Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion

Action Agency: Department of the Navy, Joint Base Pearl Harbor-Hickam

Federal Action: Dry dock operations at the Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility, Joint Base Pearl Harbor-Hickam, Oahu, HI

Consultation Conducted by: National Marine Fisheries Service, Pacific Islands Region, Protected Resources Division

NMFS File No. (ECO): PIRO-2024-02263

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Sarah Malloy
Regional Administrator, Pacific Islands Region

Date Issued: January 16, 2025

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1 INTRODUCTION

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1536(a)(2)) requires each federal agency to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. The ESA requires federal action agencies to consult with the National Marine Fisheries Service (NMFS) when the action may affect a listed species or its designated critical habitat under our jurisdiction (50 CFR 402.14(a)).

Section 7(b)(3) of the ESA requires that at the conclusion of consultation, we provide a biological opinion (opinion) stating whether the Federal agency's action is likely to jeopardize ESA-listed species or destroy or adversely modify designated critical habitat. If we determine that the action is likely to jeopardize listed species or destroy or adversely modify critical habitat, in accordance with the ESA section 7(b)(3)(A), we provide a reasonable and prudent alternative that allows the action to proceed in compliance with section 7(a)(2) of the ESA. If incidental take[1] is reasonably certain to occur, section 7(b)(4) requires us to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes reasonable and prudent measures to minimize such impacts and terms and conditions to implement the reasonable and prudent measures.

We prepared this opinion and ITS in accordance with section 7(b) of the ESA and implementing regulations at 50 CFR part 402. We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). Following signature and finalization, this document will be available at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome].

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

[1] Under the ESA, the term "take" is defined by the ESA as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. We further define "harass" as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Application and Interpretation of the Term Harass Pursuant to the Endangered Species Act: NMFS Guidance Memo May 2, 2016). NMFS defines harm as "an act which actually kills or injures fish or wildlife." 50 C.F.R. 222.102. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering.

1.1 Consultation History

The proposed federal action addressed by this biological opinion is the ongoing operations of the four existing dry docks and the operation of Dry Dock 5 (DD5) once construction is completed within the Pearl Harbor Naval Shipyard (PHNSY) and Intermediate Maintenance Facility (IMF) at the Joint Base Pearl Harbor Hickam (JBPHH) with the express purpose of supporting maintenance and modernization of the United States' Navy's Pacific Fleet. A consultation was previously conducted on the construction and operation of DD5 and the Waterfront Production Facility (WPF; NMFS 2022a). The current biological opinion will supersede the 2022 biological opinion for the operations of DD5 only.

On November 12, 2022, after several inter-agency meetings over two years, NMFS issued a biological opinion assessing the effects on ESA-listed species and critical habitat of constructing, operating, and maintaining DD5 to functionally replace an existing dry dock (DD3) used for maintaining and repairing submarines in a separate location within the PHNSY, as well as the operation, construction, and maintenance of the new WPF (NMFS 2022a). The WPF houses various facilities and equipment used to support vessel service and maintenance operations. The 2022 biological opinion determined that Central North Pacific (CNP) green sea turtles and hawksbill sea turtles were likely to be adversely affected, but not jeopardized by the action, and authorized incidental take of these two species.

On February 8, 2024, personnel from the PHNSY and IMF held a pre-consultation meeting with NMFS to discuss the proposed operations of DD1 – 4. NMFS suggested including the operation of DD5 in the consultation as well, thereby superseding the previous consultation from 2022 for the operation of DD5 only. This was agreed to by NMFS and action proponents with the aim of streamlining tracking and maintenance of NMFS terms and conditions for dry dock operations at the PHNSY and IMF under a single biological opinion.

On September 5, 2024 the PHNSY and IMF submitted a finalized biological evaluation (BE) covering future actions that will be conducted in DD1 – 5, and NMFS initiated formal consultation. The PHNSY and IMF determined the proposed action is likely to adversely affect but not jeopardize CNP green sea turtles and hawksbill sea turtles, and not likely to adversely affect Hawaiian monk seals.

1.2 Proposed Federal Action

Under the ESA (50 CFR 402.02), the term "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas (see 50 CFR 402.02). The U.S. Navy proposes to continue operating and maintaining the dry docks (DD1 – 4) at the PHNSY and IMF and to operate and maintain DD5 once it is complete.

1.2.1 Operation of Dry docks

All dry docks at PHNSY and IMF are caisson dry docks that support depot-level maintenance (major repair, overhauling, or complete rebuilding) of submarine and surface vessels. A caisson is a mobile structure (made of a welded, steel-plate assembly) placed at the seaward end of the dry dock to form a water-tight seal, which aids with regulating the dry dock flooding and de-

watering process. Dry docks undergo "evolutions" to allow vessels in need of repair or maintenance to enter and exit. A dry dock evolution consists of the following steps:

- Flooding - An evolution begins by filling the dry dock (generally situated below sea-level), where seawater adjacent to the dry dock is gravitationally fed via flood-through tubes within the caisson or flooding tunnels, fitted with intake grating to prevent debris from entering/clogging the piping systems. As the water level rises within the dry dock, the bubble curtain spanning the entryway, from one end to the other and running the entire length of the dry dock walls, is activated with facility-supplied air.
- Caisson Removal – Once flooding is completed, the caisson is removed to allow vessel entry.
- Caisson Replacement – After the vessel enters the dry dock, the caisson is secured back into its original position to close the dry dock entryway and create a water-tight seal in prep for the de-watering process.
- Dewatering/Pump-down – Prior to dewatering the dry dock, vessel operators stabilize the vessel on top of large keel blocks (pre-placed many weeks in advance of the dry dock evolution), with the support of technical divers communicating guidance and underwater observations to shore and vessel personnel. Once the vessel is adequately stabilized on keel blocks, the seawater within the dry dock is slowly pumped back out into the harbor waterway, which takes one to three hours, depending on the size of the dry dock.

Construction of DD5 is expected to finish in 2028. DD3 will remain operational until DD5 is complete, at which point it will be decommissioned as it cannot accommodate modern submarines in the U.S. Navy's fleet. Initially, DD1 – 3, will be used to maintain and repair submarines, after completion of DD5, DD3 will be decommissioned and DDs 1, 2 and 5 will be used for these purposes. The largest dry dock, DD4, will be used to maintain and repair Navy ships up to class CVN (nuclear-powered aircraft carriers). Hence we anticipate that up to four dry docks will be operational at any time.

1.2.2 Best Management Practices

The Navy will implement the Best Management Practices (BMPs) as listed below to avoid and minimize impacts to protected species and the marine environment. These BMPs are considered a part of the proposed action.

1. During dry dock operations, the following BMPs will be implemented to protect water quality:
    a. There will be no discharge of oils, fuels or chemicals to surface waters, or onto land where there is a potential for re-entry into surface waters. Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc., will be checked regularly for leaks. Materials will be maintained and stored properly to prevent spills.
    b. No cleaning chemicals or solvents will be discharged to ground or surface waters.
    c. Dry docks will be swept to a broom-clean condition and inspected prior to flooding.
    d. Prior to flooding, PHNSY & IMF Environmental Staff will also inspect the dock for general cleanliness, and the Docking Officer and Dockmaster will inspect the dock

for debris and anything that may become dislodged due to flooding (i.e., deteriorated concrete or piping along the dry dock walls).

e. The caisson removal and replacement-period will be minimized to the extent practicable.

f. Prior to each flooding event, bubble curtain systems will be checked and maintenance conducted as needed to ensure proper operation.

g. Routine inspections, at a minimum of once per year, will occur to ensure dry dock sumps and outfalls are cleaned (i.e., sediment removal), as necessary.

2. The following BMPs will avoid or minimize entrainment of ESA-listed species:

a. To minimize entry of sea turtles, a bubble curtain shall be used around the dry dock entrance during flooding through to caisson replacement (pausing for vessel entry as needed).

b. To minimize the number of marine species entering the dry dock, a bubble curtain will be permanently installed within each dry dock near to or within the caisson seat.

c. If a sea turtle or any ESA-listed, marine fauna species is entrained, upon discovery the Navy will immediately notify the stranding response program prior to handling sea turtles or any ESA-listed marine fauna (e.g., Hawaiian monk seal) entrained during dry dock operations (7 am to 7 pm call the Oahu direct line at 808-725-5730; after hours [7 pm to 7 am] call the NMFS stranding coordinator at 808-721-5343). Note: the Stranding Program will provide NMFS with an official stranding report within 24 hrs of when the entrained turtle was initially reported.

d. Within no more than 48 hrs from discovery, the Navy will notify the NMFS PIRO Protected Resources Division (PRD) Interagency Consultation Branch Chief (Ron.Dean@noaa.gov) of any sea turtle entrainment incidents for awareness. This notification is a separate action from 2(c) above.

1.3 Proposed Federal Action Area

The action area is defined by regulation as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The action area for the proposed activities encompasses the full extent of the action's modifications to land, water, and air. For this action, the full extent of direct and indirect effects will be contained within the PHNSY and IMF in the JBPHH (Figure 1). All operations described above will be conducted within DD1 – 4, until the completion of DD5, which as previously mentioned will functionally replace DD3 (Figure 2). Animals in waters surrounding the dry docks may be affected by vessel activity and flooding/dewatering events associated with dry dock operations.

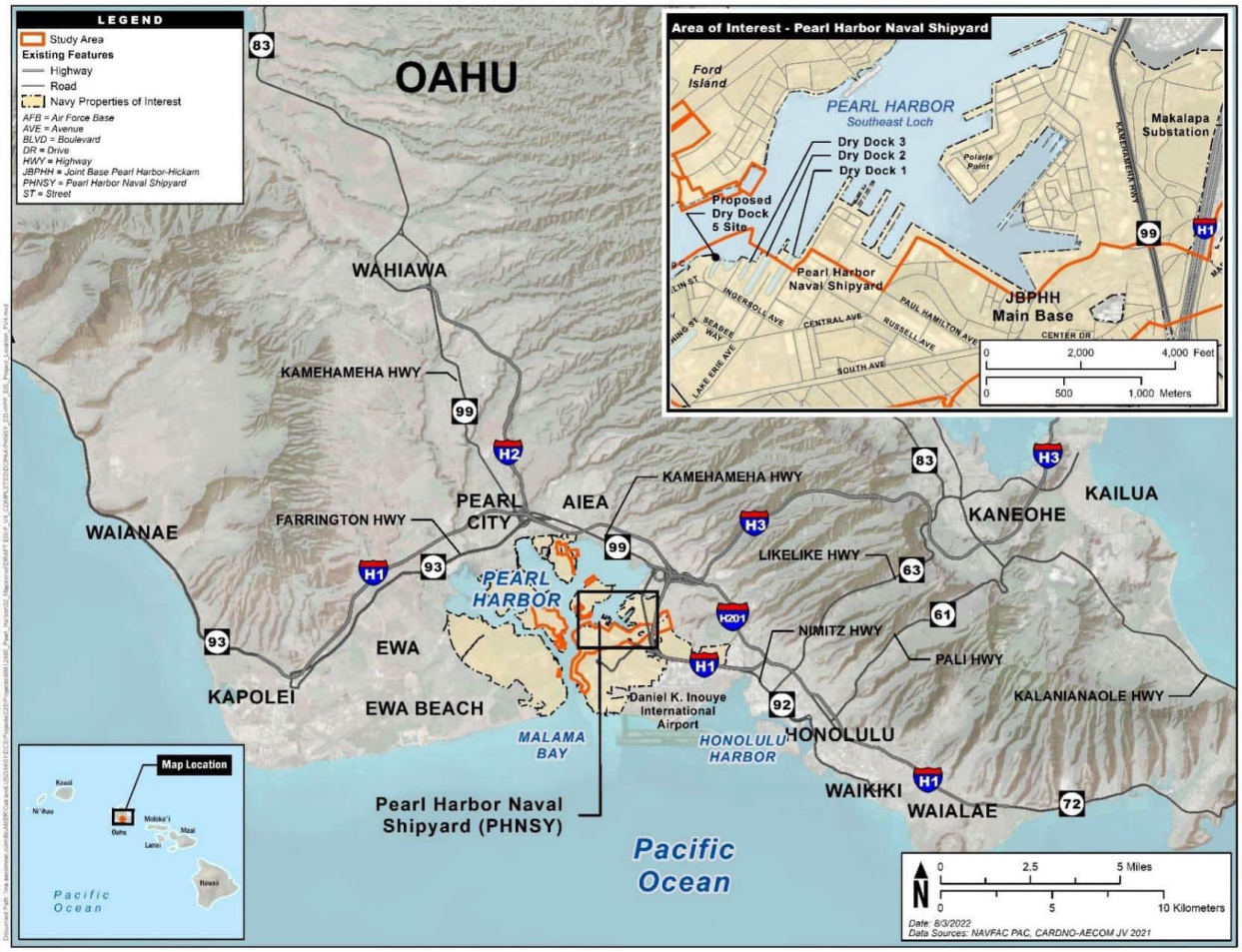

Figure 1. Location of the PHNSY and IMF within the JBPHH, Pearl Harbor, Oahu, Hawai‘i, with dry docks indicated (Source: NAVFAC 2022a).

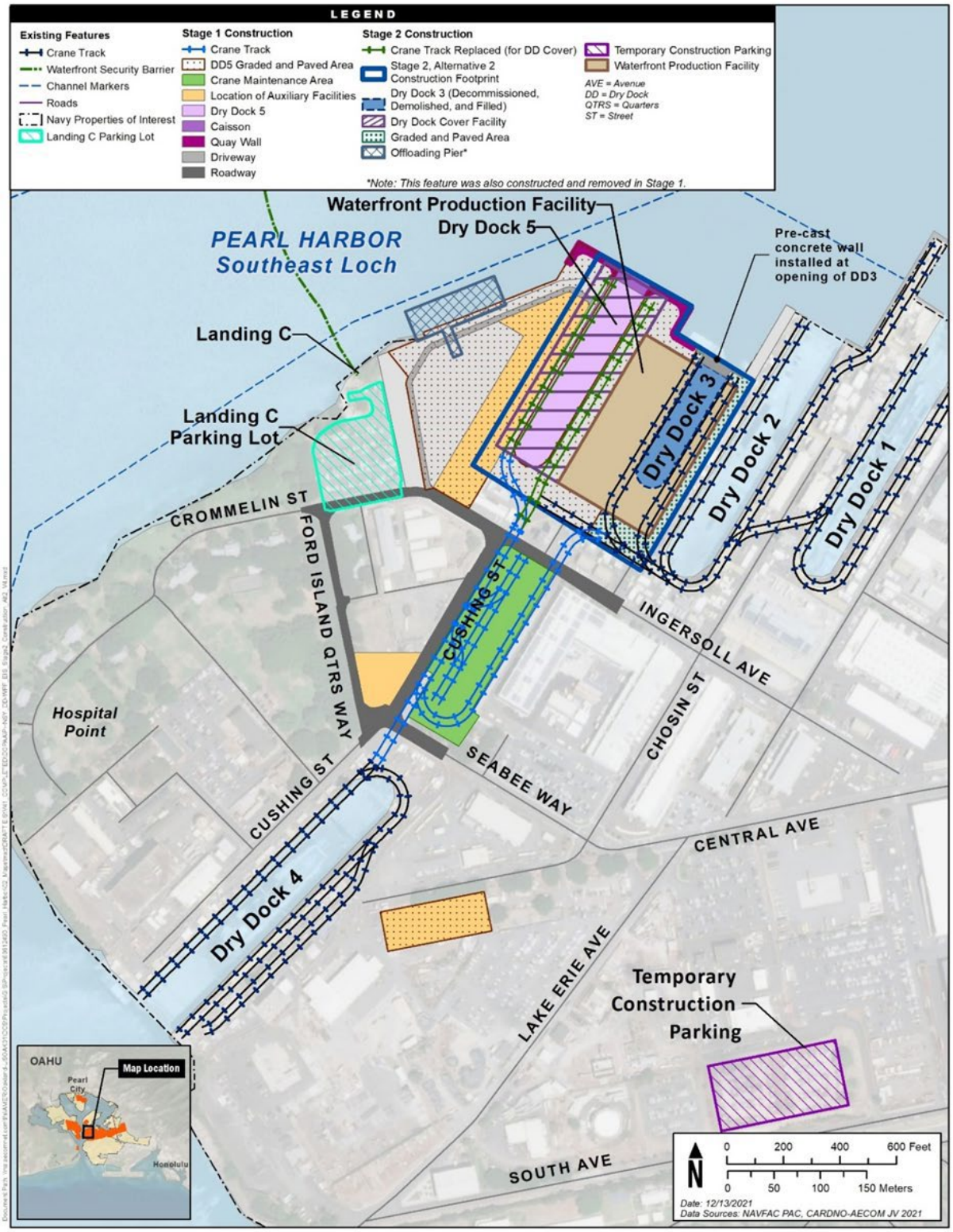

Figure 2. Locations of currently operational dry docks, and construction sites for DD5 and the WPF in the PHNSY and IMF (Source: NAVFAC 2022a).

