27) as well as the associated vessel collision pier protection systems for these piers. 96-in diameter piles would primarily be installed during Year 1, with the goal of being completed in the May 2027 timeframe. In addition, approximately 16 48-in diameter steel pipe piles would be installed for the marine approach piers (Piers 20–21 on the south side of the river and Piers 28–31 on the north side of the river). Approximately 314 36-in and 148 24-in diameter steel pipe piles would be driven for the temporary construction trestle. A total of approximately 728 piles will be installed during Year 1 (Table 1).

Installation of 96-in diameter piles at the main span piers during Year 1 may occur concurrently or may be concurrent with each other and with vibratory and impact installation of 36-in piles and vibratory installation of 24-in piles for the construction trestle. At any time, the distance between concurrent installation of 96-in piles would be greater than 445 m (0.28 mi). Table 3 provides a summary of possible concurrent pile driving scenarios.

TABLE 3—POTENTIAL CONCURRENT DRIVING SCENARIOS

Structure	Activity	Equipment and quantity
Pier	Pier 24/25 installation of two 96-in piles	Pier: • 2 vibratory hammers.
Pier and Trestle	Pier 24/25 installation (96-in pile) and trestle installation (24-in pile).	Pier: • 1 Impact hammer. • 1 vibratory hammer Trestle: • 1 vibratory hammer.
Pier and Trestle	Pier 24/25 installation (96-in pile) and trestle installation (36-in pile).	Pier: • 1 Impact hammer. • 1 vibratory hammer. Trestle: • 1 impact hammer. • 1 vibratory hammer.

During Year 2 (June 1, 2027 through May 31, 2028), construction would focus on completing installation of the marine approach piers (Piers 20–21 and 28–31) as well as completion of the temporary construction trestle. Approximately 94 48-in diameter piles would be installed using impact and vibratory installation. For the temporary construction trestle, approximately 13 24-in diameter battered piles would be installed using vibratory installation. Approximately 107 piles in total will be installed during Year 2 (Table 1).

Proposed mitigation, monitoring, and reporting measures are described in detail later in this document (please see Proposed Mitigation and Proposed Monitoring and Reporting).

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history of the potentially affected species. NMFS fully considered all of this information, and we refer the reader to these descriptions, instead of reprinting the information. Additional information regarding population trends and threats may be found in NMFS' Stock Assessment Reports (SARs; *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*) and more general information about these species (*e.g.,* physical and behavioral descriptions) may be found on NMFS' website (*https://www.fisheries.noaa.gov/find-species).*

Table 4 lists all species or stocks for which take is expected and proposed to be authorized for this activity and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS' SARs). While no serious injury or mortality is anticipated or proposed to be authorized here, PBR and annual mortality and serious injury (M/SI) from anthropogenic sources are included here as gross indicators of the status of the species or stocks and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS' stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS' U.S. Atlantic SARs. All values presented in table 4 are the most recent available at the time of publication (including from the draft 2024 SARs) and are available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments.*

TABLE 4—SPECIES,[1] STOCKS, AND THE STATUS OF MARINE MAMMALS WITH ESTIMATED TAKE FROM THE SPECIFIED ACTIVITIES

Common name	Scientific name	Stock	ESA/MMPA status; strategic (Y/N)[2]	Stock abundance N_{best}, (CV, N_{min}, most recent abundance survey)[3]	PBR	Annual M/SI[3]
Order Odontoceti (toothed whales, dolphins, and porpoises)						
Family *Delphinidae*:						
Bottlenose Dolphin[4]	*Tursiops erebennus*	Northern Migratory Coastal	-, D, Y	6,639 (0.41, 4,759, 2016)	48	12.2–21.5
		Southern Migratory Coastal	-, D, Y	3,751 (0.6, 2,353, 2016)	24	0–18.3

[1] Information on the classification of marine mammal species can be found on the web page for The Society for Marine Mammalogy's Committee on Taxonomy *(https://marinemammalscience.org/science-and-publications/list-marine-mammal-species-subspecies/*).

[2] Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

[3] NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.* CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance.

[4] Coastal bottlenose dolphins along the Eastern U.S. have been genetically identified as a separate species (Tamanend's bottlenose dolphin (*T. erebennus*)) (Costa *et al.* 2022); however, this is not yet reflected in the SARs. Here we present the most recent SAR for the two relevant stocks, both of which are now considered *T. erebennus.*

As indicated above, only bottlenose dolphins temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur. While fin whales (*Balaenoptera physalus*), minke whales (*Balaenoptera acutorostrata*), humpback whales (*Megaptera novaeangliae*), sei whales (*Balaenoptera borealis*), harbor porpoise (*Phocoena phocoena*), and harbor (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) have been documented in Lower Chesapeake Bay or the waters of coastal Maryland, the temporal and/or spatial occurrence of these species is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here. All of these species are considered extralimital in the waters of the upper bay and the Patapsco River. Additionally, single individuals of Risso's dolphin (*Grampus griseus*) have been found stranded in the Baltimore area; however, these species are also considered extralimital.

Bottlenose dolphins are the only marine mammal species that are expected to occur on a regular basis in the waters of the upper Chesapeake Bay and Patapsco River. Atlantic coastal bottlenose dolphins have recently been recategorized as Tamanend's bottlenose dolphins (*Tursiops erebennus*) by Costa *et al.* (2022). Tamanend's bottlenose dolphins within the area of the FSK Bridge project likely belong to either the Western North Atlantic Northern Migratory Coastal Stock (NMCS) or the Western North Atlantic Southern Migratory Coastal Stock (SMCS). The best available abundance estimate for the NMCS is 6,639 (Hayes *et al.,* 2024; Garrison *et al.,* 2017), and for the SMCS is 3,751 (Garrison *et al.,* 2017).

Tamanend's bottlenose dolphins are seasonally transient in the lower Patapsco River (Rodriguez et *al.,* 2021). They have a higher likelihood of occurrence along the middle and lower Chesapeake Bay, outside the area of the project area. Tamanend's bottlenose dolphins primarily use the lower Chesapeake Bay in summer with most usage near the James and Elizabeth Rivers in Virginia. They are seen annually in Virginia from April through November with approximately 65 strandings occurring each year (Barco and Swingle, 2014; Engelhaupt *et al.,* 2016). Dolphins are more commonly sighted in areas far south of Baltimore Harbor including the mouths of the Potomac and Rappahannock Rivers (Bay Journal, 2021).

Sighting data within the proximity of the project area near the mouth of the Patapsco River and within the entire Chesapeake Bay, are based on 'citizen science', where reports are logged via the Dolphin Watch app (*https://chesapeakedolphinwatch.org*) supported by University of Maryland, Center for Environmental Science. These data are available from 2017 through 2022. Logged sightings are less frequent farther north in the Patapsco River and Baltimore Harbor areas and typically occur in the summer. Recent reported observations near the immediate area of the project include a dolphin sighted using waters in the Inner Harbor (14.5 km (9 miles) north of the Key Bridge; ABC Baltimore 2023) and a dolphin sighted using waters at the mouth of the Patapsco River (approximately 8 km (5 miles) south of the Key Bridge; The Washington Post, 2018).

Rodriguez *et al.* (2021) synthesizes three consecutive years (2017, 2018, and 2019) of data from the DolphinWatch app. Overall, the highest dolphin sightings are correlated with water temperatures between 24 and 30 degrees Celsius (75.2 to 86 degrees Fahrenheit). Salinity and tidal state also influence the spatiotemporal patterns of bottlenose dolphins. Dolphins were sighted most in the summer. The highest number of documented dolphin sightings from these data was in July of each year, when water temperatures are high and provide nursery habitat for dolphin prey fish species (Gannon and Waples, 2004). During September and October, dolphins were primarily sighted in the lower and southern middle portions of the Chesapeake Bay while during the summer, dolphins occurred in the upper, middle, and lower portions of the bay. No dolphins were sighted in the upper bay during September and October of 2018.

Considering data synthesized in this report and global sea temperature data for the Upper Chesapeake Bay, it is expected that bottlenose dolphins would most likely be present within the vicinity of the FSK Bridge Rebuild project between June 1 and September 30 of any given year. Reduced presence is possible in spring and fall when water temperatures are above 20 degrees Celsius, and no dolphins are expected to be present in the project location during winter months.

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Not all marine mammal species have equal hearing capabilities (*e.g.,* Richardson *et al.,* 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007; 2019) recommended that marine mammals be divided into hearing groups based on directly measured (behavioral or auditory evoked potential techniques) or estimated hearing ranges (behavioral response data, anatomical modeling, *etc.*). Generalized hearing ranges were chosen based on the approximately 65 decibel (dB) threshold from composite audiograms, previous analyses in NMFS (2018), and/or data from Southall *et al.* (2007) and Southall *et al.* (2019). We note that the names of two hearing groups and the generalized hearing ranges of all marine mammal hearing groups have been recently updated (NMFS, 2024) as reflected below in table 5. Tamanend's bottlenose dolphins are considered high-frequency (HF) cetaceans.

TABLE 5—MARINE MAMMAL HEARING GROUPS

[NMFS, 2024]

Hearing group	Generalized hearing range *
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 36 kHz.
High-frequency (HF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz.
Very High-frequency (VHF) cetaceans (true porpoises, *Kogia,* river dolphins, Cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*).	200 Hz to 165 kHz.
Phocid pinnipeds (PW) (underwater) (true seals)	40 Hz to 90 kHz.
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 68 kHz.

* Represents the generalized hearing range for the entire group as a composite (*i.e.,* all species within the group), where individual species' hearing ranges may not be as broad. Generalized hearing range chosen based on approximately 65 dB threshold from composite audiogram, previous analysis in NMFS (2018), and/or data from Southall *et al.* (2007) and Southall *et al.* (2019). Additionally, animals are able to detect very loud sounds above and below that "generalized" hearing range.

For more detail concerning these groups and associated frequency ranges, please see NMFS (2024) for a review of available information.

Potential Effects of Specified Activities on Marine Mammals and Their Habitat

This section provides a discussion of the ways in which components of the specified activity may impact marine mammals and their habitat. The Estimated Take of Marine Mammals section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The Negligible Impact Analysis and Determination section considers the content of this section, the Estimated Take of Marine Mammals section, and the Proposed Mitigation section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and whether those impacts are reasonably expected to, or reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

Acoustic effects on marine mammals during the specified activity are expected to potentially occur from vibratory and impact pile driving. The effects of underwater noise from FHWA's proposed activities have the potential to result in Level B harassment of marine mammals in the action area.

The proposed activities would result in the placement of 728 steel pipe piles with diameters of 24-, 36-, 48-, and 96-in in year 1 and 107 24- and 48-in diameter steel pipe piles in year 2 (see table 2 for details). There are a variety of types and degrees of effects on marine mammals, prey species, and habitat that could occur as a result of the project. Below we provide a brief description of the types of sound sources that would be generated by the project, the general impacts from these types of activities, and an analysis of the anticipated impacts on marine mammals from the project, with consideration of the proposed mitigation measures.

Description of Sound Sources for the Specified Activities

Activities associated with the project that have the potential to incidentally take marine mammals though exposure to sound would include vibratory and impact pile driving during the construction of the new bridge.

Impact hammers typically operate by repeatedly dropping and/or pushing a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is impulsive, characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper, 2005). Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the substrate. Vibratory hammers typically produce less sound (*i.e.,* lower levels) than impact hammers. Peak sound pressure levels (SPLs) may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman *et al.,* 2009; California Department of Transportation (CALTRANS), 2015, 2020). Sounds produced by vibratory hammers are non-impulsive; compared to sounds produced by impact hammers, the rise time is slower, reducing the probability and severity of injury, and the sound energy is distributed over a greater amount of time (Nedwell and Edwards, 2002; Carlson *et al.,* 2005).