1.4 Analytical Approach

The U.S. Navy determined the proposed action is not likely to adversely affect Hawaiian monk seals. Our concurrence is documented in the Not Likely to Adversely Affect Determinations section (Section 9).

This biological opinion includes a jeopardy analysis which relies upon the regulatory definition of jeopardizing the continued existence of a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species:

- Evaluate the range-wide status of the species expected to be adversely affected by the proposed action
- Evaluate the environmental baseline of the species
- Evaluate the effects of the proposed action on species using an exposure–response approach
- Evaluate cumulative effects
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species, analyze whether the proposed action is likely to directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species
- If necessary, suggest a reasonable and prudent alternative to the proposed action

We reviewed available data and literature to evaluate the current environmental baseline conditions in Pearl Harbor, including all prevalent stressors to the ESA-listed species that are present. This information was acquired from scientific publications as well as previous consultations that document the development that has occurred in the harbor. Currently, a wide variety of military and recreational activities within Pearl Harbor expose species present to a range of stressors.

Next, we broke the proposed action down into potential stressors and compared them to those currently present to evaluate the extent to which they would elevate above baseline conditions. We also considered the BMPs that the Navy plans to implement to mitigate those stressors. Using the most up to date relevant science, and documented observations from PHNSY and IMF personnel we determined the most likely responses of ESA-listed to those stressors. Responses ranged from behavioral avoidance to potential injury that is unlikely to be lethal.

To assess the likelihood the action would jeopardize each species we consider the current status and trends of their populations overall, and their condition within the action area. We extrapolated effects of the action on ESA-listed species likely to be affected out 100 years, or the proposed lifetime of the dry dock currently under construction.

2 STATUS OF THE LISTED RESOURCES

This opinion examines the status of each species that is likely to be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' reproduction, numbers, or distribution for the jeopardy analysis.

2.1 Climate Change

Future climate will depend on warming caused by past anthropogenic emissions, future anthropogenic emissions and natural climate variability. NMFS' policy (NMFS 2016) is to use climate indicator values projected under the Intergovernmental Panel on Climate Change (IPCC)'s Representative Concentration Pathway (RCP) 8.5 when data are available or best available science that is as consistent as possible with RCP 8.5. RCP 8.5, like the other RCPs, were produced from integrated assessment models and the published literature; RCP 8.5 is a high pathway for which radiative forcing reaches >8.5 W/m^2 by 2100 (relative to pre-industrial values) and continues to rise for some amount of time. A few projected global values under RCP 8.5 are noted in Table 1. The IPCC predicts that climate-related risks for natural and humans systems are higher for global warming of 1.5 ºC compared to present conditions but the risks associated with a 1.5 ºC warming are lower than the 2 ºC warming presented in Table 1 (IPCC 2018, 2022). Changes in parameters will not be uniform, and IPCC projects that areas like the equatorial Pacific will likely experience an increase in annual mean precipitation under scenario 8.5, whereas other mid-latitude and subtropical dry regions will likely experience decreases in mean precipitation. Sea levels are expected to continue to rise well beyond 2100 and while the magnitude and rate depends upon emissions pathways, low-lying coastal areas, deltas, and small islands will be at greater risk (IPCC 2018, 2022).

Table 1. Projections for certain climate parameters under Representative Concentration Pathway 8.5 (values from Table 2.1 IPCC 2014; see Figure 3.4 in IPCC 2022).

Projections	Mean and likely range Years 2046-2065	Mean and likely range Years 2081-2100
Global mean surface temperature change (ºC)	2.0 (1.4-2.6)	3.7 (2.6-4.8)
Global mean sea level increase (m)	0.30 (0.22-0.38)	0.63 (0.45-0.82)

In this assessment, we rely on systematic assessments of available and relevant information to incorporate climate change in a number of ways. We address the effects of climate, including changes in climate, in multiple sections of this assessment: Status of the Listed Resources (Section 2), Environmental Baseline (Section 3), and Integration and Synthesis (Section 6). In

the Status of Listed Resources and the Environmental Baseline we present an extensive review of the best scientific and commercial data available to describe how the listed species and its designated critical habitat is affected by climate change—the status of individuals, and its demographically independent units (subpopulations, populations), and critical habitat in the action area and range wide.

We do this by identifying species sensitivities to climate parameters and variability based on the scientific literature and our understanding of the species' biology. We focus on specific parameters that influence a species health and fitness, and the conservation value of their habitat. We examine habitat variables that are affected by climate change such as sea level rise, temperatures (water and air), and changes in weather patterns (precipitation), and we try to assess how species have coped with these stressors to date, and how they are likely to cope in a changing environment. We look for information to evaluate whether climate changes affects the species' ability to feed, reproduce, and carry out normal life functions, including movements and migrations.

We review existing studies and information on climate change and the local patterns of change to characterize the Environmental Baseline and Action Area changes to environmental conditions that would likely occur under RCP 8.5, and where available we use changing climatic parameters (magnitude, distribution, and rate of changes) information to inform our assessment. In our exposure analyses, we try to examine whether changes in climate related phenomena will alter the timing, location, or intensity of exposure to the action. In our response analyses we ask, whether and to what degree a species' responses to anthropogenic stressors would change as they are forced to cope with higher background levels of stress caused by climate-related phenomena.

2.2 Status of the Species

This section consists of narratives for the species occurring in the action area that may be adversely affected by the proposed action. These status summaries provide the point of reference for our analyses of whether or not the action's direct and indirect effects are likely to appreciably reduce a species' probability of surviving and recovering in the wild. Each species' narrative presents a summary of:

1. The species' distribution and population structure (which are relevant to the distribution criterion of the jeopardy standard)
2. The status and trend in abundance of the species and affected population(s) (which are relevant to the numbers criterion of the jeopardy standard)
3. Information on the reproduction of the species and affected population(s) (which is a representation of the reproduction criterion of the jeopardy standard)
4. Natural and anthropogenic threats to the species and/or affected population(s) (which helps explain our assessment of a species' likelihood of surviving and recovering in the wild)
5. Recent conservation activities for the species and/or affected population(s) (which also helps explain our assessment of a species' likelihood of surviving and recovering in the wild)

More detailed background information on the general biology and ecology of these species can be found in status reviews and recovery plans for the various species as well as the public scientific literature. We incorporate this information by reference and provide an overview in the sections below. In the sections below, we note new studies that have occurred since the last status review or that were not included in the status review.

2.2.1 Central North Pacific Green Sea Turtle

We listed the green sea turtle as threatened on July 28, 1978 (43 FR 32800), except for breeding populations that occur in Florida and the Pacific coast of Mexico, which were listed as endangered. In 2016, NMFS and the USFWS replaced the global green sea turtle listing with 11 Distinct Population Segments[2] (DPSs) (Figure 3; 81 FR 20058). These 11 DPSs are demographically, spatially, and genetically independent. Eight of these DPSs are listed as threatened including the CNP (light-colored polygons in Figure 3) and three are listed as endangered (dark-colored polygons in Figure 3). Only the range of the CNP DPS overlaps with the proposed action area and therefore is likely to be affected. As specified in the final rule designating the DPSs, the longstanding protective regulations (50 CFR 17.42(b), 223.205, 223.206, and 223.207) remain in effect and continue to apply all section 9 prohibitions, including 'take', to the threatened DPSs. The most recent 5-year review of the green sea turtle was conducted by Seminoff et al. (2015). DPS-specific recovery plans have not been drafted and therefore we rely on the original 1998 recovery plan for Pacific green sea turtles (NMFS and USFWS 1998a).

2.2.1.1 Distribution and Population Structure

The distribution of Central North Pacific green turtles encompasses the Hawaiian Archipelago and Johnston Atoll. It is bounded by a four-sided polygon with open ocean extents reaching to 41˚N,169˚E in the northwest corner, 41˚N, 143˚W in the northeast, 9˚N, 125˚W in the southeast, and 9˚N, 175˚W in the southwest (Figure 3). About 96% of the nesting occurs in French Frigate Shoals and half of the nesting in French Frigate Shoals occurred on East Island (Figure 4). Based on spatially concentrated (limited) distributions of nesting and lack of evidence of genetic substructuring, Seminoff et al. (2015) concluded that the Central North Pacific green sea turtle consists of a single population.

[2] Under the ESA, a Distinct Population Segment is defined as a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species (61 FR 4722).

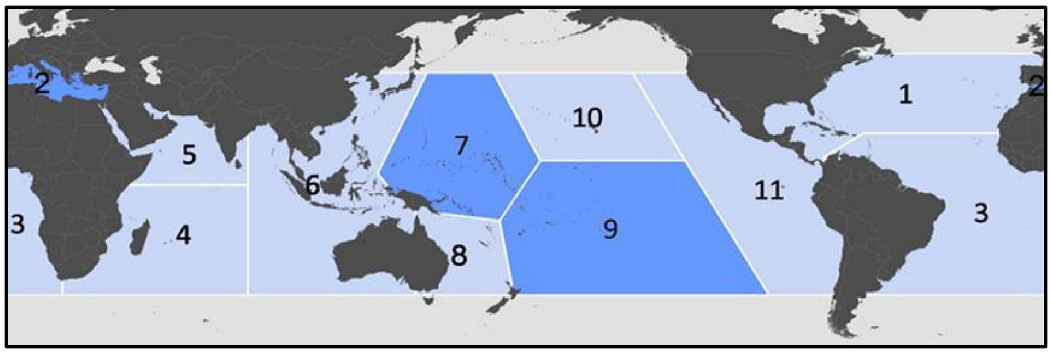

Figure 3. Overview of listed green sea turtle DPSs; (1) North Atlantic; (2) Mediterranean; (3) South Atlantic; (4) Southwest Indian; (5) North Indian; (6) East Indian-West Pacific; (7) Central West Pacific; (8) Southwest Pacific; (9) Central South Pacific; (10) Central North Pacific; and (11) East Pacific. Light blue indicates threatened populations and dark blue indicates endangered populations. (Source: https://www.noaa.gov/media-release/successful-conservation-efforts-along-florida-pacific-coasts-recognized-in-revised-esa)

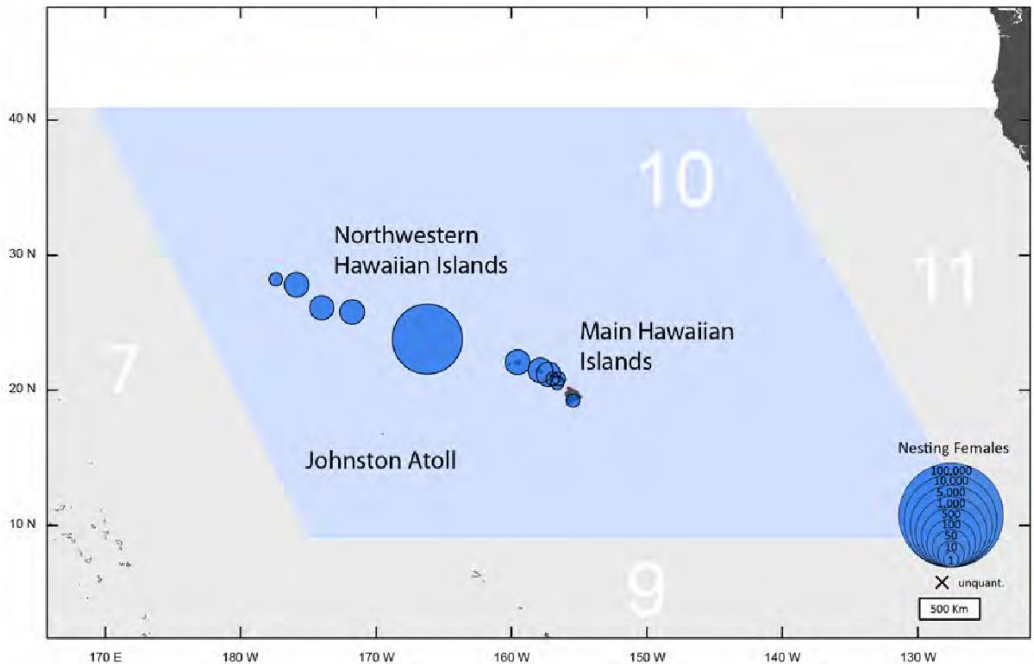

Figure 4. Nesting distribution of Central North Pacific green sea turtles. Size of circles indicates estimated nester abundance. The geographic range of this species encompasses the entire Hawaiian archipelago and Johnston Atoll.

2.2.1.2 Status and Trends of Abundance

We incorporate by reference pages 336 to 339 of the most recent status review (Seminoff et al. 2015) and briefly summarize it here along with information not included in the status review. To estimate total mean abundances of the CNP DPS, we parameterized a post-breeding, age-based Leslie matrix model using the fecundity values in Balazs et al. (2015) and the survival rates and

age at maturity of Piacenza et al. (2016) and conducted 10,000 simulations drawing from triangular distributions for the survival rates and age to maturity ranges specified in Table 2. All other parameters were held stable as specified in Table 2 across the simulations. The right eigenvector of a Leslie matrix model provides the stable age distribution of the population from which we can derive the percent of the population that are adult females. We then use the adult female population size of 3,846 from Seminoff et al. (2015) to estimate the total population size of individuals greater than one year old. The results suggest a total population of 682,296 (range 60,965 to 1,145,988) for the CNP DPS.

Table 2. Parameters used to estimate total population size for the CNP green sea turtle.

Parameter	**Mean**	**Range**	**Source**
Remigration Interval	4	NA	Balazs et al. (2015)
Nests per Year	4	NA	Balazs et al. (2015)
Eggs per Nest	104	NA	Balazs et al. (2015)
Nest Survival Rate	0.54	NA	Balazs et al. (2015)
Sex Ratio (proportion female)	0.516	NA	Balazs et al. (2015)
First Year Survival	0.35	NA	Piacenza et al. (2016)
Pelagic Juvenile Survival	0.80	NA	Piacenza et al. (2016)
Neritic Juvenile Survival	0.824	0.799 – 0.967	Piacenza et al. (2016)
Subadult Survival	0.876	0.799 – 0.98	Piacenza et al. (2016)
Adult Survival	0.929	0.924 – 0.933	Piacenza et al. (2016)
Time to Maturity	31	17 - 41	Piacenza et al. (2016)

Although the trajectory of the nesting population has been increasing in recent years, the distribution of this green turtle DPS has declined substantially: as much as 80% of historically major nesting sites have been extirpated or the abundance of nesting females at these sites has declined substantially between 1875 and 2012 (Kittinger et al. 2013). Nesting that once occurred across a wide geographic area has been largely concentrated in a small geographic area: more than 96% of nesting occurs at French Frigate Shoals in the Northwest Hawaiian Islands, which is a low-lying coral atoll that is susceptible to erosion, geomorphological changes, and sea level rise (Seminoff et al. 2015). In 2018, Hurricane Walaka demolished East Island, which was the index beach representing over 40 years of nesting trends for the population and supported about half of the nesting activity at French Frigate Shoals. Given the instability of East Island, in 2019 Tern Island was officially identified as the new index site at French Frigate Shoals for the Central North Pacific green sea turtle population. Fortunately, comprehensive monitoring at Tern Island started in 2017, and therefore we have seven nesting seasons of data for Tern (2017 – 2024, with no monitoring in 2020 due to COVID travel restrictions). During this time, nesting has fluctuated between 86 females in 2018 and 645 females in 2021, with an average of 367 females nesting annually (NMFS unpublished).

The most recent estimate of the CNP green sea turtle population is expected to continue increasing at a rate of 5.4% annually for the foreseeable future (Balazs et al. 2015).

2.2.1.3 Reproduction

We incorporate by reference pages 10 through 12 of the most recent status review (Seminoff et al. 2015) and briefly summarize it here along with information not included in the status review. Like other sea turtles, green sea turtles lay their eggs terrestrially on specific nesting beaches.

Females emerge at night and lay eggs at night during warmer months of the year. Eggs are buried in sand where they incubate for about two months — though that time varies among populations. For example, in Hawai‘i eggs incubate for 53-102 days depending on location (Balazs et al. 2015). All sea turtles exhibit temperature-dependent sex determination. Eggs that incubate below a threshold temperature are predominantly male while eggs that incubate above that temperature are predominantly female. Hatchling sea turtles emerge and enter a pelagic phase that lasts 1-7 years before they return to coastal habitats where they continue maturing. Females then take 20 to 40 years to mature. Once mature they reproduce every 2-4 years, lay 2-5 clutches of eggs per season, with 80-120 eggs per clutch. Mature females are expected to remain reproductively active for 17 to 23 years. Many populations exhibit high fidelity for nesting beaches often migrating over great distances between islands to lay eggs (Scheelings 2023).

2.2.1.4 Threats

We incorporate by reference pages 189 to 193, 206 to 214, 235 to 248, 265 to 278, 296 to 304, 315 to 325, 341 to 351, and 369 to 375 of the most recent status review (Seminoff et al. 2015). Below we list the impacts identified as threats to Indo-Pacific green sea turtles and provide specific page numbers in Seminoff et al. (2015) where details, references and justifications may be found. The severity of threats varies among DPSs and locales within each DPS where they are present. For example, certain remote nesting beaches remain unaffected by coastal development while other nesting beaches within the same DPS closer to human population centers are threatened. Each of the threats listed below substantially impacts all or part of the CNP DPS.

- Coastal Development
    - Shoreline hardening eliminates areas of nesting beaches. (pages 236, 316, and 342)
    - Coastal construction degrades or eliminates nesting and foraging grounds. (pages 207, 235 to 236, 266 to 268, and 341 to 342)
    - Removal of vegetation increases beach erosion. (pages 266 to 268, 296, and 316 to 317)
    - Non-native vegetation impedes nesting turtles. (pages 268 and 296)
    - Dredging and land-fill degrades coastal foraging grounds. (pages 189, 208, 268 to 269 to 270, and 317)
    - Artificial lighting disorients nesting females and hatchling turtles away from the shore. (pages 189, 207, 236, 266 to 268, 296 to 297, and 316)
    - Expected to worsen with increasing human populations. (page 266)
- Pollution
    - Run-off of sediments, nutrients, wastes, and other pollutants like heavy metals threaten foraging grounds and turtle health. (pages 189, 238 to 239, 247 to 248, 266, 269, 302, 318, 324, and 348)

- Debris like glass, plastic, and fishing line can entrap and a can be ingested by turtles, leading to mortality. (page 237, 268, 302, 324, and 348 to 349)
- Oil pollution has destroyed areas of habitat. (page 208, 247, and 348)
- Expected to worsen with increasing human populations.

· Beach Traffic
- Foot traffic on beaches degrades nesting grounds. (pages 189, 207, 213, 236 to 237, and 266)
- Vehicle traffic degrades beaches and results in mortality through vehicle strikes. (pages 207, 237, and 268)
- Expected to worsen with increasing human populations.

· Global Warming
- Higher temperatures during egg incubation are likely to shift hatchling sex ratios, potentially reducing annual clutch numbers. (pages 214, 277, 325, 350, and 374)
- Trophic alterations affect forage quantity, quality, and/or distribution. (page 208)
- Disruption of ocean currents that facilitate natural dispersal (page 374)
- Expected to worsen with climate change. (pages 214, 277, and 374)

· Storms
- Can cause erosion of nesting beaches (pages 214, 278, and 325)
- Expected to worsen as storms increase in intensity with climate change. (page 214)

· Sea-level rise
- Increased beach erosion degrades nesting grounds. (pages 192, 277, 325, and 374)
- Inundation of nesting grounds may also occur. (pages 192, 277, 325, and 374)
- Expected to worsen with climate change. (page 278 and 303)

· Fisheries Incidental Take
- Pacific longline fishery kills at least 100 CNP green sea turtles annually (page 347)
- Hawaiian gill nets entangle and drown CNP green sea turtles (page 348)
- Hook and line fishers entangle CNP green sea turtles (page 348)

· Vessel Interactions

- Strikes from boats are known to injure and kill sea turtles. (page 213, 277, 302, and 349)
- Boat traffic can damage habitat and exclude turtles from foraging grounds. (pages 208, 238, 269, 324, and 349)

2.2.1.5 Recent Conservation Activities

The Status Review (Seminoff et al. 2015) summarizes international and local efforts to mitigate present threats to green sea turtles within each DPS as of 2015. We incorporate by reference that information from pages 191 to 196, 210 to 219, 244 to 254, 274 to 284, 299 to 306, 322 to 331, 345 to 354, and 372 to 379. Detailed information can be found in the Status Review (Seminoff et al. 2015) and other references.

2.2.2 Hawksbill Sea Turtle

We listed hawksbill sea turtles globally as endangered on June 2, 1970 (35 FR 61573). The last 5-year review for hawksbill sea turtles (NMFS and USFWS 2013) reaffirmed the endangered listing. The original 1998 recovery plan (NMFS and USFWS 1998b) remains in effect.

2.2.2.1 Distribution and Population Structure

We incorporate by reference pages seven through 16 of the Recovery Plan (NMFS and USFWS 1998b) along with updates from pages 10 through 16 of the most recent 5-year Review (NMFS and USFWS 2013) and briefly summarize them. New information is supplemented from additional sources. Hawksbills nest on insular and mainland sandy beaches throughout the tropics and subtropics (Figure 5). The current distribution of nesting beaches is thought to be a small fraction of that which existed historically.

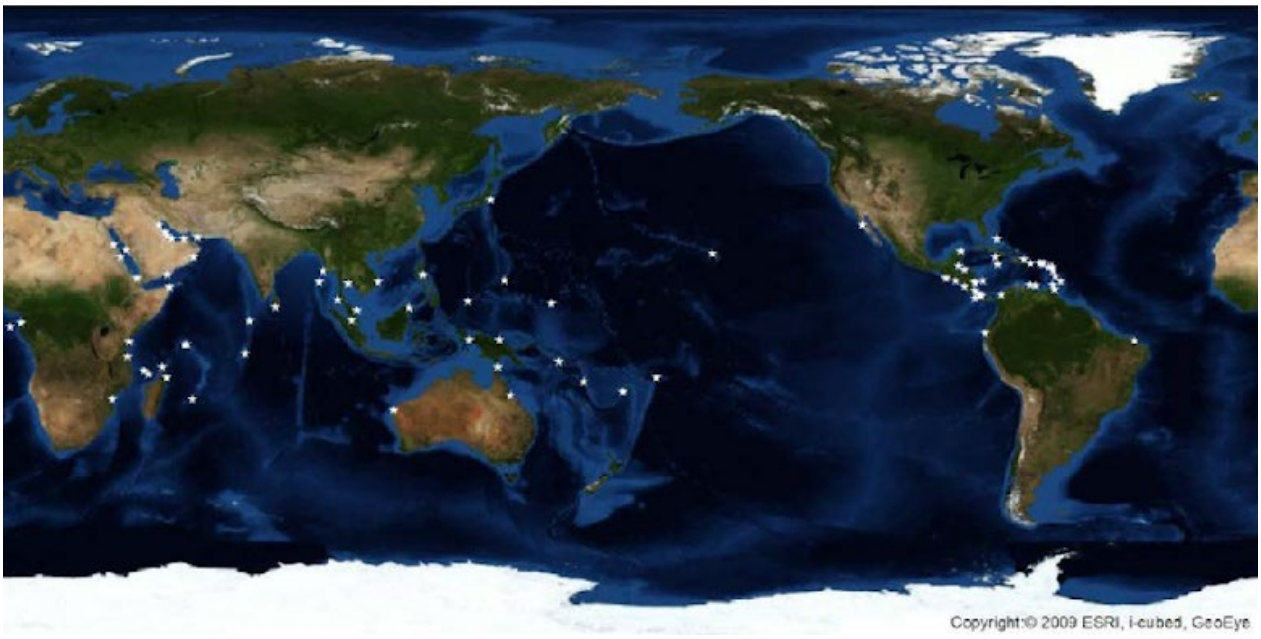

Figure 5. Global nesting distribution of hawksbill sea turtles (Source: NMFS and USFWS 2013)

Hawksbills in Atlantic and Pacific waters have been shown to be genetically isolated from one another. Recent genetic research has also revealed further demographic differentiation among nesting populations within the Pacific Ocean (Banerjee et al. 2019; Gaos et al. 2016, 2018, 2020; Vargas et al. 2016). However, the hawksbill turtle is not currently listed as DPSs under the ESA.

Like other sea turtles, hawksbills exhibit a pelagic stage as juveniles, utilizing offshore waters for about 1-5 years, where they shelter in floating algal mats before recruiting to nearshore habitats where they continue to mature. As adults, hawksbill turtles are found primarily within nearshore waters in a variety of habitats. However, they strongly prefer healthy coral reefs for foraging, relying primarily on sponges, though diets vary between regions. Some females make migrations up to hundreds of kilometers between foraging and nesting grounds, while others remain close to natal rookeries year-round. An important note for management purposes is that hawksbill individuals often forage adjacent to nesting beaches that they do not utilize themselves.

2.2.2.2 Status and Trends of Abundance

At the time the Recovery Plan (NMFS and USFWS 1998b) was published, little was known about the global status of hawksbill turtles, aside from the substantial historic population declines contributing to their endangered status. Therefore, we incorporate by reference pages 16 through 25 of the most recent 5-year Review (NMFS and USFWS 2013), summarize them here and supplement new information. Due to a lack of monitoring data from foraging sites, hawksbill turtle abundance has been evaluated using nesting beach data. NMFS and USFWS (2013) reported that of 24 nesting populations in the Pacific recent trend data (> 20 years) exists for 14 nesting rookeries, and historic trend data (> 20 years) for 21 nesting rookeries. Of those populations, all have declined historically, and the majority had declined recently as of the publication date, with the exception being the Sabah Turtle Islands in Malaysia where the population is stable. However, more recent evidence suggests that some small populations in the Indo-Pacific are rebounding (Gaos et al 2021; Hamilton et al 2015). In Hawai‘i, the hawksbill

population is likely increasing but estimates of the rate of increase are confounded by increases in nesting beach monitoring efforts (Gaos et al. 2021).

2.2.2.3 Reproduction

We incorporate by reference pages 17 through 20 of the Recovery Plan (NMFS and USFWS 1998b) along with updates from pages 11 through 13 of the most recent 5-year Review (NMFS and USFWS 2013) and summarize them here. Like other sea turtles, hawksbill turtles lay their eggs terrestrially on specific nesting beaches. Females exhibit strong site fidelity, sometimes migrating to beaches relatively close to their natal beaches. Migration distances vary within rookeries. Environmental factors like slope, vegetation, and oceanographic conditions also influence specific site selection. Females will lay 3-5 egg clutches in a season, in approximately 2-week intervals. Individuals do not nest annually, likely due to the energy demands of migration. Remigration intervals range from 2-5 years and a female may nest three to 12 seasons throughout her life. As with other turtles, incubation temperature determines the sex of hatchling turtles, with temperatures above a certain threshold producing predominantly females. Once hatched, hawksbill turtles in Hawai‘i mature over a minimum of 17-22 years.

2.2.2.4 Threats

We incorporate by reference pages 21 through 46 of the Recovery Plan (NMFS and USFWS 1998b) along with further details from pages 40 through 52 of the most recent 5-year Review (NMFS and USFWS 2013). Below we list the impacts identified as threats to Indo-Pacific green sea turtles and provide specific page numbers in NMFS and USFWS (1998b; 2013) where details, references and justifications may be found.

- Coastal Development
    - Shoreline hardening eliminates areas of nesting beaches. (page 31 of NMFS and USFWS 1998b)
    - Coastal construction degrades or eliminates nesting and foraging grounds. (page 41 of NMFS and USFWS 2013)
    - Dredging and boat anchoring threatens foraging habitat. (page 42 of NMFS and USFWS 2013)
    - Clearing of vegetation deters nesting turtles while also altering temperatures eggs are exposed to during incubation, potentially shifting sex ratios. (page 41 of NMFS and USFWS 2013)
    - Artificial lighting disorients nesting females and hatchling turtles away from the shore. (page 33 of NMFS and USFWS 1998b)
    - Expected to continue worsening with increasing human populations. (page 41 of NMFS and USFWS 2013)
- Pollution
    - Run-off of sediments, nutrients, wastes, and other pollutants like heavy metals and pesticides threaten foraging grounds and turtle health. (page 40 of NMFS and USFWS 1998b)

- Debris like glass, plastic, and fishing line can entrap and a can be ingested by turtles, leading to mortality. (page 41 of NMFS and USFWS 1998b)
- Hawksbills are particularly susceptible to oil pollution. (page 52 of NMFS and USFWS 2013)
- Expected to worsen with increasing human populations. (page 41 of NMFS and USFWS 2013)

· Beach Traffic
- Foot traffic on beaches degrades nesting grounds. (page 32 of NMFS and USFWS 2013)
- Vehicle traffic degrades nesting beaches and crushes eggs and hatchlings. (page 35 of NMFS and USFWS 1998b)

· Global Warming
- Higher temperatures during egg incubation are likely to shift hatchling sex ratios, potentially reducing annual clutch numbers. (page 50 of NMFS and USFWS 2013)
- Threatens coral reefs used for foraging. (page 42 of NMFS and USFWS 2013)
- Trophic alterations affect forage quantity, quality, and/or distribution. (page 50 of NMFS and USFWS 2013)
- Disruption of ocean currents that facilitate natural dispersal (page 50 of NMFS and USFWS 2013)
- Expected to worsen with climate change. (page 50 of NMFS and USFWS 2013)

· Sea-level rise
- Increased beach erosion degrades nesting grounds. (page 50 of NMFS and USFWS 2013)
- Inundation of nesting grounds may also occur. (page 50 of NMFS and USFWS 2013)
- Expected to worsen with climate change. (page 50 of NMFS and USFWS 2013)

· Directed Take (NMFS and USFWS conclude this is the greatest threat to hawksbill turtles.)
- Hawksbill turtles are harvested primarily for their shells. (page 29 of NMFS and USFWS 1998b)
- Eggs and adults are also harvested for subsistence (page 42 of NMFS and USFWS 2013)
- Harvesting continues to increase in certain locales. (pages 42 and 43 of NMFS and USFWS 2013)

· Fisheries Incidental Take (NMFS and USFWS 2013 conclude this is a major threat.)