The likely or possible impacts of the FHWA's proposed activities on marine mammals could involve both non-acoustic and acoustic stressors. Potential non-acoustic stressors could result from the physical presence of the equipment and personnel; however, visual and other non-acoustic stressors would be limited, and any impacts to marine mammals are expected to primarily be acoustic in nature.

Potential Effects of Underwater Sound on Marine Mammals

The introduction of anthropogenic noise into the aquatic environment from impact and vibratory pile driving is the primary means by which marine mammals may be harassed from the FHWA's specified activity. Anthropogenic sounds cover a broad range of frequencies and sound levels and can have a range of highly variable impacts on marine life from none or minor to potentially severe responses depending on received levels, duration of exposure, behavioral context, and various other factors. Broadly, underwater sound from active acoustic sources, such as those in the project, can potentially result in one or more of the following: temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, stress, and masking (Richardson *et al.,* 1995; Gordon *et al.,* 2003; Nowacek *et al.,* 2007; Southall *et al.,* 2007; Götz *et al.,* 2009).

We describe the more severe effects of certain non-auditory physical or physiological effects only briefly as we do not expect that use of impact driving is reasonably likely to result in such effects (see below for further discussion). Potential effects from impulsive sound sources can range in severity from effects such as behavioral disturbance or tactile perception to physical discomfort, slight injury of the internal organs and the auditory system, or mortality (Yelverton *et al.,* 1973). Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to high level underwater sound or as a secondary effect of extreme behavioral reactions (*e.g.,* change in dive profile as a result of an avoidance reaction) caused by exposure to sound include neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al.,* 2006; Southall *et al.,* 2007; Zimmer and Tyack, 2007; Tal *et al.,* 2015). The project activities considered here do not involve the use of devices such as explosives or mid-frequency tactical sonar that are associated with these types of effects.

In general, animals exposed to natural or anthropogenic sound may experience physical and psychological effects, ranging in magnitude from none to severe (Southall *et al.,* 2007, 2019). Exposure to anthropogenic noise has the potential to result in auditory threshold shifts and behavioral reactions (*e.g.,* avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). It can also lead to non-observable physiological responses, such an increase in stress hormones. Additional noise in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions, such as communication and predator and prey detection.

The degree of effect of an acoustic exposure on marine mammals is dependent on several factors, including, but not limited to, sound type (*e.g.,* impulsive vs. non-impulsive), signal characteristics, the species, age and sex class (*e.g.,* adult male vs. mom with calf), duration of exposure, the distance between the noise source and the animal, received levels, behavioral state at time of exposure, and previous history with exposure (Wartzok *et al.,* 2004; Southall *et al.,* 2007). In general, sudden, high-intensity sounds can cause hearing loss as can longer exposures to lower-intensity sounds. Moreover, any temporary or permanent loss of hearing, if it occurs at all, will occur almost exclusively for noise within an animal's hearing range. We describe below the specific manifestations of acoustic effects that may occur based on the activities proposed by FHWA.

Richardson *et al.* (1995) described zones of increasing intensity of effect that might be expected to occur in relation to distance from a source and assuming that the signal is within an animal's hearing range. First (at the greatest distance) is the area within which the acoustic signal would be audible (potentially perceived) to the animal but not strong enough to elicit any overt behavioral or physiological response. The next zone (closer to the receiving animal) corresponds with the area where the signal is audible to the animal and of sufficient intensity to elicit behavioral or physiological responsiveness. The third is a zone within which, for signals of high intensity, the received level is sufficient to potentially cause discomfort or tissue damage to auditory or other systems. Overlaying these zones to a certain extent is the area within which masking (*i.e.,* when a sound interferes with or masks the ability of an animal to detect a signal of interest that is above the absolute hearing threshold) may occur; the masking zone may be highly variable in size.

Below, we provide additional detail regarding potential impacts on marine mammals and their habitat from noise in general, starting with hearing impairment, as well as from the specific activities FHWA plans to conduct, to the degree it is available.

Hearing Threshold Shifts. NMFS defines a noise-induced threshold shift (TS) as a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018, 2024). The amount of threshold shift is customarily expressed in dB. A TS can be permanent or temporary. As described in NMFS (2018, 2024) there are numerous factors to consider when examining the consequence of TS, including, but not limited to, the signal temporal pattern (*e.g.,* impulsive or non-impulsive), likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, the magnitude of the TS, time to recovery (seconds to minutes or hours to days), the frequency range of the exposure (*i.e.,* spectral content), the hearing frequency range of the exposed species relative to the signal's frequency spectrum (*i.e.,* how animal uses sound within the frequency band of the signal; *e.g.,* Kastelein *et al.,* 2014), and the overlap between the animal and the source (*e.g.,* spatial, temporal, and spectral).

Auditory Injury (AUD INJ). NMFS (2024) defines AUD INJ as damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (Houser 2021; Finneran 2024). AUD INJ may or may not result in a permanent threshold shift (PTS). PTS is subsequently defined as a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2024). PTS does not generally affect more than a limited frequency range, and an animal that has incurred PTS has some level of hearing loss at the relevant frequencies; typically animals with PTS or other AUD INJ are not functionally deaf (Au and Hastings, 2008; Finneran, 2016). Available data from humans and other terrestrial mammals indicate that a 40-dB threshold shift approximates AUD INJ onset (see Ward *et al.,* 1958, 1959; Ward, 1960; Kryter *et al.,* 1966; Miller, 1974; Ahroon *et al.,* 1996; Henderson *et al.,* 2008). AUD INJ levels for marine mammals are estimates, as with the exception of a single study unintentionally inducing PTS in a harbor seal (*Phoca vitulina*) (Kastak *et al.,* 2008), there are no empirical data measuring AUD INJ in marine mammals largely due to the fact that, for various ethical reasons, experiments involving anthropogenic noise exposure at levels inducing AUD INJ are not typically pursued or authorized (NMFS, 2024).

Temporary Threshold Shift (TTS). TTS is a temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2024), and is not considered an AUD INJ. Based on data from marine mammal TTS measurements (see Southall *et al.,* 2007, 2019), a TTS of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability (Finneran *et al.,* 2000, 2002; Schlundt *et al.,* 2000). As described in Finneran (2015), marine mammal studies have shown the amount of TTS increases with the 24-hour cumulative sound exposure level (SEL_{24}) in an accelerating fashion: at low exposures with lower SEL_{24}, the amount of TTS is typically small and the growth curves have shallow slopes. At exposures with higher SEL_{24}, the growth curves become steeper and approach linear relationships with the sound exposure level (SEL).

Depending on the degree (elevation of threshold in dB), duration (*i.e.,* recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to more impactful (similar to those discussed in auditory masking, below). For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that takes place during a time when the animal is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more severe impacts. We note that reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.,* 2007), so we can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

Many studies have examined noise-induced hearing loss in marine mammals (see Finneran (2015) and Southall *et al.* (2019) for summaries). TTS is the mildest form of hearing impairment that can occur during exposure to sound (Kryter, 2013). While experiencing TTS, the hearing threshold rises, and a sound must be at a higher level in order to be heard. In terrestrial and marine mammals, TTS can last from minutes or hours to days (in cases of strong TTS) (Finneran, 2015). In many cases, hearing sensitivity recovers rapidly after exposure to the sound ends. For cetaceans, published data on the onset of TTS are limited to captive bottlenose dolphin, beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*) (Southall *et al.,* 2019). For pinnipeds in water, measurements of TTS are limited to harbor seals, elephant seals (*Mirounga angustirostris*), bearded seals (*Erignathus barbatus*) and California sea lions (*Zalophus californianus*) (Kastak *et al.,* 1999, 2007; Kastelein *et al.,* 2019b, 2019c, 2021, 2022a, 2022b; Reichmuth *et al.,* 2019; Sills *et al.,* 2020). TTS was not observed in spotted (*Phoca largha*) and ringed (*Pusa hispida*) seals exposed to single airgun impulse sounds at levels matching previous predictions of TTS onset (Reichmuth *et al.,* 2016). These studies examine hearing thresholds measured in marine mammals before and after exposure to intense or long-duration sound exposures. The difference between the pre-exposure and post-exposure thresholds can be used to determine the amount of threshold shift at various post-exposure times.

The amount and onset of TTS depends on the exposure frequency. Sounds below the region of best sensitivity for a species or hearing group are less hazardous than those near the region of best sensitivity (Finneran and Schlundt, 2013). At low frequencies, onset-TTS exposure levels are higher compared to those in the region of best sensitivity (*i.e.,* a low frequency noise would need to be louder to cause TTS onset when TTS exposure level is higher), as shown for harbor porpoises and harbor seals (Kastelein *et al.,* 2019a, 2019c). Note that in general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Finneran, 2015). In addition, TTS can accumulate across multiple exposures, but the resulting TTS will be less than the TTS from a single, continuous exposure with the same SEL (Mooney *et al.,* 2009; Finneran *et al.,* 2010; Kastelein *et al.,* 2014, 2015). This means that TTS predictions based on the total SEL_{24} will overestimate the amount of TTS from intermittent exposures, such as sonars and impulsive sources. Nachtigall *et al.* (2018) describe measurements of hearing sensitivity of multiple odontocete species (bottlenose dolphin, harbor porpoise, beluga, and false killer whale (*Pseudorca crassidens*)) when a relatively loud sound was preceded by a warning sound. These captive animals were shown to reduce hearing sensitivity when warned of an impending intense sound. Based on these experimental observations of captive animals, the authors suggest that wild animals may dampen their hearing during prolonged exposures or if conditioned to anticipate intense sounds. Another study showed that echolocating animals (including odontocetes) might have anatomical specializations that might allow for conditioned hearing reduction and filtering of low-frequency ambient noise, including increased stiffness and control of middle ear structures and placement of inner ear structures (Ketten *et al.,* 2021). Data available on noise-induced hearing loss for mysticetes are currently lacking (NMFS, 2024). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species.

Relationships between TTS and AUD INJ thresholds have not been studied in marine mammals, and there are no measured PTS data for cetaceans, but such relationships are assumed to be similar to those in humans and other terrestrial mammals. AUD INJ typically occurs at exposure levels at least several dB above that inducing mild TTS (*e.g.,* a 40-dB threshold shift approximates AUD INJ onset (Kryter *et al.,* 1966; Miller, 1974), while a 6-dB threshold shift approximates TTS onset (Southall *et al.,* 2007, 2019). Based on data from terrestrial mammals, a precautionary assumption is that the AUD INJ thresholds for impulsive sounds (such as impact pile driving pulses as received close to the source) are at least 6 dB higher than the TTS threshold on a peak-pressure basis and AUD INJ cumulative sound exposure level thresholds are 15 to 20 dB higher than TTS cumulative sound exposure level thresholds (Southall *et al.,* 2007, 2019). Given the higher level of sound or longer exposure duration necessary to cause AUD INJ as compared with TTS, it is considerably less likely that AUD INJ could occur.

Behavioral Effects. Exposure to noise also has the potential to behaviorally disturb marine mammals to a level that rises to the definition of harassment under the MMPA. Generally speaking, NMFS considers a behavioral disturbance that rises to the level of harassment under the MMPA a non-minor response—in other words, not every response qualifies as behavioral disturbance, and for responses that do, those of a higher level, or accrued across a longer duration, have the potential to affect foraging, reproduction, or survival. Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g.,* minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Behavioral responses may include changing durations of surfacing and dives, changing direction and/or speed; reducing/increasing vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); eliciting a visible startle response or aggressive behavior (such as tail/fin slapping or jaw clapping); and avoidance of areas where sound sources are located. In addition, pinnipeds may increase their haul out time, possibly to avoid in-water disturbance (Thorson and Reyff, 2006).

Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.,* species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g.,* Richardson *et al.,* 1995; Wartzok *et al.,* 2004; Southall *et al.,* 2007, 2019; Weilgart, 2007; Archer *et al.,* 2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al.,* 2012), and can vary depending on characteristics associated with the sound source (*e.g.,* whether it is moving or stationary, number of sources, distance from the source). In general, pinnipeds seem more tolerant of, or at least habituate more quickly to, potentially disturbing underwater sound than do cetaceans, and generally seem to be less responsive to exposure to industrial sound than most cetaceans. Please see Appendices B and C of Southall *et al.* (2007) and Gomez *et al.* (2016) for reviews of studies involving marine mammal behavioral responses to sound.

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.,* 2004). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a ''progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial,'' rather than as, more generally, moderation in response to human disturbance (Bejder *et al.,* 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure.

As noted above, behavioral state may affect the type of response. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al.,* 1995; Wartzok *et al.,* 2004; National Research Council (NRC), 2005). Controlled experiments with captive marine mammals have shown pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al.,* 1997; Finneran *et al.,* 2003). Observed responses of wild marine mammals to loud pulsed sound sources (*e.g.,* seismic airguns) have been varied but often consist of avoidance behavior or other behavioral changes (Richardson *et al.,* 1995; Morton and Symonds, 2002; Nowacek *et al.,* 2007).

Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal (*e.g.,* Erbe *et al.,* 2019). If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. If a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g.,* Lusseau and Bejder, 2007; Weilgart, 2007; NRC, 2005). However, there are broad categories of potential response, which we describe in greater detail here, that include alteration of dive behavior, alteration of foraging behavior, effects to breathing, interference with or alteration of vocalization, avoidance, and flight.

Avoidance and displacement. Changes in dive behavior can vary widely and may consist of increased or decreased dive times and surface intervals as well as changes in the rates of ascent and descent during a dive (*e.g.,* Frankel and Clark, 2000; Costa *et al.,* 2003; Ng and Leung, 2003; Nowacek *et al.,* 2004; Goldbogen *et al.,* 2013a, 2013b; Blair *et al.,* 2016). Variations in dive behavior may reflect interruptions in biologically significant activities (*e.g.,* foraging) or they may be of little biological significance. The impact of an alteration to dive behavior resulting from an acoustic exposure depends on what the animal is doing at the time of the exposure and the type and magnitude of the response.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g.,* bubble nets or sediment plumes), or changes in dive behavior. Acoustic and movement bio-logging tools also have been used in some cases to infer responses to anthropogenic noise. For example, Blair *et al.* (2015) reported significant effects on humpback whale (*Megaptera novaeangliae*) foraging behavior in Stellwagen Bank in response to ship noise including slower descent rates, and fewer side-rolling events per dive with increasing ship nose. In addition, Wisniewska *et al.* (2018) reported that tagged harbor porpoises demonstrated fewer prey capture attempts when encountering occasional high-noise levels resulting from vessel noise as well as more vigorous fluking, interrupted foraging, and cessation of echolocation signals observed in response to some high-noise vessel passes. As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g.,* Croll *et al.,* 2001; Nowacek *et al.,* 2004; Madsen *et al.,* 2006; Yazvenko *et al.,* 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

Respiration rates vary naturally with different behaviors and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure (*e.g.,* Kastelein *et al.,* 2001; 2005; 2006; Gailey *et al.,* 2007). For example, harbor porpoise respiration rates increased in response to pile driving sounds at and above a received broadband SPL of 136 dB (zero-peak SPL: 151 dB (referenced to 1 micropascal (re 1 μPa); SEL of a single strike (SEL_{ss}): 127 dB re 1 μPa^2-s) (Kastelein *et al.,* 2013).

Avoidance is the displacement of an individual from an area or migration path as a result of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson *et al.,* 1995). For example, gray whales (*Eschrictius robustus*) are known to change direction—deflecting from customary migratory paths—in order to avoid noise from seismic surveys (Malme *et al.,* 1984). Harbor porpoises, Atlantic white-sided dolphins (*Lagenorhynchus actusus*), and minke whales have demonstrated avoidance in response to vessels during line transect surveys (Palka and Hammond, 2001). In addition, beluga whales in the St. Lawrence Estuary in Canada have been reported to increase levels of avoidance with increased boat presence by way of increased dive durations and swim speeds, decreased surfacing intervals, and by bunching together into groups (Blane and Jaakson, 1994). Avoidance may be short-term, with animals returning to the area once the noise has ceased (*e.g.,* Bowles *et al.,* 1994; Goold, 1996; Stone *et al.,* 2000; Morton and Symonds, 2002; Gailey *et al.,* 2007). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (*e.g.,* Blackwell *et al.,* 2004; Bejder *et al.,* 2006; Teilmann *et al.,* 2006).

A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. The flight response differs from other avoidance responses in the intensity of the response (*e.g.,* directed movement, rate of travel). Relatively little information on flight responses of marine mammals to anthropogenic signals exist, although observations of flight responses to the presence of predators have occurred (Connor and Heithaus, 1996; Bowers *et al.,* 2018). The result of a flight response could range from brief, temporary exertion and displacement from the area where the signal provokes flight to, in extreme cases, marine mammal strandings (England *et al.,* 2001). However, it should be noted that response to a perceived predator does not necessarily invoke flight (Ford and Reeves, 2008), and whether individuals are solitary or in groups may influence the response.

Behavioral disturbance can also impact marine mammals in more subtle ways. Increased vigilance may result in costs related to diversion of focus and attention (*i.e.,* when a response consists of increased vigilance, it may come at the cost of decreased attention to other critical behaviors such as foraging or resting). These effects have generally not been demonstrated for marine mammals, but studies involving fishes and terrestrial animals have shown that increased vigilance may substantially reduce feeding rates (*e.g.,* Beauchamp and Livoreil, 1997; Fritz *et al.,* 2002; Purser and Radford, 2011). In addition, chronic disturbance can cause population declines through reduction of fitness (*e.g.,* decline in body condition) and subsequent reduction in reproductive success, survival, or both (*e.g.,* Harrington and Veitch, 1992; Daan *et al.,* 1996; Bradshaw *et al.,* 1998). However, Ridgway *et al.* (2006) reported that increased vigilance in bottlenose dolphins exposed to sound over a 5-day period did not cause any sleep deprivation or stress effects.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hour cycle). Disruption of such functions resulting from reactions to stressors such as sound exposure are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.,* 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall *et al.,* 2007). Note that there is a difference between multi-day substantive (*i.e.,* meaningful) behavioral reactions and multi-day anthropogenic activities. For example, just because an activity lasts for multiple days does not necessarily mean that individual animals are either exposed to activity-related stressors for multiple days or, further, exposed in a manner resulting in sustained multi-day substantive behavioral responses.

Physiological stress responses. An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.,* Selye, 1950; Moberg, 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

Neuroendocrine stress responses often involve the hypothalamus-pituitary-adrenal system. Virtually all neuroendocrine functions that are affected by stress, including immune competence, reproduction, metabolism, and behavior—are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction, altered metabolism, reduced immune competence, and behavioral disturbance (*e.g.,* Moberg, 1987; Blecha, 2000). Increases in the circulation of glucocorticoids are also equated with stress (Romano *et al.,* 2004).

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and "distress" is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (*e.g.,* Holberton *et al.,* 1996; Hood *et al.,* 1998; Jessop *et al.,* 2003; Krausman *et al.,* 2004; Lankford *et al.,* 2005; Ayres *et al.,* 2012; Yang *et al.,* 2022). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker, 2000; Romano *et al.,* 2002b) and, more rarely, studied in wild populations (*e.g.,* Romano *et al.,* 2002a). For example, Rolland *et al.* (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. In addition, Lemos *et al.* (2022) observed a correlation between higher levels of fecal glucocorticoid metabolite concentrations (indicative of a stress response) and vessel traffic in gray whales. Yang *et al.* (2022) studied behavioral and physiological responses in captive bottlenose dolphins exposed to playbacks of "pile-driving-like" impulsive sounds, finding significant changes in cortisol and other physiological indicators but only minor behavioral changes. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as ''distress.'' In addition, any animal experiencing TTS would likely also experience stress responses (NRC, 2005), however distress is an unlikely result of this project based on observations of marine mammals during previous, similar construction projects.

Norman (2011) reviewed environmental and anthropogenic stressors for Cook Inlet beluga whales. Lyamin *et al.* (2011) determined that the heart rate of a beluga whale increases in response to noise, depending on the frequency and intensity. Acceleration of heart rate in the beluga whale is the first component of the ''acoustic startle response.'' Romano *et al.* (2004) demonstrated that captive beluga whales exposed to high-level impulsive sounds (*i.e.,* seismic airgun and/or single pure tones up to 201 dB root-mean-square (RMS)) resembling sonar pings showed increased stress hormone levels of norepinephrine, epinephrine, and dopamine when TTS was reached. Thomas *et al.* (1990) exposed beluga whales to playbacks of an oil-drilling platform in operation (''Sedco 708,'' 40 Hz-20 kHz; source level 153 dB). Ambient SPL at ambient conditions in the pool before playbacks was 106 dB and 134 to 137 dB RMS during playbacks at the monitoring hydrophone across the pool. All cell and platelet counts and 21 different blood chemicals, including epinephrine and norepinephrine, were within normal limits throughout baseline and playback periods, and stress response hormone levels did not increase immediately after playbacks. The difference between the Romano *et al.* (2004) and Thomas *et al.* (1990) studies could be the differences in the type of sound (seismic airgun and/or tone versus oil drilling), the intensity and duration of the sound, the individual's response, and the surrounding circumstances of the individual's environment. The sounds in the Thomas *et al.* (1990) study would be more similar to those anticipated by the FHWA's activities; therefore, no more than short-term, low-hormone stress responses, if any, are expected as a result of exposure to noise from the FHWA's activities.

Vocalizations and Auditory Masking. Since many marine mammals rely on sound to find prey, moderate social interactions, and facilitate mating (Tyack, 2008), noise from anthropogenic sound sources can interfere with these functions, but only if the noise spectrum overlaps with the hearing sensitivity of the receiving marine mammal (Southall *et al.,* 2007; Clark *et al.,* 2009; Hatch *et al.,* 2012). Chronic exposure to excessive, though not high-intensity, noise could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions (Clark *et al.,* 2009). Acoustic masking is when other noises such as from human sources interfere with an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.,* those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson *et al.,* 1995; Erbe *et al.,* 2016). Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from maximizing their performance fitness in survival and reproduction. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.,* signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.,* sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions (Hotchkin and Parks, 2013).

Marine mammals vocalize for different purposes and across multiple modes, such as whistling, echolocation click production, calling, and singing. Changes in vocalization behavior in response to anthropogenic noise can occur for any of these modes and may result from a need to compete with an increase in background noise or may reflect increased vigilance or a startle response. For example, in the presence of potentially masking signals, humpback whales and killer whales (*Orcinus orca*) have been observed to increase the length of their songs (Miller *et al.,* 2000; Fristrup *et al.,* 2003) or vocalizations (Foote *et al.,* 2004), respectively, while North Atlantic right whales (*Eubalaena glacialis*) have been observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks *et al.,* 2007). Fin whales (*Balaenoptera physalus*) have also been documented lowering the bandwidth, peak frequency, and center frequency of their vocalizations under increased levels of background noise from large vessels (Castellote *et al.,* 2012). Other alterations to communication signals have also been observed. For example, gray whales, in response to playback experiments exposing them to vessel noise, have been observed increasing their vocalization rate and producing louder signals at times of increased outboard engine noise (Dahlheim and Castellote, 2016). Alternatively, in some cases, animals may cease sound production during production of aversive signals (Bowles *et al.,* 1994, Wisniewska *et al.,* 2018).

Under certain circumstances, marine mammals experiencing significant masking could also be impaired from maximizing their performance fitness in survival and reproduction. Therefore, when the coincident (masking) sound is human-made, it may be considered harassment when disrupting or altering critical behaviors. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect (though not necessarily one that would be associated with harassment).