- Hawksbills are often killed as bycatch in artisanal and commercial fisheries. (page 51 of NMFS and USFWS 2013)
- Hawksbills are particularly vulnerable to entanglement in nets and capture on hooks. (page 51 of NMFS and USFWS 2013)
- Destructive fishing methods like dynamite and cyanide fishing imperil turtles and degrade or destroy foraging grounds. (page 51 of NMFS and USFWS 2013)
- Trawling degrades and destroys foraging habitat. (page 51 of NMFS and USFWS 2013)
- Expected to worsen as fisheries expand (page 51 of NMFS and USFWS 2013)

· Vessel Interactions

- Strikes from boats are known to injure and kill sea turtles. (page 43 of NMFS and USFWS 1998b)
- Boat traffic can damage habitat and exclude turtles from foraging grounds. (page 42 of NMFS and USFWS 2013)

2.2.2.5 Recent Conservation Activities

The Recovery Plan (NMFS and USFWS 1998b) summarizes historic conservation efforts aimed at protecting hawksbill turtles and the 5-year Review (NMFS and USFWS 2013) provides updates on more recent actions. We incorporate by reference that information from pages 47 through 52 of NMFS and USFWS (1998b) and pages 44 through 50 of NMFS and USFWS (2013), summarize it broadly below, and supplement it with additional information as needed. Throughout the Indo-Pacific, various international agreements and treaties are in place to control the harvest of sea turtles and their eggs, such as CITES (Appendix I), the Convention on Biological Diversity (CBD), and more regionally the Indian Ocean–South-East Asian Marine Turtle Memorandum of Understanding (IOSEA), Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC) and others.

Local and regional conservation programs like the East Pacific Hawksbill Sea Turtle Initiative and the Hawai‘i Island Hawksbill Turtle Project have also had a positive impact through monitoring, habitat restoration, stakeholder engagement, and policy advocacy. Many countries have enacted bans on sea turtle harvest. To reduce bycatch, some countries have also instituted requirements for TEDs in trawl fisheries (Food and Agriculture Organization of the United Nations, 2004). Additionally, MPAs throughout the Indo-Pacific have had variable success in preventing the take of turtles and their eggs, and damage to nesting and foraging grounds by coastal development and other activities like fishing. Overall, current conservation measures have had some success in reducing take on Hawksbill turtles. However, enforcement is challenging, and illegal poaching and destructive fishing practices persist in many places.

3 ENVIRONMENTAL BASELINE

The environmental baseline is defined by regulation (50 CFR 402.02). Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the

proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone completed formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The impacts to listed species or designated critical habitat from Federal agency activities or existing Federal agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

The JBPHH is located within Pearl Harbor, which is a large, coastal-plain estuary situated on the central south shore of Oahu, Hawai'i that consists of three lochs formed from drowned river valleys. The lochs meet at an entrance channel that leads to the open ocean. Since its establishment as a Naval Base at the onset of the 20th century, Pearl Harbor has been heavily developed. It now includes a variety of facilities such as piers, pilings, quay walls, and other shoreline hardscape structures constructed to support vessels of all sizes that have replaced much of the natural shoreline. The harbor has also been dredged to accommodate deep-draft ship traffic, resulting in the deepening of the harbor and loss of benthic habitat. Details of current stressors present in the proposed action area are described in the following sections.

3.1 Conditions of the Species and Habitat within Pearl Harbor

3.1.1 Green Sea Turtle

The Navy has conducted various surveys and assessments of ESA-listed species including turtles in Pearl Harbor over the years. The survey findings, stranding records, and historical and anecdotal information indicate that green sea turtles are common in the harbor, with their distribution and density varying by location (Teresa 2021; UH-ARL 2021; DON 2017; Richie et al. 2016; NMFS unpublished stranding data; NMFS unpublished satellite tag tracks). Green sea turtle presence is considered to be uncommon within the vicinity of PHNSY & IMF, with greater concentrations of individuals occurring along the margins of the channel leading into Pearl Harbor and the Waipio Peninsula (Teresa 2021; Neyland et al. 2021; UH-ARL 2021; DON 2017). The majority (60 to 75%) of green turtles seen in Pearl Harbor are juvenile/sub-adult size class ranging from 50 to 100 cm straight carapace length (SCL; Richie et al. 2016; Teresa 2021). Site fidelity is suspected for turtles residing within the Harbor (Richie et al. 2016; UH-ARL 2021).

3.1.1.1 Distribution and Trends

Between 2013 to 2015 and 2016 to 2018, the Navy conducted monthly shore-based and boat-based surveys of Pearl Harbor as part of their JBPHH Integrated Natural Resources Management Plan (INRMP) monitoring plan. The shore-based surveys occurred at nine stations around Pearl Harbor, and boat-based transect surveys occurred throughout the Harbor. Sea turtles were observed predominantly at the harbor entrance, in the main channel, and in West Loch (Richie et al 2016). Between November 2013 and November 2015, there were 199 distinct sightings of green sea turtles and 36 sightings of unidentified sea turtles during shore station surveys. Additionally, from November 2013-December 2014 there were 74 distinct sightings of green sea turtles and 23 sightings of unidentified sea turtles during boat surveys (Richie et al. 2016).

During the 2016-2018 Marine Species Surveys, copulation events were observed on three occasions - once outside the harbor entrance channel and twice near the back of West Loch (NAVFAC 2018). Collaboration with NMFS biologists confirmed that two reproductive adult turtles that were tagged in the NWHI during the 2017 nesting season were detected in Pearl Harbor in September. In summary, between December 2016 and March 2018, there was a range of about 10 to 40 green sea turtles seen in shore-based stations and transect boat surveys, with the greatest number of sea turtles seen per transect during boat-based surveys (NAVFAC 2018).

To assess temporal and spatial patterns in habitat use of green turtles in Pearl Harbor, Teresa (2021) compiled data collected via linear dive transects from March 2000 to May 2011. Over the 10-year study period, sea turtles were sighted on 121 transects (26%), while the remaining 343 transects had zero turtle observations (n=464). A general increase was observed in the number of turtles documented over time (likely consistent with the increasing turtle population in Hawai‘i), and a non-uniform spatial distribution of green turtles was found within Pearl Harbor. The Entrance Channel locations had the greatest number of sightings (these locations accounted for approximately 76.7% of total turtles sighted in transects). Of sea turtles sighted (n=680), 345 green turtles (plus one hawksbill turtle) were observed on the west side of the Entrance Channel and 265 green turtles were observed on the east side of the Entrance Channel. Benthic surveys revealed these Harbor Channel locations to have a diverse biotic cover that includes macroalgae, turf algae, and a notable amount of live coral (Wells et al. 2020b summarized in Teresa 2021). The lower number of turtles detected within the harbor was probably a combination of two factors: a true absence of turtles in this region (due to lack of adequate habitat) and a failure in turtle detection caused by poor visibility conditions.

Teresa (2021) found seasonality patterns in the presence of green turtles, with a slight decrease in turtle sightings during the early months of the year (between March and June), and a greater number of turtles sighted in the later months of the year. They also found distinct depth preferences of turtles based on size, with smaller turtles sighted at shallower transects and larger individuals at deeper locations. Of the turtles observed, the behavior of 569 turtles was documented, with the majority observed swimming (50.4%) and resting (43.9%), and the rest hovering at cleaning stations (5.6%). Interestingly, no turtles were observed foraging across the sampling period.

A much lower number of turtles were detected in transects inside the harbor. Several locations had zero turtles sighted across the 10-year period, while other locations in the West Loch Channel area had greater and more regular turtle presence perhaps due to several freshwater springs found in these areas (Teresa 2021). The lower number of turtles sighted within the harbor can be due to the absence of suitable resting and foraging habitat (i.e., low habitat complexity within the harbor), but also due to high sedimentation and turbidity affecting underwater visibility limiting the detectability of sea turtles. Additionally, a significant increase in the number of turtles was recorded near the Fort Kamehameha Wastewater Treatment Outfall pipe which emerges from the seafloor. The pipe was installed in 2004 and became operational in January 2005. Turtles were observed congregating around the outfall pipe and their regular presence in this location may indicate this is a significant habitat feature for them.

The Navy has also monitored sea turtle activity around DD5 during construction activities per a conservation recommendation made as part of its consultation with NMFS on the construction of DD5 (NMFS 2022a). These activities began on September 29, 2023, paused on December 31, 2023, due to a safety issue, and resumed on January 25, 2024. Though they are less common

within the PHNSY & IMF than waters closer to the ocean, sea turtles have been frequently seen during in-water work on DD5. All individuals identifiable to the species level have been green sea turtles.

To ensure compliance with United States regulations including the ESA, the Navy performs quantitative analyses to estimate the number of sea turtles that could be affected by at-sea training and testing activities. A key element of this quantitative impact analysis is knowledge of the abundance and concentration (density — the number of individual animals found per square kilometer of area) of the species in specific areas where those activities will occur. Methods to estimate sea turtle density vary by species and region, and include counting nesting individuals or the number of eggs in nests, using information from tagging studies, or where data permit, using designed-based methods. The Navy's compilation (DON 2017) of sea turtle densities for Pearl Harbor is provided in the Mapping Tool for the Navy Marine Species Density Database for the U.S. Pacific & Gulf of Alaska (MGEL 2021, https://seamap.env.duke.edu/models/mapper/PACGOA), and presented in Figure 6. These sea turtle guild density estimates may not be precise, specifically they likely under-represent the number of individuals that occur in Pearl Harbor based on anecdotal information, i.e., opportunistic observations of turtle presence at sites such as Ford Island and Middle Loch. We therefore consider the high end of the range to be the best estimate of density (i.e. greater than 50 animals per km^2).

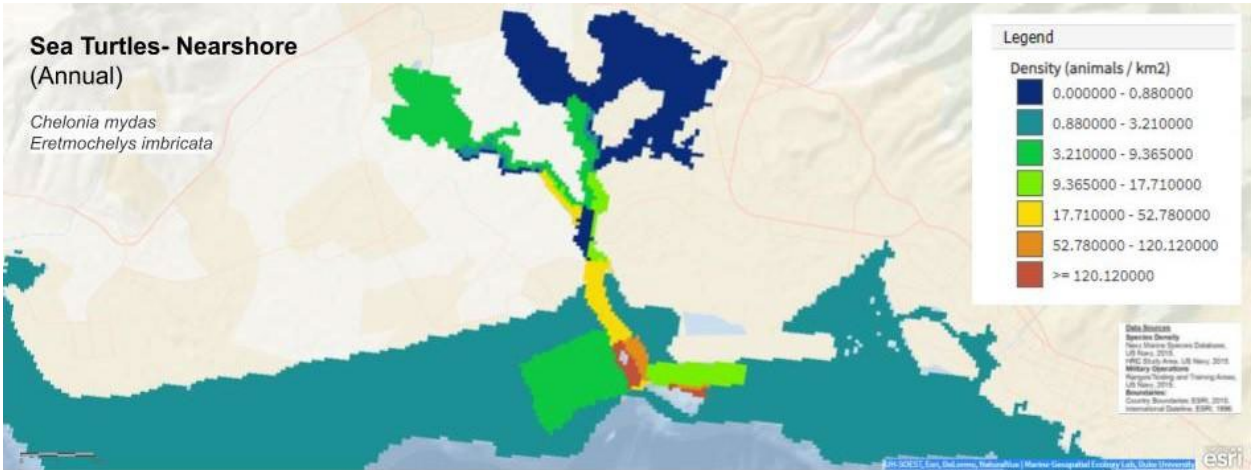

Figure 6. Sea turtle guild density estimates presented for Pearl Harbor in the Mapping Tool for the Navy Marine Species Density Database for the U.S. Pacific & Gulf of Alaska (Source: modified from MGEL 2024).

Since 2017, during the turtle nesting season, the Navy conducts nesting surveys along the beaches near the Harbor mouth (NAVFAC pers. com 2022). Originally the surveys were conducted at Nimitz and Iroquois Point Beaches, and in 2022 the Navy added Fort Kamehameha Beach, Ahua Reef, Hickam Beach and Honeymoon Beach as survey sites. The Navy's surveys are not targeted to survey basking turtles, but they observe basking behavior opportunistically. While the Navy has observed three (3) possible body pits indicating possible nesting, they have not recorded or confirmed turtle nesting events via these surveys (NAVFAC pers. com 2022). They have observed some basking behavior around the survey areas (specific locations and densities unknown).

3.1.1.2 Resting Sites (aka Turtle Caves)

Between July 2020 and January 2021, the Navy executed dive surveys to identify and catalog sea turtle resting sites in select areas in Pearl Harbor where the in-water construction and fill associated with the construction of DD5 and the WPF are occurring (NMFS 2022a; Figure 7). The surveys identified many structures that could function as resting habitat (Neyland et al. 2021), including specifically 97 turtle resting limestone caves with excavated roofs/sides, hereafter identified as "caves" (Figure 8). Through the use of Self-Contained Underwater Breathing Apparatus (SCUBA), divers collected in situ data, which included the global positioning system (GPS) coordinates, dimensions (i.e., length, width, and height), water depth, and physical composition of each cave within the surveyed areas. The resting caves were primarily found in undercut indentations at the base of the vertical limestone fossil reef walls that were dredged to create channels and inlets, and located seaward of the Entrance Channel up into the harbor lochs (Neyland et al. 2021).

Green sea turtles were physically observed within 16 of the 97 (16.5%) documented caves identified throughout the surveyed locations: two of which were at the PHNSY & IMF (Neyland et al. 2021). Between December 2020 and May 2021, the Navy executed another study to build on the previous work by Neyland et al. (2021) to better understand the frequency of green sea turtle resting habitat use and potential site preference within the caves observed (UH-ARL 2021). Two "turtlecams" (i.e., GoPro cameras equipped with light-emitting diodes [LEDs]) were deployed to document sea turtle use of suspected resting caves throughout the 24-hour cycle at PHNSY & IMF. While no turtle sightings were made in the "outer" cave of PHNSY & IMF, there were 30 in the "inner" cave.

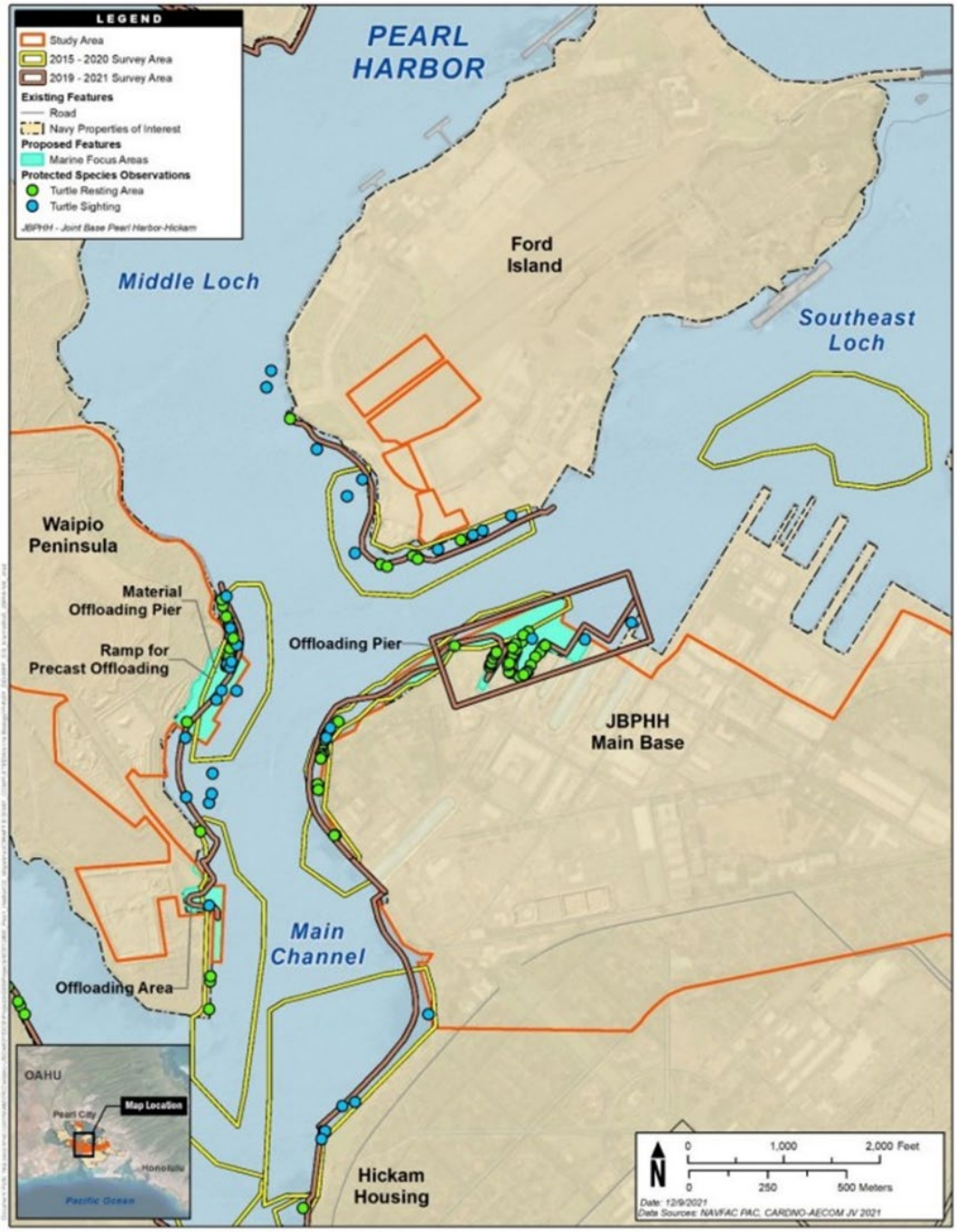

Figure 7. Locations of green sea turtle sightings and potential sea turtle resting areas observed during focused surveys in 2020 – JBPHH Main Base.