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. For example, low-frequency signals may have less effect on high-frequency echolocation sounds produced by odontocetes but are more likely to affect detection of mysticete communication calls and other potentially important natural sounds such as those produced by surf and some prey species. The masking of communication signals by anthropogenic noise may be considered as a reduction in the communication space of animals (*e.g.,* Clark *et al.,* 2009) and may result in energetic or other costs as animals change their vocalization behavior (*e.g.,* Miller *et al.,* 2000; Foote *et al.,* 2004; Parks *et al.,* 2007; Di Iorio and Clark, 2010; Holt *et al.,* 2009). Masking can be reduced in situations where the signal and noise come from different directions (Richardson *et al.,* 1995), through amplitude modulation of the signal, or through other compensatory behaviors, including modifications of the acoustic properties of the signal or the signaling behavior (Hotchkin and Parks, 2013). Masking can be tested directly in captive species (*e.g.,* Erbe, 2008), but in wild populations it must be either modeled or inferred from evidence of masking compensation. There are few studies addressing real-world masking sounds likely to be experienced by marine mammals in the wild (*e.g.,* Branstetter *et al.,* 2013).

Masking occurs in the frequency band that the animals utilize and is more likely to occur in the presence of broadband, relatively continuous noise sources such as vibratory pile driving. Energy distribution of vibratory pile driving sound covers a broad frequency spectrum and is anticipated to be within the audible range of marine mammals present in the proposed action area. Since noises generated from the proposed construction activities are mostly concentrated at low frequencies (< 2 kHz), these activities likely have less effect on mid-frequency echolocation sounds produced by odontocetes (toothed whales). However, lower frequency noises are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey noise. Low-frequency noise may also affect communication signals when they occur near the frequency band for noise and thus reduce the communication space of animals (*e.g.,* Clark *et al.,* 2009) and cause increased stress levels (*e.g.,* Holt *et al.,* 2009). Unlike TS, masking, which can occur over large temporal and spatial scales, can potentially affect the species at population, community, or even ecosystem levels, in addition to individual levels. Masking affects both senders and receivers of the signals, and at higher levels for longer durations, could have long-term chronic effects on marine mammal species and populations. However, the noise generated by the FHWA's proposed activities will only occur intermittently, across an estimated 234 days in year 1 and 193 days in year 2 during the authorization period in a relatively small area focused around the proposed construction site. Thus, while the FHWA's proposed activities may mask some acoustic signals that are relevant to the daily behavior of marine mammals, the short-term duration and limited areas affected make it very unlikely that the fitness of individual marine mammals would be impacted.

Potential Effects on Marine Mammal Habitat

The FHWA's proposed activities could have localized, temporary impacts on marine mammal habitat, including prey, by increasing in-water SPLs. Increased noise levels may affect acoustic habitat and adversely affect marine mammal prey in the vicinity of the project areas (see discussion below). Elevated levels of underwater noise would ensonify the project areas where both fishes and mammals occur and could affect foraging success. Additionally, marine mammals may avoid the area during the proposed construction activities; however, displacement due to noise is expected to be temporary and is not expected to result in long-term effects to the individuals or populations.

The total area likely impacted by the FHWA's activities is relatively small compared to the available habitat in upper Chesapeake Bay and the Patapsco River. Avoidance by potential prey (*i.e.,* fish) of the immediate area due to increased noise is possible. The duration of fish and marine mammal avoidance of this area after pile installation and associated activities stops is unknown, but a rapid return to normal recruitment, distribution, and behavior is anticipated. Any behavioral avoidance by fish or marine mammals of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity.

The proposed project will occur within the same footprint as existing marine infrastructure. The nearshore and intertidal habitat where the proposed project will occur is an area of relatively high marine vessel traffic. Most marine mammals do not generally use the area within the footprint of the project area. Temporary, intermittent, and short-term habitat alteration may result from increased noise levels during the proposed construction activities. Effects on marine mammals will be limited to temporary displacement from pile installation and removal noise, and effects on prey species will be similarly limited in time and space.

Water quality. Temporary and localized reduction in water quality will occur as a result of in-water construction activities. Most of this effect would occur during the installation and removal of piles when bottom sediments are disturbed. The installation and removal of piles would disturb bottom sediments and may cause a temporary increase in suspended sediment in the project area. During pile extraction (if necessary), sediment attached to the pile moves vertically through the water column until gravitational forces cause it to slough off under its own weight. The small resulting sediment plume is expected to settle out of the water column within a few hours. Studies of the effects of turbid water on fish (marine mammal prey) suggest that concentrations of suspended sediment can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton, 1993).

Effects to turbidity and sedimentation are expected to be short-term, minor, and localized. Since the currents are so strong in the area, following the completion of sediment-disturbing activities, suspended sediments in the water column should dissipate and quickly return to background levels in all construction scenarios. Turbidity within the water column has the potential to reduce the level of oxygen in the water and irritate the gills of prey fish species in the proposed project area. However, turbidity plumes associated with the project would be temporary and localized, and fish in the proposed project area would be able to move away from and avoid the areas where plumes may occur. Therefore, it is expected that the impacts on prey fish species from turbidity, and therefore on marine mammals, would be minimal and temporary. In general, the area likely impacted by the proposed construction activities is relatively small compared to the available marine mammal habitat in the upper Chesapeake Bay and Patapsco River.

Potential Effects on Prey. Sound may affect marine mammals through impacts on the abundance, behavior, or distribution of prey species (*e.g.,* crustaceans, cephalopods, fishes, zooplankton). Marine mammal prey varies by species, season, and location and, for some, is not well documented. Studies regarding the effects of noise on known marine mammal prey are described here.

Fishes utilize the soundscape and components of sound in their environment to perform important functions such as foraging, predator avoidance, mating, and spawning (*e.g.,* Zelick *et al.,* 1999; Fay, 2009). Depending on their hearing anatomy and peripheral sensory structures, which vary among species, fishes hear sounds using pressure and particle motion sensitivity capabilities and detect the motion of surrounding water (Fay *et al.,* 2008). The potential effects of noise on fishes depends on the overlapping frequency range, distance from the sound source, water depth of exposure, and species-specific hearing sensitivity, anatomy, and physiology. Key impacts to fishes may include behavioral responses, hearing damage, barotrauma (pressure-related injuries), and mortality.

Fish react to sounds that are especially strong and/or intermittent low-frequency sounds, and behavioral responses such as flight or avoidance are the most likely effects. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. The reaction of fish to noise depends on the physiological state of the fish, past exposures, motivation (*e.g.,* feeding, spawning, migration), and other environmental factors. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fishes (*e.g.,* Scholik and Yan, 2001, 2002; Popper and Hastings, 2009). Several studies have demonstrated that impulse sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.,* Fewtrell and McCauley, 2012; Pearson *et al.,* 1992; Skalski *et al.,* 1992; Santulli *et al.,* 1999; Paxton *et al.,* 2017). However, some studies have shown no or slight reaction to impulse sounds (*e.g.,* Peña *et al.,* 2013; Wardle *et al.,* 2001; Jorgenson and Gyselman, 2009; Cott *et al.,* 2012). More commonly, though, the impacts of noise on fishes are temporary.

SPLs of sufficient strength have been known to cause injury to fishes and fish mortality (summarized in Popper *et al.,* 2014). However, in most fish species, hair cells in the ear continuously regenerate and loss of auditory function likely is restored when damaged cells are replaced with new cells. Halvorsen *et al.* (2012b) showed that a TTS of 4 to 6 dB was recoverable within 24 hours for one species. Impacts would be most severe when the individual fish is close to the source and when the duration of exposure is long. Injury caused by barotrauma can range from slight to severe and can cause death, and is most likely for fish with swim bladders. Barotrauma injuries have been documented during controlled exposure to impact pile driving (Halvorsen *et al.,* 2012a; Casper *et al.,* 2013, 2017).

Fish populations in the proposed project area that serve as marine mammal prey could be temporarily affected by noise from pile installation and removal. The frequency range in which fishes generally perceive underwater sounds is 50 to 2,000 Hz, with peak sensitivities below 800 Hz (Popper and Hastings, 2009). Fish behavior or distribution may change, especially with strong and/or intermittent sounds that could harm fishes. High underwater SPLs have been documented to alter behavior, cause hearing loss, and injure or kill individual fish by causing serious internal injury (Hastings and Popper, 2005).

Zooplankton is a food source for several marine mammal species, as well as a food source for fish that are then preyed upon by marine mammals. Population effects on zooplankton could have indirect effects on marine mammals. Data are limited on the effects of underwater sound on zooplankton species, particularly sound from construction (Erbe *et al.,* 2019). Popper and Hastings (2009) reviewed information on the effects of human-generated sound and concluded that no substantive data are available on whether the sound levels from pile driving, seismic activity, or any human-made sound would have physiological effects on invertebrates. Any such effects would be limited to the area very near (1 to 5 m) the sound source and would result in no population effects because of the relatively small area affected at any one time and the reproductive strategy of most zooplankton species (short generation, high fecundity, and very high natural mortality). No adverse impact on zooplankton populations is expected to occur from the specified activity due, in part, to large reproductive capacities and naturally high levels of predation and mortality of these populations. Any mortalities or impacts that might occur would be negligible.

The greatest potential impact to marine mammal prey during construction would occur during impact pile driving. Impact driving would be attenuated with bubble curtains during all months, reducing the potential for injurious effects on prey species. In-water construction activities would typically occur during daylight hours, allowing fish to forage and transit the project area in the evening. Vibratory pile driving may elicit behavioral reactions from fishes such as temporary avoidance of the area but is unlikely to cause injuries to fishes or have persistent effects on local fish populations. Construction would have minimal permanent and temporary impacts on benthic invertebrate species, a marine mammal prey source. In addition, it should be noted that the area in question is low-quality habitat since it is already highly developed and experiences a high level of anthropogenic noise from normal operations and other vessel traffic.

Potential Effects on Foraging Habitat

The FSK Bridge Rebuild project is not expected to result in any habitat-related effects that could cause significant or long-term negative consequences for individual marine mammals or their populations, since installation and removal of in-water piles would be temporary and intermittent. The total seafloor area affected by pile installation and removal is a very small area compared to the vast foraging area available to marine mammals outside this project area. The mouth of the Patapsco River and the northern portion of the Chesapeake Bay are at best peripheral habitat for dolphins and not expected to include any foraging areas of particular importance. The area impacted by the project is relatively small compared to the available habitat just outside the project area, and there are no areas of particular significance that would be impacted by this project. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. As described in the preceding, the potential for the FHWA's construction to affect the availability of prey to marine mammals or to meaningfully impact the quality of physical or acoustic habitat is considered to be insignificant. Therefore, impacts of the project are not likely to have adverse effects on marine mammal foraging habitat in the proposed project area.

In summary, given the relatively small areas being affected, as well as the temporary and mostly transitory nature of the proposed construction activities, any adverse effects from the FHWA's activities on prey habitat or prey populations are expected to be minor and temporary. The most likely impact to fishes at the project site would be temporary avoidance of the area. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. Thus, we preliminarily conclude that impacts of the specified activities are not likely to have more than short-term adverse effects on any prey habitat or populations of prey species. Further, any impacts to marine mammal habitat are not expected to result in significant or long-term consequences for individual marine mammals, or to contribute to adverse impacts on their populations.

Estimated Take of Marine Mammals

This section provides an estimate of the number of incidental takes proposed for authorization through the IHA, which will inform NMFS' consideration of ''small numbers,'' the negligible impact determinations, and impacts on subsistence uses.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines ''harassment'' as any act of pursuit, torment, or annoyance, which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment);

or (ii) 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).