Although individual identification of sea turtles was generally not possible, a distinct barnacle and external fibropapilloma tumor pattern allowed for the identification of a single sea turtle repeatedly visiting a cave within the PHNSY & IMF area (UH-ARL 2021). This turtle was observed making repeated visits to the inner resting cave within the PHNSY and IMF area from April 11 – 12, accounting for the total observed sea turtle sightings at the site. While this indicates site fidelity, it is very likely this individual may also be resting in other areas given the

low frequency observance (all 30 of the total of 2047 photos with turtle sightings, were taken during the course of two consecutive days over the entire six-month study period).

During the study, complementary to camera deployment/redeployment, the Navy (UH-ARL 2021) conducted boat-based visual surveys of turtles. These occurred approximately every two weeks, in the morning to early afternoon, between December 2020 and May 2021. During ten boat-based visual surveys conducted at each of the three survey locations (UH-ARL 2021) zero surfacing sea turtles were observed at PHNSY and IMF during this time.

In 2023, roughly 7.11 acres of benthic habitat were eliminated from the PHNSY and IMF due to dredging for the construction of DD5, including 13 potential resting caves and one verified resting cave (Figure 7; NAVFAC 2024).

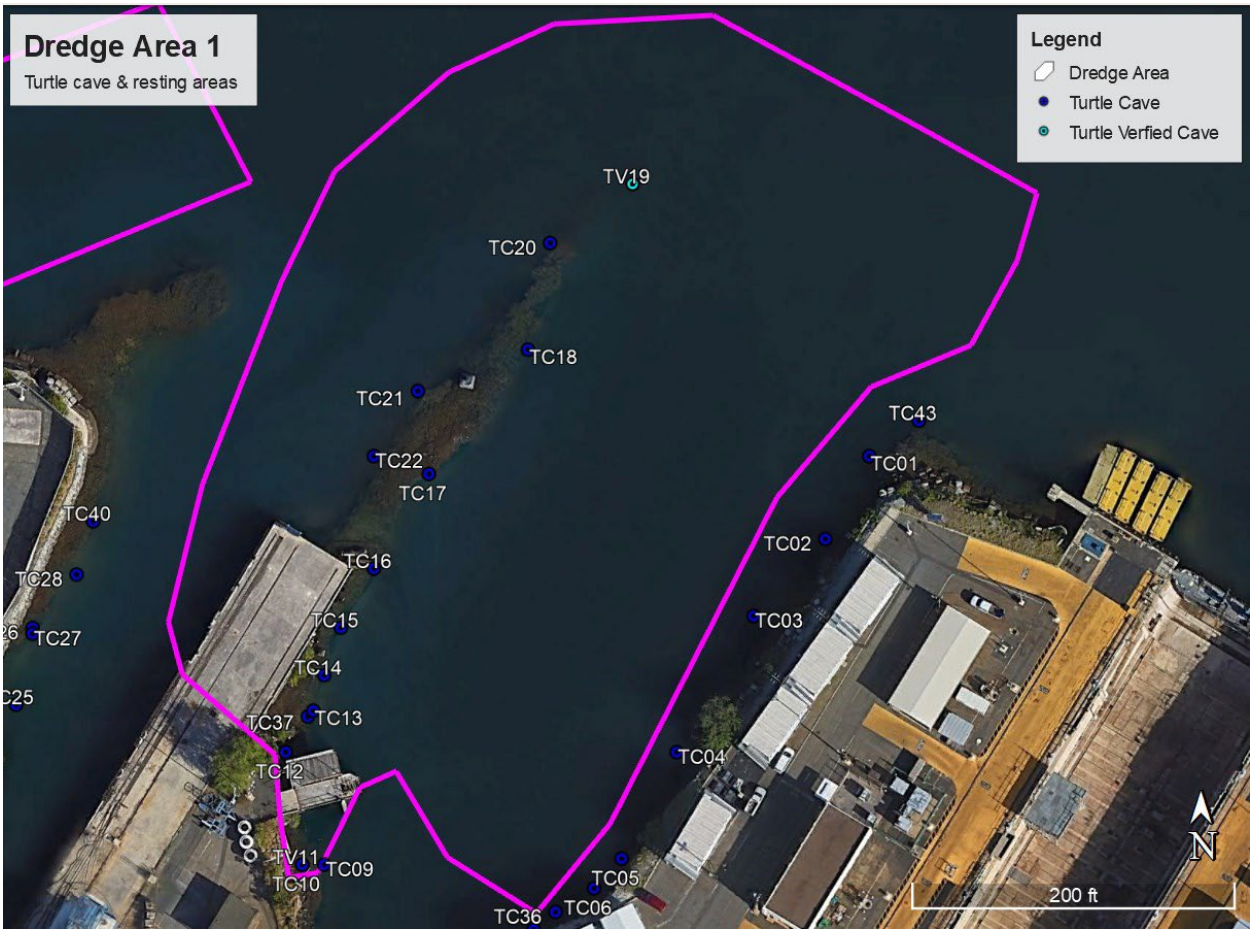

Figure 8. Turtle Caves and DD5 Dredge Area 1 (Source: NAVFAC 2024)

3.1.2 Hawksbill Sea Turtle

Hawksbill sea turtle presence in Pearl Harbor could be characterized as infrequent and likely occurring in very low numbers. Documentation and records of hawksbill turtles in the harbor are limited. For example, a total of 680 sea turtles were observed via SCUBA transects between 2000 and 2011; all were green turtles, with the single exception of one positively identified hawksbill sea turtle seen in the west side entrance channel (adjacent to the entrance channel) of

the Harbor (Teresa 2021). There have also been two documented sightings of hawksbill sea turtles near or within the Entrance Channel of the Harbor (in 2004 and 2006), and one hawksbill turtle stranding in 2020 near the Hawaiian Electric (HECO) Waiau Power Plant (NAVFAC 2022a).

The estuarine habitat with mangroves associated with parts of Pearl Harbor is prime resting/foraging habitat for hawksbills in the Pacific. As such, the NOAA stranding program has released two live stranded hawksbills into Pearl Harbor; the first in July 2018, and the second on November 12, 2021. Logistical expediency related to COVID was a primary driver for the second release. The turtle released in July 2018 was never sighted again after release. The turtle released in November 2021 (42.0 cm SCL; release location: 21.363787°N, 157.967377°W) was outfitted with a satellite tag, and the concentration of its GPS coordinate locations indicates the turtle remained primarily on the northwestern side of Ford Island (Figure 9).

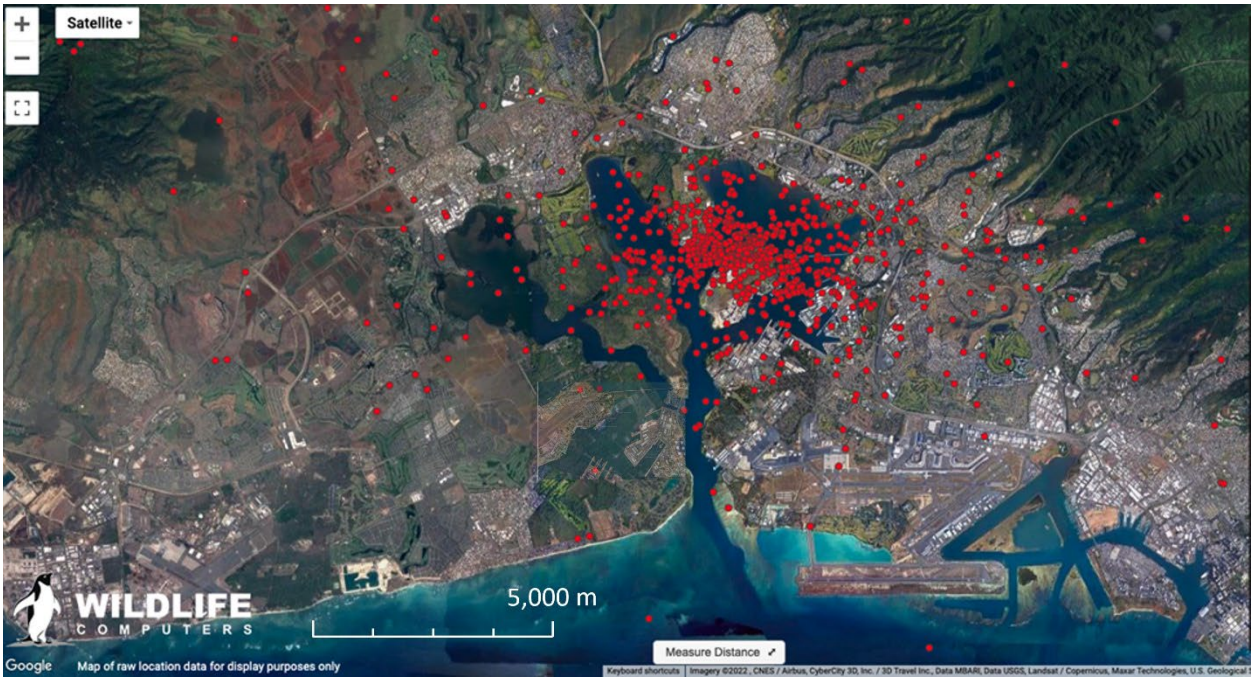

Figure 9. Map indicating satellite tag-based GPS coordinates (red dots) of a hawksbill released by the NOAA stranding program in Pearl Harbor. Note: the data points on land are due to Argos inaccuracy (~ 250-1500 m); the tag did not have GPS (has accuracy ~100m).

The Navy reports two most recent sightings of hawksbills, one on July 9, 2021, seen swimming near Ford Island (21°21'26.8"N 157°57'36.1"W) and the second turtle seen in November 2021 (Nedved pers. comm. 2022 summarized in BA). Depending on the specific date of the sighting (currently unverified), the November 2021 sighting could have been the same turtle released by NOAA. The recent 2021 sightings may suggest a potential increase in Pearl Harbor presence over time as Nedved has noted a recent increase in abundance and size of sponges on pilings (Hanser per comms. 2022; Nedved per comms. 2022; UH-ARL 202).

No hawksbill sea turtles were observed in the resting caves identified and cataloged during the Navy's dive surveys of sea turtle resting caves as discussed above in section 3.1.1.2 (Neyland et al. 2021). In addition, no hawksbill turtle nesting or basking has been documented by the Navy via their nesting surveys of beaches at the mouth of Pearl Harbor (NAVFAC pers. com 2022).

3.2 Factors Affecting the Species and Their Environment within Pearl Harbor

3.2.1 Military Activities

The Navy controls all waters and submerged land in Pearl Harbor, therefore the past and present in-water and waterfront actions and human activities influencing the species and environment in the Harbor are predominantly military actions and activities.

3.2.1.1 Disturbance from Human Activity and Equipment

3.2.1.1.1 In-Water Work

The Navy has, and continues to regularly conduct various types of in-water work throughout Pearl Harbor. Such work includes routine repair and maintenance of their facilities (dry docks, boat houses), and structures (piers, docks, outfall structures, moorings, aids to navigation, floating platforms); new construction to improve capabilities; maintenance dredging to remove accumulated sediment; technical and scientific surveys (geo-tech borings, bathymetric surveys, operation of UAVs, sediment sampling/testing, SCUBA surveys); and habitat restoration (maintenance and repair of fishponds, mangrove removal, marine invasive species removal, oyster transplantation) (NAVFAC 2011, 2020a, 2022b). The in-water activities associated with these actions include the operation of various types and sizes of vessels, including small boats, tugs, and barges; pile driving, pile extraction; drilling; welding; use of power tools; operation of heavy machinery including mechanical and hydraulic dredges; placement of large heavy objects below the waterline; use of mooring lines and tethers; discharges of fill material on the seafloor; multibeam and side scan sonar from small boats; and grab-sampling or coring.

The sea turtles addressed in this Opinion are likely exposed to several of the stressors associated with these activities to different extents, and when exposed may respond to varying degrees. These human in-water activities may generally result in behavioral responses in the turtles such as individual animals approaching the disturbance for investigation, or more likely individuals fleeing or avoiding the area. However, vessel transit and operations of heavy machinery have the potential to result in direct physical contact with, or strikes to the sea turtles. Direct physical contact and vessel strikes can cause injury and in severe cases, death of an animal (NMFS and USFWS 1998a, 1998b, 2013; Schoeman et al 2020). Vessel strikes are addressed in section 3.2.1.2 below. Use of lines and tethers, and discharge of debris (lines and trash) have the potential to result in turtle entanglement (Duncan et al. 2017; and addressed in section 3.2.1.3) and ingestion hazards. The activities also generate underwater sound (e.g. from pile driving), which can affect the turtles in a few different ways (Popper et al. 2014), described in section 3.2.1.4.

The Navy's in-water work in recent years (starting around 2005, and in particular since 2017) that has the potential to adversely affect ESA-listed species in the harbor including the sea turtles addressed in this Opinion, has generally (we are unaware of actions that the Navy has not consulted on) undergone ESA section 7 consultations (NMFS 2005, 2017, 2018a, 2018b, 2018c, 2019a, 2019b, 2019c, 2019d, 2019e, 2020a, 2020b, 2020c, 2022c). Through these consultations, NMFS has determined that the ESA-listed green turtles and hawksbill turtles are not likely to be adversely affected by these types of actions due to the nature and extent of the turtles' exposure and response to the stressors, in combination with the Navy's implementation of standard BMPs

to avoid and minimize impacts to the turtles. Via these consultations, NMFS concluded that these activities either do not result in any responses in the turtles, or in temporary behavioral responses where individuals avoid the area for a short time. In such cases, the effects are unlikely to harm or harass individuals.

An exception to the Navy's activities in Pearl Harbor that are not likely to adversely affect sea turtles is the current construction project at DD5 and WPF, where the stressors from elevated sound levels due to pile driving, vessel strikes from increased vessel traffic, permanent loss of resting caves (habitat loss) and entrapment from the operation of DD5 were determined to likely adversely affect both green and hawksbill sea turtles (NMFS 2022a).

Because it is a very busy working environment, we assume turtles in Pearl Harbor are likely acclimated to the presence of humans and equipment. However, if turtles are displaced from important feeding or resting areas in the Harbor due to activities over a prolonged period, the displacement may incur higher costs to individual animals and ultimately potentially to the populations that they represent. Loss of habitat is addressed in section 3.2.1.5.

3.2.1.1.2 Military Training and Testing

The Navy continually conducts training and testing activities and other military readiness activities across the Hawaiian Range Complex, which includes Pearl Harbor. The range and variety of actions and activities are described in the Navy's most recent Environmental Impact Statement (DON 2018), and include but are not limited to vessel activity, sonar, denotations, demolitions, pile driving, gunnery, and dive and salvage operations.