Authorized takes would be by Level B harassment only, in the form of behavioral reactions and/or TTS for individual marine mammals resulting from exposure to impact and vibratory pile driving. Based on the nature of the activity and the anticipated effectiveness of the mitigation measures (*i.e.,* shutdown zones and bubble curtains) discussed in detail below in the Proposed Mitigation section, Level A harassment is neither anticipated nor proposed to be authorized.

As described previously, no serious injury or mortality is anticipated or proposed to be authorized for this activity. Below we describe how the proposed take numbers are estimated.

For acoustic impacts, generally speaking, we estimate take by considering: (1) acoustic criteria above which NMFS believes there is some reasonable potential for marine mammals to be behaviorally harassed or incur some degree of AUD INJ; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) the number of days of activities. We note that while these factors can contribute to a basic calculation to provide an initial prediction of potential takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.,* previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the proposed take estimates.

Acoustic Criteria

NMFS recommends the use of acoustic criteria that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur AUD INJ of some degree (equated to Level A harassment).

Level B Harassment—Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source or exposure context (*e.g.,* frequency, predictability, duty cycle, duration of the exposure, signal-to-noise ratio, distance to the source), the environment (*e.g.,* bathymetry, other noises in the area, predators in the area), and the receiving animals (hearing, motivation, experience, demography, life stage, depth) and can be difficult to predict (*e.g.,* Southall *et al.,* 2007; Southall *et al.,* 2021; Ellison *et al.,* 2012). Based on what the available science indicates and the practical need to use a threshold based on a metric that is both predictable and measurable for most activities, NMFS typically uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS generally predicts that marine mammals are likely to be behaviorally harassed in a manner considered to be Level B harassment when exposed to underwater anthropogenic noise above RMS SPL of 120 dB re 1 μPa) for continuous (*e.g.,* vibratory pile driving, drilling) and above RMS SPL 160 dB re 1 μPa for non-explosive impulsive (*e.g.,* seismic airguns) or intermittent (*e.g.,* scientific sonar) sources. Generally, Level B harassment take estimates based on these behavioral harassment thresholds are expected to include any likely takes by TTS as, in most cases, the likelihood of TTS occurs at distances from the source less than those at which behavioral harassment is likely. TTS of a sufficient degree can manifest as behavioral harassment, as reduced hearing sensitivity and the potential reduced opportunities to detect important signals (conspecific communication, predators, prey) may result in changes in behavior patterns that would not otherwise occur.

FHWA's proposed activity includes the use of continuous non-impulsive and impulsive sources, and therefore the RMS SPL thresholds of 120 dB and 160 dB re 1μPa are applicable.

Level A harassment. NMFS' Updated Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0) (Updated Technical Guidance, 2024) identifies dual criteria to assess AUD INJ (Level A harassment) to five different underwater marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). FHWA's proposed activity includes the use of impulsive (impact driving) and non-impulsive (vibratory driving) sources.

The 2024 Updated Technical Guidance criteria include both updated thresholds and updated weighting functions for each hearing group. The thresholds are provided in table 6, below. The references, analysis, and methodology used in the development of the criteria are described in NMFS' 2024 Updated Technical Guidance, which may be accessed at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance-other-acoustic-tools.*

TABLE 6—THRESHOLDS IDENTIFYING THE ONSET OF AUDITORY INJURY

Hearing group	AUD INJ onset acoustic thresholds * (received level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1:* $L_{pk,flat}$: 222 dB; $L_{E,LF,24h}$: 183 dB	*Cell 2:* $L_{E,LF,24h}$: 197 dB.
High-Frequency (HF) Cetaceans	*Cell 3:* $L_{pk,flat}$: 230 dB; $L_{E,HF,24h}$: 193 dB	*Cell 4:* $L_{E,HF,24h}$: 201 dB.
Very High-Frequency (VHF) Cetaceans	*Cell 5:* $L_{pk,flat}$: 202 dB; $L_{E,VHF,24h}$: 159 dB	*Cell 6:* $L_{E,VHF,24h}$: 181 dB.
Phocid Pinnipeds (PW) (Underwater)	*Cell 7:* $L_{pk,flat}$: 223 dB; $L_{E,PW,24h}$: 183 dB	*Cell 8:* $L_{E,PW,24h}$: 195 dB.
Otariid Pinnipeds (OW) (Underwater)	*Cell 9:* $L_{pk,flat}$: 230 dB; $L_{E,OW,24h}$: 185 dB	*Cell 10:* $L_{E,OW,24h}$: 199 dB.

* Dual metric criteria for impulsive sounds: Use whichever criteria results in the larger isopleth for calculating AUD INJ onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level criteria associated with impulsive sounds, the PK SPL criteria are recommended for consideration for non-impulsive sources.

Note: Peak sound pressure level ($L_{p,0\text{-}pk}$) has a reference value of 1 μPa, and weighted cumulative sound exposure level ($L_{E,p}$) has a reference value of 1 μPa²s. In this table, criteria are abbreviated to be more reflective of International Organization for Standardization standards (ISO, 2017). The subscript "flat" is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals underwater (*i.e.,* 7 Hz to 165 kHz). The subscript associated with cumulative sound exposure level criteria indicates the designated marine mammal auditory weighting function (LF, HF, and VHF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The weighted cumulative sound exposure level criteria could be exceeded in a multitude of ways (*i.e.,* varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these criteria will be exceeded.

Ensonified Area

Here, we describe operational and environmental parameters of the activity that are used in estimating the area ensonified above the acoustic thresholds, including source levels and transmission loss coefficient.

The ensonified areas associated with the proposed pile driving activities were modeled by FHWA and JASCO Applied Sciences during the application preparation process (JASCO 2025), and the resulting predictions were verified in the field via hydroacoustic monitoring during a test-pile program during the fall of 2025. During monitoring, the source values associated with impact and vibratory driving of 96-in steel pipe piles were determined, as well as effectiveness of two separate noise attenuation systems, finding that for impact driving the bubble curtain attenuated source values by approximately 26.3 dB, and for vibratory by approximately 6 dB (see Proposed Mitigation, below).

Sound propagation modeling performed prior to the test-pile monitoring was found to be conservative as measured isopleths were smaller than expected in the modeling. The numerical model likely underestimated the true propagation loss, resulting in an over estimation of the sound propagation distances in this environment, as reflected by the measured data. Therefore, FHWA used the measured values from October 2025 for attenuated impact and vibratory driving in the prediction of ensonified areas for the work to be performed in Years 1 and 2 of the FSK Bridge rebuild project. For unattenuated vibratory driving, FHWA modeled with a source level increased by 10 dB based on predicted bubble curtain performance, although the measured performance was only 6 dB. Thus, increasing the source value by 10 dB is conservative.

One impact and one vibratory hammer were used during the test-pile program (table 7). The results of the test-pile driving indicated a need for larger hammers for all vibratory pile installation and for approximately 20 percent of impact pile installation. Source values for the larger hammers were approximated based on the measured results of the test-pile sound levels and the ratios of the driving forces or hammer energies; for further detail, please refer to the IHA application.

TABLE 7—MEASURED AND PREDICTED SOURCE VALUES FOR EACH HAMMER TYPE FOR 96-IN STEEL PILES

Method	Hammer details	Attenuated SPL at 10 m	Unattenuated SPL at 10 m
Impact (measured during test pile and estimated for 80% of production driving).	Menck MHU 800S Energy = 820 kilojoules (kJ) Hammer weight = 793 kiloNewtons (kN).	[a] 196.8	[a] 209.9
Impact (estimated for 20% of production driving)	Menck 1900, or similar Energy = 1900 kJ Hammer weight = 1,574 kN.	[b] 199.	[c]
Vibratory (measured during test pile)	APE 600 Driving force = 4,434 kN Hammer weight = 275 kN 22.5 Hz working frequency.	168	[d] 178
Vibratory (estimated for production driving)	ICE 200–C Driving force = 7,104 kN Hammer weight = 345 kN 26 Hz working frequency.	[b] 170	[d] 180

[a] The attenuated measured value for all 11 test piles is shown. For the 2 test piles with on/off bubble curtain testing, the measured attenuated SPL averaged 183.2 dB RMS and measured unattenuated measured 209.9 dB RMS. The bubble curtain effectiveness and unattenuated source level were based off the 2 piles with on/off testing.

[b] Value predicted based on ratio of hammer energies;

[c] —No unattenuated impact pile driving is planned, and thus no unattenuated value for the larger impact hammer was predicted or used in modeling;

[d] Measured unattenuated source level of vibratory installation for a single pile during the test pile program was 174 dB RMS, a 6 dB increase from attenuated measurements. However, modeling was completed before test pile measurements were fully analyzed and assumed 10 dB effectiveness of the bubble curtain system, resulting in overestimates of unattenuated source values.

Marine Mammal Occurrence

In this section we provide information about the occurrence of marine mammals, including density or other relevant information which will inform the take calculations. Rodriguez *et al.* (2021) synthesizes three consecutive years (2017, 2018, and 2019) of data from the DolphinWatch app collected between the months of April (2018 and 2019) and October (2017, 2018, and 2019). Data collection began in late June 2017. Overall, the highest dolphin sightings were correlated with water temperatures between 24 and 30 degrees Celsius (75.2 to 86 degrees Fahrenheit). Dolphins were sighted most in the summer, peaking in July of each year. Salinity and tidal state also influenced the spatiotemporal occurrence of bottlenose dolphins.

Density estimates for the upper Chesapeake Bay region were compiled for each year (table 8) and the geometric mean of all three years was used to estimate dolphin densities for the purpose of this analysis. Although dolphin densities are expected to be lower during spring and fall (no dolphins were sighted in the upper bay region during April, May, September, and October of 2018, with other years following a similar pattern), FHWA determined, and NMFS agrees, that the geometric mean density incorporates the confirmed dolphin sightings across spring, summer, and fall, and is suitable to estimate presence in all three seasons. Winter density of dolphins in the area is estimated at zero, as no dolphins were sighted in the shoulder months in the upper bay, and dolphins are not expected to be present in the project area during the months of December through February.

TABLE 8—DOLPHIN DENSITY BASED ON RODRIGUEZ *et al.* 2021

Year	Yearly (March–November) average density (per km²)	Geometric mean density (per km²)
2017	0.015	0.019
2018	0.026	
2019	0.017	

Take Estimation

Here we describe how the information provided above is synthesized to produce a quantitative estimate of the take that is reasonably likely to occur and proposed for authorization.

Estimated take by Level B harassment was calculated based on the ensonified areas multiplied by the seasonal density estimates and the number of in-water workdays in each season for each year. The approximate number of workdays per season includes concurrent driving, and has been limited to the maximum number of days in the appropriate months. The calculated daily, seasonal, and total take estimates for year 1 and year 2 are shown in tables 9 and 10, respectively.

TABLE 9—PROPOSED TAKE CALCULATIONS FOR YEAR 1

Method	Level B harassment area (km²)	Density	Daily exposures	Number of days	Estimated seasonal exposures	Proposed take
Summer						
Impact (80%)	0.43	0.019	0.0082	63	0.52	12
Impact (20%)	0.64		0.0122	16	0.20	
Vibratory (attenuated)[1]	7.74		0.1471	79	11.62	
Fall and Spring						
Impact (80%)	0.43	0.019	0.0082	124	1.01	59
Impact (20%)	0.64		0.0122	31	0.38	
Vibratory (unattenuated) [1]	19.48		0.3701	155	57.37	
Total Proposed Take						71

[1] Bubble curtains are proposed for use during vibratory pile driving only between June 1 and September 30 due to expected increased dolphin presence during the summer months. No bubble curtains would be used for vibratory driving outside of these dates.

TABLE 10—PROPOSED TAKE CALCULATIONS FOR YEAR 2

Method	Level B harassment area (km²)	Density	Daily exposures	Number of days	Estimated seasonal exposures	Proposed take
Summer						
Impact (80%)	0.43	0.019	0.0082	47	0.38	10
Impact (20%)	0.64		0.0122	12	0.15	
Vibratory (attenuated)	7.74		0.1471	67	9.85	
Fall and Spring						
Impact (80%)	0.43	0.0038	0.0082	44	0.36	21
Impact (20%)	0.64		0.0122	11	0.13	
Vibratory (unattenuated)	19.48		0.3701	55	20.36	
Total Proposed Take						31

[1] Bubble curtains are proposed for use during vibratory pile driving between June 1 and September 30 due to expected increased dolphin presence during the summer months. No bubble curtains would be used for vibratory driving outside of these dates.

An estimate of take by Level A harassment was performed in the same manner for days with impact pile driving. The Level A harassment area for attenuated impact driving measured during the test pile program was 0.02 km² for the smaller hammer; FHWA estimated a Level A harassment area of 0.045 km² for the larger impact hammer based on the measured distance for the smaller hammer and the ratio of hammer energies discussed previously. JASCO's acoustic model outputs indicated that the threshold for onset of AUD INJ for HF cetaceans would not be reached during vibratory pile driving (single and concurrent scenarios). Ranges from the test pile project measurements of attenuated and unattenuated vibratory pile driving were less than 10 m. Using the same number of seasonal days as shown in tables 9 and 10, the estimates of take by Level A harassment were 0.08 animals in Year 1, and 0.03 animals in Year 2. Thus, FHWA did not request any take by Level A harassment, and none is proposed for authorization. Tables 11 and 12 show the total estimated take proposed for authorization and the percentages of stocks taken for years 1 and 2, respectively.

TABLE 11—ESTIMATED PROPOSED TAKE BY LEVEL A AND LEVEL B HARASSMENT AND PERCENT OF STOCKS TAKEN FOR YEAR 1

Species	Stock	Level A	Level B	Total	Stock abundance	Percent of stock (%)
Bottlenose dolphin	Western North Atlantic Northern Migratory Coastal Stock.	0	71	71	6,639	1.07
	Western North Atlantic Southern Migratory Coastal Stock.				3,751	1.89

TABLE 12—ESTIMATED PROPOSED TAKE BY LEVEL A AND LEVEL B HARASSMENT AND PERCENT OF STOCKS TAKEN FOR YEAR 2

Species	Stock	Level A	Level B	Total	Stock abundance	Percent of stock (%)
Bottlenose dolphin	Western North Atlantic Northern Migratory Coastal Stock.	0	31	31	6,639	0.47
	Western North Atlantic Southern Migratory Coastal Stock.				3,751	0.83

Proposed Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting the activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, NMFS considers two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation (probability implemented as planned); and

(2) The practicability of the measures for applicant implementation, which may consider such things as cost and impact on operations.

The mitigation requirements described in the following were proposed by FHWA in its adequate and complete application or are the result of subsequent coordination between NMFS and FHWA. FHWA has agreed that all of the mitigation measures are practicable. NMFS has fully reviewed the specified activities and the mitigation measures to determine if the mitigation measures would result in the least practicable adverse impact on marine mammals and their habitat, as required by the MMPA, and has determined the proposed measures are appropriate. NMFS describes these below as proposed mitigation requirements, and has included them in the proposed IHAs.

In addition to the measures described later in this section, the FHWA would follow these general mitigation measures:

- Authorized take, by Level B harassment only, would be limited to the species and numbers listed in tables 11 and 12 for years 1 and 2, respectively. Construction activities must be halted upon observation of either a species for which incidental take is not authorized or a species for which incidental take has been authorized but the authorized number of takes has been met, entering or within the harassment zone.
- The taking by serious injury or death of any of the species listed in tables 11 and 12 or any taking of any other species of marine mammal would be prohibited and may result in the modification, suspension, or revocation of the IHAs, if issued. Any taking exceeding the authorized amounts listed in in tables 11 and 12 would be prohibited and may result in the modification, suspension, or revocation of the IHAs, if issued.
- Ensure that construction supervisors and crews, the marine mammal monitoring team, and relevant FHWA staff are trained prior to the start of all construction activities, so that responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures are clearly understood. New personnel joining during the project must be trained prior to commencing work;
- The FHWA, construction supervisors and crews, Protected Species Observers (PSOs), and relevant FHWA staff must avoid direct physical interaction with marine mammals

during construction activity. If a marine mammal comes within 10 m of such activity, operations must cease and vessels must reduce speed to the minimum level required to maintain steerage and safe working conditions, as necessary to avoid direct physical interaction.

- Employ PSOs and establish monitoring locations as described in section 5 of the IHA and the FHWA's Marine Mammal Monitoring and Mitigation Plan. The FHWA must monitor the project area to the maximum extent possible based on the required number of PSOs, required monitoring locations, and environmental conditions;

Additionally, the following mitigation measures apply to the FHWA's in-water construction activities:

Establishment of Shutdown Zones—The FHWA would establish shutdown zones with radial distances as identified in table 13 for all construction activities. If a marine mammal is observed entering or within the shutdown zones indicated in table 13, pile driving activity must be delayed or halted. If pile driving is delayed or halted due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily exited and been visually confirmed beyond the shutdown zones or 15 minutes have passed without re-detection of the animal.

TABLE 13—PROPOSED SHUTDOWN ZONES DURING PROJECT ACTIVITIES

Activity	Season	Shutdown zone (m)	Monitoring zone (Level B) (m)
Impact—small hammer	All	80	370
Impact—large hammer	All	120	450
Vibratory (Single Hammer)	Summer	10	1,330
	Fall, Winter, Spring	10	2,200
Vibratory (Concurrent)	Summer	10	1,570
	Fall, Winter, Spring	10	2,490

Pre- and Post-Activity Monitoring—Monitoring would take place from 30 minutes prior to initiation of pile driving activity (*i.e.,* pre-start clearance monitoring) through 30 minutes post-completion of pile driving activity. In addition, monitoring for 30 minutes would take place whenever a break in the specified activity (*i.e.,* impact pile driving, vibratory pile driving) of 30 minutes or longer occurs. Pre-start clearance monitoring would be conducted during periods of visibility sufficient for the lead PSO to determine that the shutdown zones indicated in table 13 are clear of marine mammals. Pile driving may commence following 30 minutes of observation when the determination is made that the shutdown zones are clear of marine mammals.

If nighttime pile driving is required, PSOs will continue monitoring using infrared goggles or other night-vision equipment. Additionally, the shutdown zones will be illuminated during any night pile driving.

Soft Start—The FHWA would use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of three strikes at reduced energy, followed by a 30-second (sec) waiting period, then two subsequent reduced-energy strike sets. A soft start would be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer. Soft start procedures are used to provide additional protection to marine mammals by providing warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. Soft starts would not be required for infrequently occurring pile restrikes (short duration events with low blow counts) due to technical conflicts with hammer energy.

Noise Attenuation Systems

A bubble curtain would be deployed for all impact pile driving except during pile restrikes, regardless of pile size or time of year. Pile restrikes are short-duration events with low blow counts that occur infrequently to test pile stability after it has been driven. Using soft start techniques during restrikes presents technical conflicts with hammer energy. A 3-ring bubble curtain would be used during impact pile driving of 96-in and 48-in piles, consisting of three perforated pipe rings stacked vertically along the length of the driven pile. The pipes in all layers would be arranged in a geometric pattern to allow for the pile being driven to be completely enclosed by bubbles for the full depth of the water column. At a minimum, the bubble curtain would distribute air bubbles around 100 percent of the piling circumference for the full depth of the water column, the lowest bubble ring would be in contact with the substrate for the full circumference of the ring, and the weights attached to the bottom ring would ensure 100 percent substrate contact. No parts of the ring or other objects would prevent full substrate contact. In addition, air flow to the bubblers would be balanced around the circumference of the pile.

For vibratory pile driving, a separate perimeter-style bubble curtain system would be deployed from June 1–September 30 when dolphins are most likely to be in the area. The perimeter style hose will sit on the riverbed and surround the pile being driven. The hose will be a Flexral AR60HT hose perforated with ¼-in holes at 5-in spacing or similar.

Impact hammering associated with the 36-in trestle piles will also be protected by either a bubble ring system or a perimeter ring system.

Both bubble curtain systems were evaluated for effectiveness during the fall 2025 FSK Bridge Test Pile Program (table 14) (Denes, 2026). The effectiveness of the 3-ring bubble curtain was measured during the installation of eight 96-in piles. During the installation of the first two test piles, the bubble curtain was turned on and off in approximately 15-minute intervals. Measurements from the rest of the piles occurred with the bubble curtain active throughout. To determine the effectiveness of the bubble curtains, regressions of measurements of pile driving noise were used to estimate the SPL at approximately 10 m from the pile for each hammer type and bubble curtain condition (on/off). The average SPL at 10 m for impact pile driving without a bubble curtain was 206.3 dB re: 1 μPa and with a bubble curtain was 180.0 re: 1 μPa.

TABLE 14—MEASURED BUBBLE CURTAIN EFFECTIVENESS FROM FSK TEST PILE PROGRAM (OCTOBER 2025)

[Denes, 2026]

Method	Bubble curtain type	Measured attenuation (dB)
Impact	Tiered 3-ring system	26.3
Vibratory	Perimeter hose system	6.0

During the noise monitoring study, vibratory setting was conducted for under 10 minutes per pile, an insufficient duration to measure alternating bubble curtain conditions for a given pile and have the bubbles dissipate. Therefore, there was only one pile measured with the bubble curtain off. The average SPL at 10 m for vibratory setting without a bubble curtain was 174.0 dB re: 1 μPa RMS and with a bubble curtain was 168.0 dB re: 1 μPa RMS (Denes, 2026).

Based on our evaluation of the applicant's proposed measures, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance. NMFS conducted an independent evaluation of the proposed measures, and has preliminarily determined for each of the proposed IHAs that the proposed mitigation measures provide the means of effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present while conducting the activities. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.,* presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.,* source characterization, propagation, ambient noise); (2) affected species (*e.g.,* life history, dive patterns); (3) co-occurrence of marine mammal species with the activity; or (4) biological or behavioral context of exposure (*e.g.,* age, calving or feeding areas);
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.,* marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

The monitoring and reporting requirements described in the following were proposed by FHWA in its adequate and complete application and/or are the result of subsequent coordination between NMFS and FHWA. FHWA has agreed to the requirements. NMFS describes these below as requirements and has included them in the proposed IHAs.

Visual Monitoring

Qualified NMFS-approved PSOs must conduct monitoring in accordance with the project's Marine Mammal Monitoring Plan. PSOs would be independent of the activity contractor (for example, employed by a subcontractor) and have no other assigned tasks during monitoring periods. At least one PSO would have prior experience performing the duties of a PSO during an activity pursuant to a NMFS-issued incidental take authorization. Other PSOs may substitute other relevant experience, education (degree in biological science or related field), or training for prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued ITA. PSOs would be present during all pile installation and removal activities, including vibratory and impact methods during summer months, with reduced presence during spring, fall, and winter seasons, in accordance with the following:

- Observer training must be provided before the project starts and must include instruction on species identification (sufficient to distinguish the species in the project area), description and categorization of observed behaviors, and interpretation of behaviors that may be construed as being reactions to the specified activity, proper completion of data forms, and other basic components of biological monitoring, including tracking of observed animals or groups of animals such that repeat sound exposures may be attributed to individuals (to the extent possible).
- All PSOs must have no other project-related tasks while conducting monitoring.
- PSOs shall be placed at the best vantage point(s) practicable to monitor for marine mammals and implement shutdown or delay procedures when applicable through communication with the equipment operator.
- A minimum of two independent NMFS-approved PSOs will be active and on duty at a time from June 1 through September 30. The PSO closest to the hammer will be designated as the lead PSO. The lead PSO will be responsible for monitoring the shutdown zone and coordinating communication between PSOs and between PSOs and construction crew. One PSO would be stationed on or near the pile driving platform or barge to monitor the full shutdown zone and as much of the clearance zone as possible. Another PSO would be actively monitoring the downriver portion of the

clearance zone from the bow of the barge or equivalent.