The sea turtles in Pearl Harbor are exposed to the stressors resulting from these activities to different extents, and may respond to varying degrees. The Navy training and testing activities have undergone iterations of section 7 consultations over time, with the last formal consultation concluded in 2018 (NMFS 2018a). During the 2018 consultation, NMFS determined that the primary impacts on sea turtles resulting from the Navy's training and testing undertaken across the entire Hawaiian Range Complex are from explosives and vessel strikes resulting in sublethal and lethal adverse effects to sea turtles. Note that effects occur largely outside Pearl Harbor. NMFS determined that other potential stressors analyzed, some that occur in the harbor, such as elevated sound from various acoustic sources (e.g., sonar, pile driving, small airguns, vessel and aircraft noise, and weapons noise), ingestion of expended materials, entanglement, energy stressors, and physical disturbance, are not likely to adversely affect ESA-listed green and hawksbill turtles (NMFS 2018a).

3.2.1.1.3 Recreation

Recreational activities in Pearl Harbor are ongoing, but are limited in scope and intensity. They are associated primarily with Military personnel and their families, and those with access to JBPHH given that public access to Pearl Harbor is restricted. Iroquois Point Beach, Hickam Beach and Kamehameha Beach, each located at or near the mouth of Pearl Harbor, are used for typical beach and nearshore activities (NAVFAC 2011, 2022b).

Recreational small boat use in Pearl Harbor is limited, and tied to transit to and from Hickam Harbor Marina at Hickam Harbor, Rainbow Bay Marina at Aiea Bay, and the Marina docks (including Kapilina Marina) in the lagoon behind Hammer Point (NOAA 2015). The potential

effects of elevated underwater noise and vessel strike that may be associated with this boat activity, in combination with effects of other activities resulting in these same stressors, are addressed in sections below.

Legal fishing in Pearl Harbor is largely regulated, and restricted to pole-cast catch-and-release only from selected locations in the Harbor (NAVFAC 2011, 2022b). Recreational fishing is currently suspended at some locations due to ongoing efforts to remove invasive octocorals (DON 2023). Based on anecdotal information including our opportunistic observations, and as acknowledged by the Navy, illegal fishing may occur in the Harbor, such as in the inner reaches of West Loch. These fishing activities, and inadvertent abandoned fishing gear in general, such as traps, lines, or nets may cause the entanglement of sea turtles (addressed in Section 3.2.1.3). Given the unknown frequency of illegal fishing activities and the resulting discharge (or loss) of fishing gear, we are unable to quantify the effects on listed sea turtles in the Harbor from this ongoing activity.

3.2.1.2 Vessel Collision and Strike

Pearl Harbor is the homeport for nearly 40 warships, service force vessels and submarines. Many vessels, of varying sizes, move in and through Pearl Harbor on a daily basis. The majority of vessel traffic involves commissioned Navy ships (NAVFAC 2022a), other vessels include tug boats, barges and numerous recreational crafts, including small speed boats transiting to and from the marinas. The Navy states that there are typically about 2,000 naval vessel movements (one-way trips) in the harbor annually, which translates to approximately 5 trips per day. In addition, every other year in June, due to Rim of the Pacific military training exercises, there are an additional 30–35 visiting vessels in the harbor (NAVFAC 2022a). Our anecdotal observations indicate that non-naval vessels movements in the harbor, i.e., from recreational small boat use as described above in Section 3.2.1.1, likely involve several (potentially ranging from 5-20) additional trips per day in, out, and within the harbor.

Vessel collision is a threat to the survival of many air breathing marine vertebrates such as marine mammals and sea turtles (Schoeman et al. 2020). Ship strikes are a known source of mortality for green sea turtles in Hawaiian waters (NMFS unpublished stranding data), and the various vessel movements in Pearl Harbor pose a real collision risk to green turtles that occur there (Kelly 2020). Effects of strikes include injury or death of the animal (NMFS and USFWS 1998a, 1998b, 2013; Schoeman et al 2020).

Around Hawai‘i, it is estimated that between 200-250 green sea turtles are struck by vessels annually, and the mortality for vessel strikes is 95 to 100% (NMFS unpublished stranding data; Kelly 2020). There are a number of ‘hotspot’ areas of concern relative to vessel strikes on Oahu where a cluster of vessel collisions have occurred. These are all high-density or high-use boating areas typically associated with small boat harbors or boat ramps (Kelly 2020). Pearl Harbor is one of the hotspots: of 135 vessel strike-induced green sea turtle strandings on Oahu between 2008 and 2018, 27 animals (20%) were found stranded in Pearl Harbor (NMFS 2019 report #IR-19-001; Figure 10). The stranded turtles in the harbor were concentrated in the main entrance channel, with a few observed in West Loch, a couple around Ford Island, and none observed in the inner reaches of the harbor in Middle Loch or East Loch. None of the stranded turtles were hawksbills.

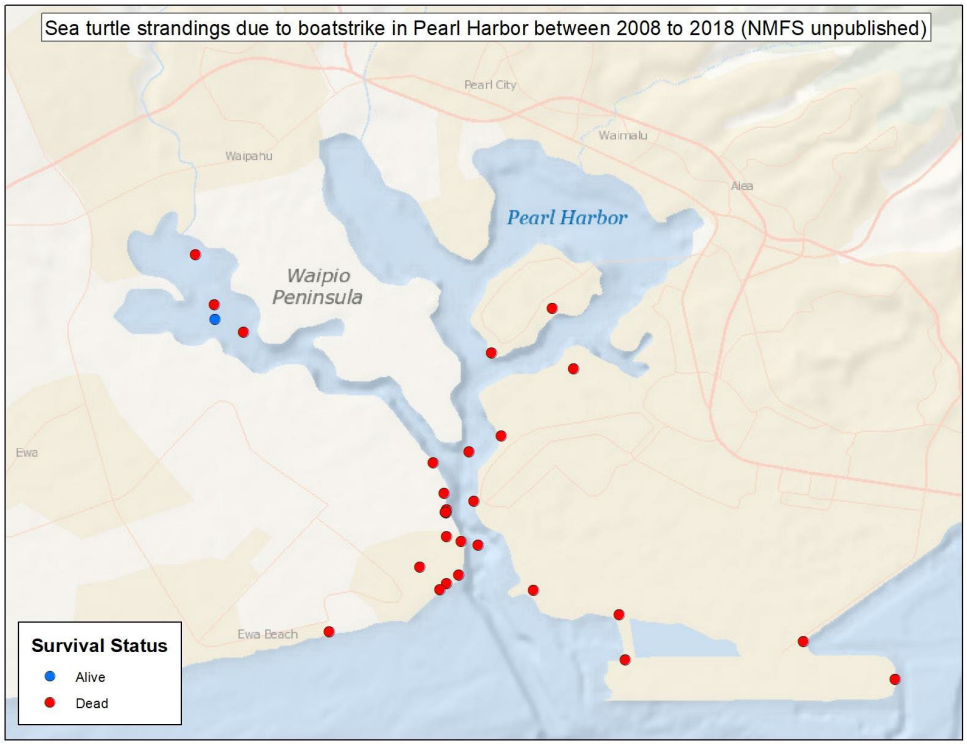

Figure 10. Sea turtle strandings (n=27) due to boat strike in Pearl Harbor from 2008-2018 (Kelly 2020 based on NMFS 2019 report #IR-19-001).

Given that green sea turtles have a fairly tight core foraging home range (Balazs et al. 2017), there is a high potential for an animal to strand in/near where an impact might have occurred. In Pearl Harbor, dead or injured sea turtles within the harbor are very likely to be discovered and reported because the waters and shorelines are actively monitored by the Navy. Therefore, strandings are likely a good representation of the overall level of vessel strike impact in or near Pearl Harbor (with the understanding that strandings recovered within the harbor may have occurred just outside or near the entrance channel and funneled into the harbor with incoming tides). Noteworthy is that a turtle struck by a vessel may not be observed as the impact event occurs, nor discovered immediately upon being struck. Therefore, while strandings in the harbor indicate the general level of impact by vessel strike in the area, a discrete stranding cannot be precisely tied to a strike event by a particular vessel, vessel activity type, or time of impact.

During NMFS's 2018 consultation with the Navy on their training and testing activities in the Hawai‘i and Southern California Range Complex (NMFS 2018a), NMFS estimated that across the entire Hawai‘i Range (of which Pearl Harbor makes up a small area) 20 green sea turtles and one hawksbill sea turtle will be killed per year due to vessel strikes resulting from these training and testing activities (NMFS 2018a), and that approximately seven green sea turtles and one hawksbill sea turtle will be harmed per year.

3.2.1.3 Entanglement and Entrapment

3.2.1.3.1 Mooring Lines and Tethers

The Navy's regular in-water work and activities are often associated with the use of mooring lines and tethers for barges/platforms and anchoring systems. However, to date, entanglement from equipment and gear typically used in construction and pile driving has not been reported by the Navy in Pearl Harbor. In addition, as addressed above in section 3.2.1.1, the Navy's recent (at minimum since year 2017) actions involving in-water work that uses lines, tethers, etc., and that have the potential for adverse effects on ESA-listed species, have undergone ESA section 7 consultations (NMFS 2005, 2017, 2018a, 2018b, 2018c, 2019a, 2019b, 2019c, 2019d, 2019e, 2020a, 2020b, 2020c, 2022a, 2022c). During these consultations, NMFS determined that the ESA-listed green turtles and hawksbill turtles will not be adversely affected by these types of actions due to the nature and extent of turtles' exposure to the stressors, in combination with the Navy's implementation of standard BMPs to avoid and minimize impacts to the turtles. These BMPs required the use of trained observers to monitor for sea turtles, halt work if any approached within 50 yards and observe to ensure no entanglements occurred from ropes and cords used during active in-water work.

Entanglement in fishing gear is the most common cause of sea turtle stranding in Hawai'i (Work et al. 2015, Brunson et al. 2022). There are activities such as fishing in Pearl Harbor that result in turtle entanglement risk that fall outside the ESA section 7 consultation scope. While the Navy regulates fishing activities in the harbor, illegal fishing occurs in remote shoreline areas in shallow waters of the harbor (areas where the Navy cannot easily patrol) using hook and line, gill nets and crab traps. Based on monthly Navy surveys conducted in the harbor to document fishing violations in 2019, 2021 and ongoing in 2022 (NAVFAC pers. com 2022), one turtle was observed entangled in a gill net (note these surveys are not designed to quantify turtle presence). Entanglement in fishing gear has been observed in turtles stranded in Pearl Harbor (NMFS stranding data unpublished), and between 2006 and the end of 2021, 57 turtles were recorded as entangled in fishing lines and seven in nets.

3.2.1.3.2 Dry Dock Operations

As part of Naval facilities operations, the Navy regularly conducts depot-level maintenance (major repair, overhauling, or complete rebuilding) of submarine and surface vessels in their four 80-100 year-old operating dry docks (DD 1 – 4) located at PHNSY & IMF. Each entry and exit of a Navy vessel into and out of a dry dock involves, at minimum, one cycle of the Navy flooding and dewatering the dry dock. The Navy has indicated that they currently undertake an average of ten flooding events per year, with a maximum of 16 flooding events per year in the operating dry docks DD1 – 4. Each dry dock may experience approximately 2-4 flooding/dewatering events per year (NAVFAC 2022a). However, vessels can be in the dry docks for depot maintenance for more than a year.

The flooding and dewatering of the dry docks can result in the entrapment of a turtle, as a turtle may be present within a dry dock when the ship has entered, and the basin is sealed and dewatered. Entrapment may result in injury or death of an animal if undiscovered or relocated without care. However, the Navy states that the turtles trapped in the existing dry docks to date were discovered by Navy personnel prior to the basin being drained fully, and were carefully

removed from the dry dock and successfully relocated back into the marine environment (NAVFAC 2022a). While the Navy has not reported the death or injury of any individual turtles resulting from these entrapments and relocation events, we have no information to fully assess nor quantify the overall effect on the individuals trapped in the dry dock.

3.2.1.4 Elevated Sound

The Navy regularly conducts a range of actions in and around Pearl Harbor that generate varying levels and types of sound in the harbor. These actions include vessel operations, aircraft flights, sonar, dredging, and construction. The sources of sound specifically include the transit of boats, tugs, and barges in and out of the harbor; pile driving, pile extraction; drilling; welding; use of power tools; and operation of heavy machinery including mechanical and hydraulic dredges.

The sea turtles in Pearl Harbor are likely exposed to the sound generated from these activities to different degrees, and may respond in various ways. While the specific level of sound generated by all of the different vessels is unknown, sound generated by vessels is generally low frequency, which can travel long distances underwater (DOSITS 2022) and fall within the suspected hearing range of sea turtles. Unmitigated sound can cause direct physical harm to the turtles such as barotrauma and non-auditory damage to gas-filled organs, or hearing loss expressed in permanent threshold shift (PTS) or temporary threshold shift (TTS). Exposure to sound in the Harbor may also cause behavioral responses (Popper et al. 2014) including avoidance, cessation of feeding, resting, and/or social interactions, and changes in diving behavior (McCauley et al. 2000).

We have not quantified the level of exposure and response of sea turtles to all sounds occurring in Pearl Harbor. However, the Navy's recent (since 2017, at minimum) in-water actions that generate sound that have the potential to adversely affect ESA-listed species in the harbor including turtles, have undergone ESA section 7 consultations (NMFS 2018a, 2018b, 2018c, 2019a, 2019b, 2019c, 2019d, 2020a, 2020b, 2020c, 2022a, 2022c). Through these consultations, NMFS has determined that the ESA-listed green turtles and hawksbill turtles will not be adversely affected by resulting elevated noise due to the nature and extent of turtles' exposure and response to this stressor, in combination with Navy's implementation of measures to mitigate the noise impacts to turtles. We have concluded that these activities either do not result in any responses in the turtles, or in behavioral responses where individuals primarily temporarily avoid the area of higher sound. In such cases, the effects are unlikely to harm or harass individuals.

Because it is a very busy working environment, we assume turtles in Pearl Harbor are likely acclimated to the higher ambient sound. However, if turtles are displaced from important feeding or resting areas in the Harbor due to activities over a prolonged period it may come at higher costs to individual animals.

3.2.1.5 Habitat Disturbance or Loss

Over the last century, the Navy's extensive dredging and filling operations have altered the shoreline and bathymetry of Pearl Harbor to provide navigation channels for large naval ships and waterfront Naval facilities. The dredging and filling activities have induced substantial permanent changes to the benthos and potentially to water quality in the harbor (Coles 2006). The dredging for DD5 and Waipio eliminated a total of 7.32 acres of viable benthic habitat for

sea turtles, including 15 potential resting caves in Pearl Harbor (Figure 7; NAVFAC 2024). Together, these changes have almost certainly affected sea turtles over time by altering their resting and foraging habitat, and influencing their home ranges and movement patterns. Our working assumption is that the ESA-listed turtles currently in Pearl Harbor are largely acclimated to the altered shorelines and bathymetry of Pearl Harbor, although it is likely turtles will recognize the loss or removal of habitat to which they have become accustomed or acclimated.

In recent years, the Navy has primarily conducted pile-driving, mooring installation, and maintenance dredging resulting in temporary disturbance or minimal (on the scale of a few square feet/meters) permanent loss of habitat. We are reasonably certain that as a result of these activities, ESA-listed green turtles and hawksbill sea turtles likely only temporarily avoid affected areas given the small footprints and/or temporary nature of disturbance to habitats in the harbor.

3.2.2 Pollution and Marine Debris

Prior to the 20th century, water quality in Pearl Harbor was reportedly high, and sedimentation and turbidity low (Commander, Navy Region Hawai‘i [CNRH], 2008 as cited in NAVFAC 2022b). Since then, human activities, largely military within Pearl Harbor and both military and non-military in the surrounding watersheds, have resulted in several different types of anthropogenic pollution negatively affecting the water quality within Pearl Harbor (NAVFAC 2020b). The pollutants include oil-based products, contaminants, pesticides, sediment, nutrients, and marine debris.

Today, Pearl Harbor has naturally-persistent levels of high turbidity (NAVFAC 2022b), and the harbor waters (Pearl Harbor Estuary and Mamala Bay) have been listed by the Hawai‘i Department of Health (HDOH) as impaired water bodies for failing to attain water quality standards for total nitrogen, total phosphorus, and chlorophyll a (HDOH 2020). HDOH has issued an advisory warning that humans should not consume fish and shellfish caught in Pearl Harbor (HDOH 2020; NAVFAC 2022b). A Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) feasibility study investigations conducted in Pearl Harbor between 1996 and 2017 has identified four (4) chemicals of concern in the harbor floor sediments to be remediated: total Polychlorinated biphenyls (PCBs), copper, lead, and mercury (NAVFAC 2018).

Various military activities within Pearl Harbor are the cause of the contamination of soil, sediment, and groundwater with metals, organic compounds, and petroleum hydrocarbons (NAVFAC 2018). In addition, Pearl Harbor is a natural sediment trap receiving a contaminant load from many non-military commercial, industrial, residential, and agricultural sources in the surrounding watershed discharged from the many tributary streams and storm drains (NAVFAC 2018; AECOM 2010 as cited in NAVFAC 2022a). Sediment-laden runoff enters the Harbor primarily due to poor erosion and sediment control in upland areas. Heavy metals and other chemical contaminants (pesticides, herbicides, etc.) frequently adsorb to the sediment particles and are transported to the harbor waters (AECOM 2010 as cited in NAVFAC 2022a). After heavy rains, there is increased freshwater input in Pearl Harbor, and increased turbidity and suspended sediment (NAVFAC 2022a, 2022b).

Waste, debris, and other pollutants may be introduced, or elevated, in Pearl Harbor from the various military activities in the area including from vessels, facilities, materials, equipment, and divers in the form of discharge of hydrocarbon-based contaminants from vessels or equipment, chemical spills, inadvertent disposal of debris/trash, and leaching of toxins from construction materials (NAVFAC 2022a, 2022b). Vessel activity and in-water work (e.g., dredging, pile-drilling, pile removal, etc.) in the harbor can elevate ambient suspended sediment and turbidity levels by dislodging, re-suspending, and dispersing sediment in the water column exposing turtles to sedimentation (NAVFAC 2022a, 2022b). Any contaminants associated with sediment particles may also be re-suspended.

The various pollutants mentioned above may affect sea turtles in Pearl Harbor in different ways. The sea turtles may avoid an affected area; their immunity and fertility may be compromised; they may have reduced ability to detect predators (Oliver et al. 2000); or their response may be serious injury or in severe cases, death (NMFS and USFWS 1998a, 1998b; NMFS and USFWS 2013). Changes to water quality may also influence the condition of the benthic communities that they rely on such as corals, algae and seagrass, and may negatively impact turtles' food sources (NMFS and USFWS 1998a, 1998b).

Currently, the Navy implements various measures and strategies to control pollution in Pearl Harbor. Navy manages and treats occasional or intermittent Navy discharges into Pearl Harbor including from the existing dry docks, Navy WWTP, and storm drains, through stipulations of dozens of National Pollutant Discharge Elimination System (NPDES) permits issued to them by HDOH (NAVFAC 2022a). The Navy controls suspended sediment and turbidity levels associated with in-water work through the implementation of various BMPs, and monitoring as per Clean Water Act regulations (NAVFAC 2022a). The Navy plans to undertake, under EPA and HDOH oversight, CERCLA remediation of contaminants present in the sediment in multiple locations across the Harbor, including at PHNSY & IMF (NAVFAC 2018). The Navy coordinated with NMFS regarding the potential effects on ESA-listed species from these remediation actions, and NMFS determined that after the implementation of BMPs, all stressors will be minimized to an insignificant or discountable level of concern (NAVFAC 2020b). Note that the CERCLA site investigations indicate that there are no immediate threats to human health or the environment from these chemicals (NAVFAC 2018). Also, while HDOH has listed Pearl Harbor waters as impaired, it considers harbor waters a low priority for the establishment of total maximum daily load requirements (HDOH 2020). In terms of marine debris, while ingestion of marine debris is a significant concern for sea turtles, it is a concern mostly to their early developmental stages spent in the open sea and not harbor waters, when and where they may eat plastic because it closely resembles natural prey items (Schuyler 2014; Lutcavage et al., 1997; Laist et al., 1999; Santos et al., 2015).

In conclusion, while it is likely that the turtles in Pearl Harbor are exposed to the polluted harbor waters and may exhibit various responses, they may be acclimated to the ambient water quality or largely unaffected given they are surface air breathers. However, the overall trend of water quality and the effect of pollution on turtles in Pearl Harbor has not been quantified.

3.2.3 Climate Change

Global climate effects have likely affected and continue to affect the military infrastructure at JBPHH and the resources and environment within Pearl Harbor. Corals in the harbor may

experience bleaching, increased occurrence of disease, and weakening of coral skeletons as a result of ocean warming and ocean acidification (NMFS 2022b; Erez et al., 2011; Langdon et al., 2000; McWilliams et al., 2005). Sponge communities exposed to elevated temperatures may display decreases in buoyant weight, the prevalence of diseases, and an increase in mortality (Webster 2007; Bennett et al., 2017; Laffy et al., 2019; Idan et al., 2020). Macroalgae may respond in varying and unpredictable ways (Yan and Gao 2020). Flooding of wetlands and erosion of shorelines may, in the future, increase due to sea-level rise and storm-surge (Marra and Kruk 2017 as reviewed in NAVFAC 2022b), leading to increased sediment in the environment and other associated contaminants. The freshwater input to Pearl Harbor via point and nonpoint sources from its multiple contributing watersheds may change due to decreased average rainfall, or increase from more frequent and intense storms (Zhang et al., 2016; Timm et al., 2015 as reviewed in NAVFAC 2022b). These changes may contribute to the spread of environmental contamination and affect water quality (increasing nutrients and turbidity levels) (NAVFAC 2011; NAVFAC 2022a), and, subsequently, benthic conditions.

Since green turtles and hawksbill sea turtles inhabit and depend on the water column and benthic communities in the Harbor for food and shelter, they are vulnerable to changes that affect the condition of these habitats or foraging resources. However, we have not quantified these changes and potential effects on listed turtles in Pearl Harbor.

4 EFFECTS OF THE ACTION

Under the ESA regulations (50 CFR 402.02), the effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action but that are not part of the action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. For this proposed action, we determined it will not cause any other activities.

4.1 Stressors

Stressors associated with the proposed action include:

1. Vessel Strikes
2. Disturbance from Human Activity and Equipment Operations
3. Wastes and Discharges
4. Entrapment in Dry Dock

We determined vessel strikes, elevated underwater sound, disturbance from human activity and equipment operations, and wastes and discharges are not likely to adversely affect any listed species or designated critical habitats. The rationale for those determinations is documented in Section 9.1. As a result, in this section we focus on dry dock operations in Pearl Harbor that are likely to adversely affect ESA-listed green turtles and hawksbill sea turtles through entrapment.

4.2 Entrapment in Dry dock

4.2.1 Exposure

The Navy has indicated that turtles (green sea turtles) become trapped in their existing operating dry docks in the harbor (see Environmental Baseline Section 3.2.1.3), and we have been notified on occasion in the past of such occurrences. We are therefore reasonably certain that CNP green turtles and hawksbill turtles will continue to become trapped in operational dry docks.

Currently, the Navy information indicates that on average one turtle becomes entrapped across the existing four dry docks (DD1 – 4) for every four flooding/dewatering cycles. Once the new DD5 is constructed, the Navy estimates it will undertake an average four flooding/dewatering cycles per year at this new dry dock. Despite the Navy's proposed BMPs to mitigate the risk, turtles that are present in or immediately near a dry dock risk becoming entrapped within the dry dock during each flooding/dewatering cycle. We are reasonably certain that an average of one turtle will be trapped every four dewatering cycles in each dry dock, i.e., one per year. Given that DD5 will be constructed adjacent to the existing DD3 (which will be decommissioned and filled as part of Stage 2 of the proposed action), it is likely that the overall number of turtle entrapments in a dry dock at PHNSY & IMF in Pearl Harbor will remain close to baseline levels.

Turtle surveys in Pearl Harbor indicate that a majority of turtle sightings are green sea turtles with 85% of turtles in the November 2013 to November 2015 turtle surveys and 76% of turtles in the November 2013-December 2014 surveys confirmed as green sea turtles, with the remaining sightings not identified to species (Richie et al. 2016). Based on the estimates that there are on average 14 nesting hawksbill females per year in Hawai‘i (Gaos et al. 2021), and a mean of 464 nesting green sea turtle females in Hawai‘i (Seminoff et al. 2015), we estimate that approximately 97% of all turtles in Pearl Harbor are green sea turtles and approximately 3% hawksbill turtles. We are therefore reasonably certain that the vast majority of individuals entrapped in dry docks will be green sea turtles.

Surveys of sea turtles in Pearl Harbor used the three general size classes of less than 50 cm SCL, 50 to 100 cm SCL and greater than 100 SCL to categorize sightings by size. (Richie et al. 2016; Teresa 2021). Given that the average size at first reproduction for green turtles in Hawai‘i is 89

cm SCL (Balazs et al., 2015), the middle size class will be composed of a combination of juveniles, subadults, and adults. Based on these surveys, we anticipate that the majority (60 to 75%) of the green turtles that will be exposed to dry dock entrapment will be less than 100 cm SCL). Based on the strandings data presented in Appendix A of Richie et al. (2016), of the 191 reported turtles, 5 individuals (3%) were greater than 89 cm SCL. Richie et al. (2016) also found that 8% of sighted green sea turtles between 2013 and 2015 were greater than 100 cm SCL. Teresa (2021) found that 36.8% of sighted green sea turtles between 2000 and 2011 were greater than 100 cm SCL and, therefore likely adults. Overall, we anticipate that the majority of sea turtles exposed to dry dock entrapment will be juveniles, although the possibility of the entrapment of adult-sized sea turtles cannot be discounted.

Given that juveniles have no external sexual features until they reach adulthood, the gender of the individuals in Pearl Harbor are not identified. However, based on Balazs et al. (2015) reporting that 61.6% of adults are female we assume an approximately 3:2 female biased ratio. While there is some evidence of seasonality from turtle surveys in the harbor, i.e., fewer turtle sightings between March and June, and a greater number in the later months of the year (Teresa 2021), we assume this does not influence individuals' level of exposure to stressors as the stressors will span the entire year, and occur for several years. Since the Navy has not documented nesting in Pearl Harbor (NAVFAC 2022a; NAVFAC pers. com 2022), behavioral responses to pile driving, habitat loss, and entrapment in DD5 are not expected to appreciably impact green sea turtle reproductive behavior or nesting success.

Since the green sea turtle population in Hawai‘i has been increasing, and may continue into the future, we expect that the green sea turtle population also in Pearl Harbor will increase over time. A general increase was observed in the number of turtles documented in linear dive transects from March 2000 to May 2011 (Teresa 2021). We estimate that an increasing green sea turtle population in Pearl Harbor will be associated with an increasing probability of turtle entrapment in the dry docks. While we do not know the rate of population increase of green sea turtles in Pearl Harbor, data on counts of nesting female green turtles in Hawai‘i indicate an average annual increase of 5.4% (Balazs et al., 2015; NMFS unpublished). We therefore use this green sea turtle population growth estimate for calculating entrapment risk in the dry docks.

Assuming an annual 5.4 % increase in the probability of green sea turtle entrapment during dry dock operations, and a 0.97 probability of an individual entrapped being a green sea turtle, we expect the number of green sea turtles trapped in the dry docks to increase over 5-year periods as per the maximum estimates outlined in Table 3. These are based on the maximum number of flooding events of four per dry dock per year, with four dry docks operational, and estimates from personnel that one turtle is trapped every four flooding events. Note that we have calculated these numbers using 5-year sums, and have rounded these sums up to the next higher whole number because, under the ESA, we estimate the take of discrete individuals and not percentages.

Table 3. The estimated annual number of green sea turtles trapped in the dry dock over 5-year periods of dry dock operations over the next 50-year period.

5- Year Periods	# Turtles trapped per 5-year period
Years 1-5	22
Years 6-10	29
Years 11-15	38
Years 16-20	49
Years 21-25	64
Years 26-30	84
Years 31-35	110
Years 36-40	144
Years 41-45	188
Years 46-50	247
Total # turtles over 50 yrs.	975

We are also reasonably certain that hawksbill turtles will be exposed to these stressors, albeit at much lower levels due to their uncommon occurrence. While the hawksbill population size in Hawai‘i is trending upward (Gaos et al., 2021), we do not have sufficient data to estimate a population rate of change, and therefore assume that a hawksbill turtle's entrapment risk will remain the same over time. Based on our estimate that approximately 3% of the turtles in Pearl Harbor currently are hawksbill sea turtles — i.e., using a 0.03 probability that a turtle entrapped in any of the dry docks during operations will be a hawksbill sea turtle — we estimate that one hawksbill turtle may become trapped in a dry dock approximately every 8 years of operations. We do not have sufficient information on hawksbill sea turtles in Pearl Harbor to identify the life stage, reproductive phase, age, or sex of individuals that may be exposed to the stressors. However, we are reasonably certain that hawksbills in Pearl Harbor are likely primary juveniles since this is the primary life stage in Pearl Harbor of green sea turtles and the two hawksbill turtles released by the NOAA stranding program were juveniles (see Environmental Baseline Section 3).

In summary, based on the above calculations, we estimate that a total of 925 green sea turtles and up to six hawksbill sea turtles will be trapped in dry docks over the next 50-year operational period. The Navy will continue operating dry docks beyond 50 years, likely for the 100-year design life of the dry docks and potentially beyond. While our calculations can be projected out for this duration and beyond, Pearl Harbor has a maximum carrying capacity for green turtles, i.e., there will be a point where the green sea turtle population in the harbor will no longer increase. We cannot determine what this carrying capacity might be, and when it will be reached, but we are reasonably certain it will occur within the first 50 years at a 5.4% rate of increase. At that rate, the population will be roughly eight times its current abundance in 50 years. Because it is not reasonable to expect a greater increase than that, we estimate the number annually entrapped in years 51-100 to be the same as in years 46-50 (230 per 5-year period).

4.2.2 Response

The Navy will implement their proposed mitigation measures to minimize turtle entrapments using bubble curtains as deterrents, and to carefully handle and relocate 100% of any turtles that are entrapped in consultation with NOAA's Marine Wildlife Stranding Program. Therefore, we are reasonably certain the probable response of the individuals to be primarily behavioral, specifically temporary displacement. The Navy indicates that historical turtle entrapments in the existing dry dock have never led to injury or death. Therefore, we are reasonably certain future turtle entrapments will not result in death. We expect that there is a low potential for injury, but are unable to quantify what this probability will be. We anticipate that some individual green sea turtles could be entrapped on multiple occasions over their lifetime. Of the estimated 925 green sea turtles and up to six hawksbill turtles entrapped in the operational dry docks over the first 50 years of operations, we are reasonably certain the entrapment and subsequent handling and release will only injure a few turtles and not kill any.

5 CUMULATIVE EFFECTS

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). A conclusion of reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the Environmental Baseline (Section 3.2.3).

We searched for information on future state, tribal, local, or private (non-Federal) actions reasonably certain to occur in the action area. We did not find any information about non-Federal actions other than what we described in the Environmental Baseline (Section 3), most of which we expect will continue in the future. An increase in these activities could similarly increase their effect on ESA-protected resources and for some, an increase in the future is considered reasonably certain to occur. Given current trends in global population growth, threats associated with climate change are likely to continue to increase in the future. Given Pearl Harbor receives a contaminant load from many non-military commercial, industrial, residential, and agricultural sources in the surrounding watershed, threats associated with pollution from discharges from point and nonpoint sources of pollution in harbor waters are likely to continue.

For the illegal non-federal fishing and associated threats identified in the Environmental Baseline, the magnitude of increase and the significance of any anticipated effects remain unknown. The best scientific and commercial data available provide little specific information on any long-term effects of these potential sources of disturbance on ESA-protected resources. Thus, this consultation assumed effects in the future will be similar to those in the past and, therefore, are reflected in the anticipated trends described in the status of listed resources (Section 2) and Environmental Baseline sections.