- From October 1 through November 30 and March 1 through May 31, one PSO will be active and on duty at a time. This PSO will be stationed on the pile driving barge or equivalent.
- From December 1 through February 28, one PSO will be active and on duty one day a week. This PSO will be stationed on the pile driving barge or equivalent.
- Between April 15 and October 30, pile driving activities will be initiated only during daylight hours when the PSO (if present) can visually monitor for the presence of marine mammals. In the event that pile driving continues after dusk (to complete the installation of a pile in progress), night vision equipment (handheld night vision devices or handheld thermal imagers), will be used.
- Monitoring would be conducted 30 minutes before, during, and 30 minutes after drilling and pile driving/removal activities. In addition, observers shall record all incidents of marine mammal occurrence, regardless of distance from activity, and must document any behavioral reactions in concert with the distance from piles being driven or removed. PSOs would include the time to install or remove a single pile or series of piles, as long as the time elapsed between uses of the pile driving equipment is no more than 30 minutes.
- PSOs would scan the waters using binoculars and/or the naked eye to search for marine mammals.
- PSOs will rotate shifts and stations to reduce potential fatigue. No PSO will be assigned a combined watch schedule of more than 12 hours in any 24-hour period.

Additionally, PSOs should meet the following qualifications:

- Have the ability to conduct field observations and collect data according to assigned protocols;
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound of marine mammals observed within a defined shutdown zone; and marine mammal behavior; and
- Ability to communicate orally, by radio, or in person with project personnel to provide real-time information on marine mammals observed in the area as necessary.

Hydroacoustic Monitoring—The FHWA would conduct hydroacoustic monitoring to ground truth the zones over which effects to marine mammals are expected for each location and source/mitigation system configuration. An acoustic monitoring plan would be submitted to NMFS no later than 60 days prior to the beginning of impact pile driving for approval. FHWA proposes that underwater noise measurements of the first 5 piles installed of each size (24-, 36-, 48-, and 96-in steel) with both impact and vibratory driving would be collected. Beyond the first 5 piles of each size, underwater noise monitoring will be conducted during the installation of one pile per month for the duration of the project under normal production driving conditions.

Data will be collected using a bottom-moored hydrophone at a single location. Underwater acoustic recorders will be deployed at prescribed locations in the area of the project at different distances from the active pile (see figure 14 of the FHWA's application). Underwater noise data will be collected at near-field, intermediate, and far-field locations to monitor noise associated with the active pile.

Environmental data would be collected, including but not limited to, the following: wind speed and direction, air temperature, humidity, surface water temperature, water depth, wave height, weather conditions, and other factors that could contribute to influencing the airborne and underwater sound levels (*e.g.,* aircraft, boats, *etc.*). The chief inspector would supply the acoustics specialist with the substrate composition, hammer model and size, hammer energy settings and any changes to those settings during the piles being monitored.

For acoustically monitored piles, data from the monitoring locations would be post-processed to obtain the following sound measures:

- Mean, median, minimum, and maximum RMS pressure level in [dB re 1 μPa];
- Mean, median, minimum, and maximum single strike SEL in [dB re μPa^2s];
- Cumulative SEL as defined by the mean single strike SEL + 10*log10 (number of hammer strikes) in [dB re μPa^2s]; and
- A frequency spectrum (pressure spectral density) in dB re μPa^2 per Hz based on the average of up to eight successive strikes with similar sound. Spectral resolution would be 1 Hz, and the spectrum would cover nominal range from 7 Hz to 20 kHz.

Reporting

Draft marine mammal monitoring and hydroacoustic monitoring reports would be submitted to NMFS within 90 days after the completion of pile driving activities for each IHA or 60 days before the requested date of issuance of any future IHAs for projects at the exact location, whichever comes first. The marine mammal monitoring report would include an overall description of work completed, a narrative regarding marine mammal sightings, and associated PSO data sheets. Specifically, the report must include:

- Dates and times (beginning and end) of all marine mammal monitoring;
- Construction activities occurring during each daily observation period, including the number and type of holes/piles driven or removed and by what method (*i.e.,* impact, vibratory, or drilling);
- PSO locations during marine mammal monitoring; and
- Environmental conditions during monitoring periods (at the beginning and end of a PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions, including cloud cover, fog, sun glare, and overall visibility to the horizon, and estimated observable distance. Upon observation of a marine mammal, the following information is required:
- The name of the PSO who sighted the animal(s), the PSO's location, and activity at the time of the sighting;
- The time of the sighting;
- Identification of the animal(s) (*e.g.,* genus/species, lowest possible taxonomic level, or unidentified), the PSO's confidence in identification, and the composition of the group if there is a mix of species;
- The distance and bearing of each marine mammal observed relative to the specified activity for each sighting (*e.g.,* if pile driving was occurring at the time of sighting);
- The estimated number of animals (min/max/best estimate);
- The estimated number of animals by cohort (adults, juveniles, neonates, group composition, sex class, *etc.*);
- The animal's closest point of approach and estimated time spent within the harassment zone;
- A description of any marine mammal behavioral observations (*e.g.,*

observed behaviors such as feeding or traveling), including an assessment of behavioral responses thought to have resulted from the activity (*e.g.,* no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching);

• The number of marine mammals detected within the harassment zones by species (differentiated by month as appropriate);

• Detailed information about any implementation of any mitigation triggered (*e.g.,* shutdowns and delays), a description of specific actions that ensued, and the resulting changes in the behavior of the animal(s), if any; and

• All PSO datasheets and/or raw sighting data in an electronic tabular format with the draft report.

Acoustic monitoring report(s) must be submitted on the same schedule as visual monitoring reports (*i.e.,* within 90 days following the completion of construction). The acoustic monitoring report must contain the informational elements described in the Acoustic Monitoring Plan and, at minimum, must include:

• Hydrophone equipment and methods: (1) recording device, sampling rate, calibration details, distance (m) from the pile where recordings were made; and (2) the depth of water and recording device(s);

• Location, identifier, orientation (*e.g.,* vertical, battered), material, and geometry (shape, diameter, thickness, length) of pile being driven, substrate type, method of driving during recordings (*e.g.,* hammer model and energy), and total pile driving duration;

• Whether a sound attenuation device is used and, if so, a detailed description of the device used, its distance from the pile and hydrophone, and the duration of its use per pile;

• For impact pile driving: (1) number of strikes per day and per pile and strike rate; (2) depth of substrate to penetrate; (3) decidecade (one-third octave) band spectra in tabular and figure formats computed on a per-pulse basis, including the arithmetic mean or median for all computed spectra; (4) pulse duration and median, mean, maximum, minimum, and number of samples (where relevant) of the following sound level metrics: (5) RMS SPL; (6) SEL_{24}, Peak (PK) SPL, and SEL_{ss}; and

• For vibratory driving/removal: (1) duration of driving per pile; (2) vibratory hammer operating frequency; (3) decidecade (one-third octave) band spectra in tabular and figure formats for 1-sec windows, including the arithmetic mean or median for all computed spectra; and (4) median, mean, maximum, minimum, and number of samples (where relevant) of the following sound level metrics: 1-sec RMS SPL, SEL_{24} (and timeframe over which the sound is averaged).

If no comments are received from NMFS within 30 days, the draft reports would constitute the final reports. If comments are received, a final report addressing NMFS comments must be submitted within 30 days after receipt of comments.

Reporting Injured or Dead Marine Mammals

In the unanticipated event that the specified activity causes the take of a marine mammal in a manner prohibited by the IHAs (if issued), such as an injury, serious injury, or mortality, FHWA must immediately cease the specified activities and report the incident to the NMFS Office of Protected Resources (*PR.ITP.MonitoringReports@noaa.gov* and *ITP.hotchkin@noaa.gov*) and to the regional stranding coordinator as soon as feasible. The report must include the following information:

• Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);

• Species identification (if known) or description of the animal(s) involved;

• Condition of the animal(s) (including carcass condition if the animal is dead);

• Observed behaviors of the animal(s), if alive;

• If available, photographs or video footage of the animal(s); and

• General circumstances under which the animal was discovered.

Activities would not resume until NMFS can review the circumstances surrounding the prohibited take. NMFS would work with FHWA to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. FHWA must not resume in-water construction activities until NMFS has notified them via letter, email, or telephone.

If FHWA discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (*e.g.,* in less than a moderate state of decomposition as described in the next paragraph), then the Navy would immediately report the incident to the NMFS Office of Protected Resources (*PR.ITP.MonitoringReports@noaa.gov*) and to the regional stranding coordinator as soon as feasible. The report would include the same information identified in the paragraph above. Activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would work with FHWA to determine whether modifications in the activities are appropriate.

Finally, in the event that FHWA discovers an injured or dead marine mammal and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHAs (*e.g.,* previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the FHWA would report the incident to the Office of Protected Resources, NMFS, and the NMFS Stranding Hotline and/or by email to the Regional Stranding Coordinator, within 24 hours of the discovery. FHWA would provide photographs, video footage (if available), or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.,* population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be ''taken'' through harassment, NMFS considers other factors, such as the likely nature of any impacts or responses (*e.g.,* intensity, duration), the context of any impacts or responses (*e.g.,* critical reproductive time or location, foraging impacts affecting energetics), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS' implementing regulations (54 FR 40338, September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the baseline (*e.g.,* as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

NMFS has identified key factors which may be employed to assess the level of analysis necessary to conclude whether potential impacts associated with a specified activity should be considered negligible. These include, but are not limited to, the type and magnitude of taking, the amount and importance of the available habitat for the species or stock that is affected, the duration of the anticipated effect to the species or stock, and the status of the species or stock. The potential effects of the specified activities on Tamanend's bottlenose dolphins are discussed below.

Pile driving associated with the FSK Bridge Rebuild project, as outlined previously, has the potential to disturb or displace marine mammals. Specifically, the specified activities may result in take, in the form of Level B harassment only from underwater sounds generated by pile driving. Potential takes could occur if dolphins are present in zones ensonified above the threshold for Level B harassment identified above while activities are underway.

The FHWA's proposed activities and associated impacts would occur within a limited, confined area of the stocks' range. The work would occur in the vicinity of the FSK Bridge Rebuild project site, and sound from the specified activities would be blocked by the shorelines of the Patapsco River and Chesapeake Bay. The intensity and duration of take by Level B harassment would be minimized through use of mitigation measures described herein. Further, the presence of dolphins in the area is limited and typically seasonal as animals move through the area chasing prey associated with changing water temperatures, thereby reducing the potential for prolonged exposure or behavioral disturbance. In addition, NMFS does not anticipate that serious injury or mortality will occur as a result of the FHWA's proposed activity given the nature of the activity, even in the absence of required mitigation.

Exposures to elevated sound levels produced during pile driving may cause behavioral disturbance of some individuals. Behavioral responses of marine mammals to pile driving at the FSK Bridge Rebuild project site are expected to be mild, short term, and temporary. Effects on individuals that are taken by Level B harassment, as enumerated in the Estimated Take section, on the basis of reports in the literature as well as monitoring from other similar activities elsewhere, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging if such activity were occurring (*e.g.,* Ridgway *et al.,* 1997; Nowacek *et al.,* 2007; Thorson and Reyff, 2006; Kendall and Cornick, 2015; Goldbogen *et al.,* 2013b; Blair *et al.,* 2016; Wisniewska *et al.,* 2018; Piwetz *et al.,* 2021). Marine mammals within the Level B harassment zones may not show any visual cues that they are disturbed by activities, or they could become alert, avoid the area, leave the area, or display other mild responses that are not visually observable such as exhibiting increased stress levels (*e.g.,* Rolland *et al.,* 2012; Lusseau, 2005; Bejder *et al.,* 2006; Rako *et al.,* 2013; Pirotta *et al.,* 2015; Pérez-Jorge *et al.,* 2016). They may also exhibit increased vocalization rates, louder vocalizations, alterations in the spectral features of vocalizations, or a cessation of communication signals (Hotchkin and Parks 2013).

Bottlenose dolphins in the region will only be present temporarily based on seasonal patterns. Thus, individuals present will be exposed to only transient periods of noise-generating activity as they move past the project site. Most likely, individual animals will either be temporarily deterred from swimming past the construction activities and will pass by when no pile driving is occurring, or will swim through the area more quickly. Takes may also occur during important foraging seasons, when anadromous fishes are migrating past the project area and marine mammals follow. However, the FSK Bridge project area represents a small portion of available foraging habitat and impacts on dolphin feeding are expected to be minimal. No marine mammal species or individuals are known or expected to be resident in the project area, and impacts are unlikely to be more than temporary and low-intensity.

The activities analyzed here are similar to numerous other coastal construction activities which have taken place with no known long-term adverse consequences from behavioral harassment. Any potential reactions and behavioral changes are expected to subside quickly when the exposures cease, and therefore, no long-term adverse consequences are expected (*e.g.,* Graham *et al.,* 2017). While there are no long-term peer-reviewed studies of marine mammal habitat use in the Patapsco River, studies from other areas indicate that most marine mammals would be expected to have responses on the order of hours to days. The intensity of Level B harassment events will be minimized through use of mitigation measures described herein, which were not quantitatively factored into the take estimates. The FHWA will use PSOs stationed strategically to increase detectability of marine mammals during in-water construction activities, enabling a high rate of success in implementation of shutdowns to minimize any likelihood of injury. Further, given the absence of any important habitat areas within the estimated harassment zones, we assume that potential takes by Level B harassment will have an inconsequential short-term effect on individuals and will not result in population-level impacts.

As stated in the Mitigation section, the FHWA will implement shutdown zones (table 13). No take by Level A harassment is proposed for authorization and thus is not expected to adversely impact individual fitness, let alone annual rates of recruitment or survival for the affected species or stocks.

Repeated, sequential exposure to pile driving noise over a long duration could result in more severe impacts to individuals that could affect a population (via sustained or repeated disruption of important behaviors such as feeding, resting, traveling, and socializing; Southall *et al.,* 2007). Alternatively, marine mammals exposed to repetitious construction sounds may become habituated, desensitized, or tolerant after initial exposure to these sounds (reviewed by Richardson *et al.,* 1995; Southall *et al.,* 2007). However, given the relatively low abundance and generally transitory nature of marine mammals in the Chesapeake Bay and Patapsco River near the project location compared to the stock sizes (tables 10 and 11), population-level impacts are not anticipated. The absence of any important habitat areas in the action area further decreases the likelihood of population-level impacts.

The FSK Bridge Rebuild project is also not expected to have significant adverse effects on any marine mammal habitats. The long-term impact on marine mammals associated with the FSK Bridge Rebuild project would be a small permanent decrease in low-quality potential habitat because of the shifted footprint of the bridge. Installation of in-water piles would be temporary and intermittent, and the increased footprint of the facilities would destroy only a small amount of low-quality habitat, which currently experiences high levels of anthropogenic activity. Impacts to the immediate substrate are anticipated, but these would be limited to minor, temporary suspension of sediments, which could impact water quality and visibility for a short amount of time but which would not be expected to have any effects on individual marine mammals. Further, there are no known biologically important areas near the FSK Bridge project zone that will be impacted by the FHWA's proposed activities.

Impacts to marine mammal prey species are also expected to be minor and temporary and to have, at most, short-term effects on foraging of individual marine mammals and likely no effect on the populations of marine mammals as a whole. Overall, the area impacted by the FSK Bridge project is very small compared to the available surrounding habitat and does not include habitat of particular importance. The most likely impact to prey would be temporary behavioral avoidance of the immediate area. During construction activities, it is expected that some fish and marine mammals would temporarily leave the area of disturbance, thus impacting marine mammals' foraging opportunities in a limited portion of their foraging range. But, because of the relatively small area of the habitat that may be affected and lack of any habitat of particular importance, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences.

In summary and as described above, the following factors primarily support our preliminary negligible impact determinations for the affected stocks of Tamanend's bottlenose dolphins:

- No takes by mortality or serious injury or by Level A harassment are anticipated or authorized;
- Any acoustic impacts to marine mammal habitat from pile driving are expected to be temporary and minimal;
- Take will not occur in places and/or times where take would be more likely to accrue to impacts on reproduction or survival, such as within habitats critical to recruitment or survival (*e.g.,* rookery);
- The FSK Bridge Rebuild project area represents a very small portion of the available foraging area for all potentially impacted marine mammal species and does not contain any habitat of particular importance;
- Take will only occur within the Chesapeake Bay and Patapsco River, which is a limited, confined area of any given stock's home range;
- Monitoring reports from similar work have documented little to no observable effect on individuals of the same species impacted by the specified activities;
- The required mitigation measures (*i.e.,* soft starts, pre-clearance monitoring, shutdown zones, bubble curtains) are expected to be effective in reducing the effects of the specified activity by minimizing the numbers of marine mammals exposed to injurious levels of sound; and
- The intensity of anticipated takes by Level B harassment is low for all stocks consisting of, at worst, temporary modifications in behavior, and would not be of a duration or intensity expected to result in impacts on reproduction or survival.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds for each of the proposed IHAs that the total marine mammal take from the proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted previously, only take of small numbers of marine mammals may be authorized under section 101(a)(5)(A) and (D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. When the predicted number of individuals to be taken is fewer than one-third of the species or stock abundance, the take is considered to be of small numbers (see 86 FR 5322, January 19, 2021). Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

For all stocks, the number of takes proposed for authorization is less than one-third of the best available population abundance estimate (*i.e.,* no more than 1.9 percent of any stock in year 1, and no more than 0.9 percent of any stock in year 2; see tables 11 and 12). The maximum annual number of animals that may be authorized to be taken from these stocks would be considered small relative to the relevant stock's abundances even if each estimated take occurred to a new individual.

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds for each of the proposed IHAs that small numbers of marine mammals would be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

Section 7(a)(2) of the ESA of 1973 (16 U.S.C. 1531 *et seq.*) requires that each Federal agency ensures that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of incidental take authorizations, NMFS consults internally whenever we propose to authorize take for ESA-listed species.

No incidental take of ESA-listed species is proposed for authorization or expected to result from this activity. Therefore, NMFS has determined that formal consultation under section 7 of the ESA is not required for this action.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue two consecutive IHAs to FHWA for conducting the FSK Bridge Rebuild project near Baltimore, MD, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. A draft of the proposed IHAs can be found at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities.*

Request for Public Comments

We request comment on our analyses, the proposed authorization, and any other aspect of this notice of proposed IHAs for the proposed FSK Bridge Rebuild project. We also request comment on the potential renewal of these proposed IHAs as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform decisions on the request for these IHAs or any subsequent renewal IHAs.

On a case-by-case basis, NMFS may issue a one-time, 1-year renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical or nearly identical activities as described in the Description of Proposed Activity section of this notice is planned or (2) the activities as described in the Description of Proposed Activity section of this notice would not be completed by the time the IHA expires and a renewal would allow for completion of the activities beyond that described in the *Dates and Duration* section of this notice, provided all of the following conditions are met:

- A request for renewal is received no later than 60 days prior to the needed renewal IHA effective date (recognizing that the renewal IHA expiration date cannot extend beyond 1 year from expiration of the initial IHA).
- The request for renewal must include the following:

1. An explanation that the activities to be conducted under the requested renewal IHA are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor (*e.g.,* reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take).

2. A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

- Upon review of the request for renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

Dated: April 16, 2026.

Kimberly Damon-Randall,

Director, Office of Protected Resources, National Marine Fisheries Service.

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

Agency Information Collection Activities; Submission to the Office of Management and Budget (OMB) for Review and Approval; Comment Request; NOAA Office of Education Higher Education Scholarship, Fellowship, and Internship Programs

The Department of Commerce will submit the following information collection request to the Office of Management and Budget (OMB) for review and clearance in accordance with the Paperwork Reduction Act of 1995, on or after the date of publication of this notice. We invite the general public and other Federal agencies to comment on proposed, and continuing information collections, which helps us assess the impact of our information collection requirements and minimize the public's reporting burden. Public comments were previously requested via the **Federal Register** on December 8, 2025, during a 60-day comment period. This notice allows for an additional 30 days for public comments.

Agency: National Oceanic and Atmospheric Administration, Commerce.

Title: NOAA Office of Education Higher Education Scholarship, Fellowship, and Internship Programs.

OMB Control Number: 0648–0568.

Form Number(s): None.

Type of Request: Regular submission. Revision and extension of approved collection.

Number of Respondents: 3,379.

Average Hours per Response: Hollings and EPP/MSI Application—12 hours; Hollings and EPP Reference—1 hour; Voluntary Alumni Update Form—0.1 hours; Student Tracker Form—28 hours; EPP Graduate Fellowship Application—12 hours; EPP Graduate Fellowship References—1 hour; Student Training Record Form—0.5 hours; Hollings and EPP Student Surveys—0.25 hours; Hollings and EPP Mentor Surveys—0.5 hours; Hollings and EPP Travel Request Forms—0.25 hours.

Total Annual Burden Hours: 13,043.

Needs and Uses: This request is for extension and revision of a current information collection.

The National Oceanic and Atmospheric Administration (NOAA) Office of Education is sponsoring the information collection herein described. The Administrator of NOAA is authorized by section 4002 of the America COMPETES Act, Public Law 110–69, to establish and administer a Graduate Sciences Program and two undergraduate scholarship programs to enhance understanding of ocean, coastal, Great Lakes, and atmospheric science and stewardship by the general public and other coastal stakeholders, including underrepresented groups in ocean and atmospheric science and policy careers. In addition, NOAA's Administrator is authorized by section 214 of the Consolidated Appropriations Act, 2005, Public Law 108–447, to establish and administer the Ernest F. Hollings Undergraduate Scholarship Program to support undergraduate studies in oceanic and atmospheric science, research, technology, and education that support NOAA's mission and programs.

The NOAA Office of Education collects, evaluates, and assesses student data and information for the purpose of selecting successful candidates for scholarships, fellowships and internships, generating internal NOAA reports, and articles to demonstrate the success of its program.

The purpose of the NOAA Educational Partnership Program with Minority Serving Institutions (EPP) is to educate, train and graduate students in NOAA mission-aligned disciplines to build a pool of candidates eligible for the future NOAA workforce. The EPP program is strongly committed to broadening the participation of Minority Serving Institutions such as Historically Black Colleges and Universities, Hispanic Serving Institutions, Indian Tribally Controlled Colleges and Universities, Alaska Native-Serving Institutions, and Native Hawaiian-Serving Institutions. The EPP program has five program components: the Undergraduate Scholarship Program (USP); the Cooperative Science Centers (CSCs); Graduate Fellowship Program (GFP); the Graduate Sciences Program (GSP); and the Environmental Entrepreneurship Program (EEP). The GSP and EEP programs are no longer actively supporting students, however alumni of those programs may provide updates to EPP of educational and career changes.

The Ernest F. Hollings Undergraduate Scholarship Program was established to increase undergraduate training in oceanic and atmospheric science, research, technology, and education and foster multidisciplinary training opportunities.

The NOAA Office of Education requires all applicants to NOAA's Undergraduate Scholarship Programs to complete an application in order to be considered. The application package requires two faculty and/or academic advisors to complete a student scholar