6 INTEGRATION AND SYNTHESIS

The Integration and Synthesis section is the final step in assessing the risk that the proposed action poses to species and critical habitat. In this section, we add the Effects of the Action (Section 4) and the Cumulative Effects (Section 4.3) to the Environmental Baseline (Section 3), and in light of the Status of the Listed Resources (Section 2), formulate our opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of critical habitat as a whole for the conservation of the species.

6.1 Central North Pacific Green Sea Turtle

As described in the Status of Listed Species Section the CNP green sea turtle is listed as threatened, with its abundance increasing by about 5.4% per year over the past 40 years (Balazs et al. 2015). While the nesting population trajectory is positive, more than 96% of nesting occurs at one site in the NWHI that is highly vulnerable to loss of nesting habitat. This is exemplified by the impacts on the green sea turtles' main nesting beach on East Island in French Frigate Shoals due to Hurricane Walaka in 2018. While recent monitoring suggests that the species is successfully using alternate nesting habitat on nearby Tern Island, this hurricane event placed the CNP green turtles in a natural experiment whose outcome remains uncertain.

The historical decline of green sea turtles is primarily attributed to intense harvesting. The positive increasing population trend is attributed to increased survivorship (since harvesting of turtles in foraging areas was prohibited in the mid-1970s) and cessation of habitat damage at the French Frigate Shoals rookeries beginning in the early 1950s (Balazs and Chaloupka 2004). Currently, the primary threats to the population include habitat loss due to sea level rise and climate change, coastal gill net and hook-and-line fisheries, vessel strikes, and fibropapillomatosis disease. The concentrated nature and relatively small size of the population make it vulnerable to random variation and stochasticity in the biological and physical environment, including natural catastrophes and anthropogenic threats. Emerging concerns for turtle habitat throughout the Hawaiian Archipelago are phenomena related to climate change, including changing storm dynamics and intensity, and loss of nesting habitat (Baker et al., 2006; Baker et al., 2020; Keller et al., 2009) were key considerations in the recent population assessment and ESA listing status (Seminoff et al., 2015).

As described in the Environmental Baseline Section, past and present military activities, pollution and climate change have, and continue to affect CNP green turtles within Pearl Harbor (the action area). CNP green turtles may also interact with illegal fishing activity and pollution in the harbor. As described in the Cumulative Effects Section (Section 5), these activities are reasonably likely to continue, with environmental changes associated with anthropogenic threats likely to increase due to human population growth.

From our Effects Analysis, we anticipate that green sea turtles in Pearl Harbor will experience entrapment in the dry docks, which may result in behavioral responses and potential injury. Based on our analysis, we expect the majority of individuals to experience behavioral response rather than physical injury. We anticipate that some individual green sea turtles will be exposed to entrapment in the dry docks on multiple occasions over their lifetime.

We are reasonably certain the Navy will release green turtles entrapped in dry docks without injury. Although behavioral responses could result in fitness impacts on individual sea turtles, we expect such effects to occur in only a very small number of individuals and that they will recover. We expect that individuals that sustain recoverable injuries or long-term behavioral effects will experience fitness consequences during the time it takes them to fully recover and resume normal behavioral activities, and turtles that experience short-term behavioral responses will recover fully after exposure to the stressor, with little long-term effects to individuals. We are reasonably certain effects will not result in an appreciable reduction in the survival or reproductive potential of these individual sea turtles, and given the small number of individuals affected, it is unlikely to have an appreciable impact at the population level of CNP green sea turtles. Since no nesting has been recorded in Pearl Harbor (NAVFAC 2022a; NAVFAC pers. com 2022), behavioral responses to pile driving, habitat loss, and entrapment in DD5 are not expected to appreciably impact green sea turtle reproductive behavior or nesting success.

We are reasonably certain the green sea turtle population trend will continue to be positive with the proposed action. Thus, we are reasonably certain the proposed action will not cause material changes having appreciable biological consequences to the species' numbers, reproduction, or distribution. In accordance with Section 4 (Jeopardy Analyses) above, we do not anticipate the proposed action will reduce appreciably the likelihood of the survival or recovery of green sea turtles in the wild by reducing their reproduction, numbers, or distribution.

6.2 Hawksbill Sea Turtle

In the Status of Listed Species Section, we describe that hawksbill sea turtles are listed as endangered throughout their global range. We also address that genetic studies indicate subpopulation structure within this global range, and therefore focus our risk assessment on the Pacific and specifically Oceania hawksbill populations rather than the global species range.

The historical decline of hawksbill sea turtles is primarily attributed to centuries of exploitation for the species' ornate shell (Parsons 1972). The continuing demand for hawksbill shells, as well as other products derived from the species, represents an ongoing threat to its recovery. Due to their preference to feed on sponges associated with coral reefs, hawksbill sea turtles are particularly sensitive to losses of coral reef communities. Threats from other manmade and natural sources remain, including poaching, incidental capture in commercial and artisanal fisheries, climate change, and coastal development.

As described in the Environmental Baseline Section (Section 3), past and present military activities, pollution, and climate change likely have been, and likely continue to affect hawksbill turtles in Pearl Harbor (the action area). As described in the Cumulative Effects Section (Section 4.3), these activities are reasonably likely to continue, with environmental changes associated with climate change likely to increase due to human population growth.

We are reasonably certain the Navy will release hawksbill turtles entrapped in dry docks without injury. Although long-term behavioral responses could result in fitness impacts on individual sea turtles, such effects are only predicted to occur in very few if any individuals. We do not expect these effects to result in an appreciable reduction in the survival or reproductive potential of individual sea turtles, and given the small number affected it is unlikely to have an appreciable impact at the population level of Oceania hawksbill turtles.

Given the above, we are reasonably certain the proposed action will not cause material changes having appreciable biological consequences to the species' numbers, reproduction, or distribution. In accordance with Section 4 (Jeopardy Analyses) above, we do not anticipate the proposed action will reduce appreciably the likelihood of the survival or recovery of hawksbill sea turtles in the wild by reducing their reproduction, numbers, or distribution.

7 CONCLUSION

After reviewing and analyzing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of CNP green sea turtles or hawksbill sea turtles.

8 INCIDENTAL TAKE STATEMENT

Section 9(a) of the ESA prohibits taking of endangered species. In the case of threatened species, section 4(d) of the ESA leaves it to the Secretary's discretion whether and to what extent to extend the statutory 9(a) take prohibitions, and directs the agency to issue regulations it considers necessary and advisable for the conservation of the species. We have extended section 9(a) take prohibitions to threatened CNP green sea turtles.

The term "incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (50 CFR 402.02). The proposed action results in the incidental take of CNP green sea turtles and hawksbill sea turtles. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the reasonable and prudent measures and terms and conditions of this incidental take statement (ITS).

Consistent with the decision in *Center for Biological Diversity v. Salazar*, 695 F.3d 893 (9th Cir. 2012), we have included an incidental take statement to serve as a check on the no-jeopardy conclusion by providing a reinitiation trigger if the level of take analyzed in the biological opinion is exceeded. In addition, 50 CFR 402.14(i)(3), without regard to 9(a) prohibitions, provides that in order to monitor the impacts of incidental take, "the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the ITS."

8.1 Amount or Extent of Take

Section 7 regulations require NMFS to specify the impact of incidental taking as the amount or extent of such taking (50 C.F.R. §402.14(i)(1)(i)). The amount of take represents the number of individuals that are expected to be taken by actions. The amount of incidental take caused by the operations of the dry docks is summarized in Table 4 below.

Table 4. The amount and extent of anticipated take of threatened and endangered sea turtles due to the proposed action.

Green sea turtle	Hawksbill sea turtle
Entrapment and capture of green sea turtles during the next 100 years of dry dock operations: ● Years 1-5: 22 individuals ● Years 6-10: 29 individuals ● Years 11-15: 38 individuals ● Years 16-20: 49 individuals ● Years 21-25: 64 individuals ● Years 26-30: 84 individuals ● Years 31-35: 110 individuals ● Years 36-40: 144 individuals ● Years 41-45: 188 individuals ● Years 46-50: 247 individuals ● Years 51-100: 247 individuals per 5-year period.	Entrapment and capture of hawksbill turtles: ● 1 individual every 8 years

8.2 Reasonable and Prudent Measures

Reasonable and prudent measures refer to those actions the Director considers necessary or appropriate to minimize the impacts of the incidental take on the species (50 CFR 402.02). We determine that the following reasonable and prudent measures, as implemented by the terms and conditions that follow, are necessary and appropriate to minimize the impacts of the proposed action on threatened and endangered species and to monitor the level and nature of any incidental takes.

1. The Navy shall minimize incidental take from entrapment in dry docks throughout the operational lifetime of the dry docks.
2. The Navy shall ensure the proposed action has a monitoring and reporting program sufficient to confirm the amounts and extents of take are not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

8.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action may lapse.

1. The following terms and conditions implement reasonable and prudent measure No. 1:
    a. The Navy shall explore and implement effective methods to reduce the incidence of entrapments in dry docks throughout their operational lifespans.
    b. The Navy shall develop an NMFS PRD approved protocol for responding to, handling, and relocating ESA-listed turtles trapped in the dry docks in coordination with the NMFS stranding response program within 12 months of the issuance of this biological opinion.
2. The following terms and conditions implement reasonable and prudent measure No. 2:
    a. The Navy shall ensure they monitor the number of turtles by species entrapped in each dry dock.
    b. The Navy shall provide annual reports to NMFS by March 1 of each calendar year that detail the results of the monitoring above for the previous calendar year.

8.4 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

1. The Navy should undertake or support studies on ecology, habitat use, fecundity, genetics, and post-interaction survivability of turtles.
2. The Navy should explore how climate change may affect habitat quality, prey abundance and distribution, and the physiological ecology (e.g. thermal tolerance) of the sea turtles present in, and immediately around Pearl Harbor.
3. The Navy should enforce the vessel speed limits in and at the mouth of Pearl Harbor, and explore additional mitigation measures to reduce the risk of vessel collision with sea turtles.
4. The Navy should develop an outreach and education campaign for the public to increase awareness of the fishing regulations in Pearl Harbor, and enhance capacity to monitor and regulate illegal fishing to reduce entanglement risk with sea turtles.

To keep us informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Navy should notify us of any conservation recommendations they implement in their final action.

8.5 Reinitiation of Consultation

This concludes formal consultation for Navy Pearl Harbor Dry Dock Operations. Under 50 CFR 402.16(a), reinitiation of consultation is required and shall be requested by the Federal agency, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

1. If the amount or extent of taking specified in the incidental take statement is exceeded;
2. If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
3. If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or
4. If a new species is listed or critical habitat designated that may be affected by the identified action.

9 NOT LIKELY TO ADVERSELY AFFECT DETERMINATIONS

9.1 Species Not Likely Adversely Affected

9.1.1 Hawaiian Monk Seals

The Navy estimates it will undertake on average 4 flooding/dewatering events per year at each dry dock or approximately 16 events per year. Due to the rare occurrence of Hawaiian monk seals within Pearl Harbor, there being no Navy reports of monk seal entrapments in the existing 4 (four) dry docks to date, we are reasonably certain that the likelihood of monk seals being trapped in any of the dry docks to be extremely unlikely to occur, and therefore discountable.

9.2 Stressors Not Likely to Adversely Affect Listed Resources

The applicable standard for a "not likely to adversely affect" determination is being reasonably certain to be discountable, insignificant, or completely beneficial (USFWS & NMFS 1998). Discountable effects are those extremely unlikely to occur. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Beneficial effects are contemporaneous positive effects without any adverse effects. We determined the following stressors are not likely to adversely affect any listed species or designated critical habitats.

9.2.1 Vessel Strikes

The proposed action may expose CNP green sea turtles, hawksbill sea turtles, and Hawaiian monk seals to potential strikes from vessels as they enter and exit the dry docks, and from the caissons as they are moved for the flooding/dewatering process.

Sea Turtles

Turtles may use auditory cues to react to approaching ships rather than visual cues, making them more susceptible to strike as ship speed increases (Hazel et al. 2007). Sea turtles are most vulnerable to small vessels traveling 10 knots (kts) or faster (Kelly 2020). Increased vessel speed

decreases the ability of sea turtles to recognize a moving vessel in time to dive and escape being hit, as well as the vessel operator's ability to recognize the turtle in time to avoid it. However, vessels and caissons will travel well below 10 kts during dry dock operations. Furthermore, vessels that enter and exit the dry docks will generally be quite large and easily detected and avoided by sea turtles. Thus, we are reasonably certain the probability of exposure of sea turtles to vessel strikes from this action is extremely unlikely, and therefore discountable.

Hawaiian Monk Seals

Hawaiian monk seals are extremely rare within Pearl Harbor. Even in waters where they are common, such as waters just outside Pearl Harbor, vessel strikes on monk seals are infrequent (Carretta et al. 2021). Similar to sea turtles, in the extremely rare event monk seals are encountered by a slow-moving vessel or caisson, they are expected to exhibit avoidance behavior. Given the relatively slow speed, and low likelihood of presence in the vicinity of dry docks, a strike to a Hawaiian monk seal as a result of the proposed action is extremely unlikely to occur and thus will be discountable.

9.2.2 Disturbance from Human Activity and Equipment Operation

The proposed action may expose sea turtles and Hawaiian monk seals in Pearl Harbor to disturbance from human activity and equipment operation as personnel will be present operating equipment as dry docks are flooded and dewatered, and as maintenance on docked vessels is conducted in the dry docks. This disturbance has the potential to result in direct physical contact with or strikes to ESA-listed marine species (note that vessel collision is discussed separately), and behavioral responses such as avoidance.

The Navy will implement BMPs (Section 1.2.2) to ensure intentional interactions with ESA-listed species are avoided and that unintentional interactions are minimized to the greatest extent practicable. This includes the Navy employing biological observers during dry dock floodings/dewaterings who will remain constantly vigilant of the presence of ESA-listed species within activity effects distances, and will record the success and effectiveness of in-water BMPs. The Navy will expressly prohibit all personnel from attempting to disturb, touch, ride, feed, or otherwise intentionally interacting with ESA-listed species.

Given the above, we are reasonably certain that there will be no physical injury or direct contact with any listed turtles in the harbor, and that those exposed to disturbance from human activity and heavy equipment will respond by becoming startled, alarmed, halting activities briefly, and/or potentially moving away from the activity. We expect these behavioral responses to be temporary and recoverable, and below levels that cause harm. Given the low consequence of the response, we conclude the effect on sea turtles from this disturbance from human activity and equipment operation to be insignificant.

Given the implementation of Navy's BMPs, and that Hawaiian monk seals are rarely present in Pearl Harbor, we are reasonably certain that the likelihood of monk seals being exposed to disturbance from human activity and equipment operation is extremely unlikely, and therefore discountable.

9.2.3 Wastes and Discharges

Project wastes may include plastic trash and bags that may entangle or be ingested by a marine species, which is a major anthropogenic threat to the recovery of sea turtles and Hawaiian monk seals that results in both lethal and non-lethal effects (NMFS 2007; NMFS & USFWS 1998a, 1998b). Debris may include plastic bags, rubber, balloons, plastic fragments and confectionery wrappers, all of which may be confused with prey species and ingested by marine fauna, which can block digestive systems and cause internal injuries and starvation. A long-term concern for plastic debris is that it could be a source of toxic chemicals that could compromise immunity and cause infertility in animals, even at very low levels. Stranding data and necropsies provided evidence that sea turtle mortalities resulted from poisoning or obstruction of the esophagus after ingesting garbage (NMFS & USFWS 1998a).

The Navy will implement BMPs (Section 1.2.2), to ensure that no debris will enter and/or remain in the water. During dry dock operations, the Navy will ensure no oils, fuels, or chemicals including cleaning solvents will be discharged into surface waters. Dry docks will also be thoroughly cleaned and inspected prior to flooding. Given the Navy's implementation of the above-mentioned BMPs, we are reasonably certain that exposure of monk seals, green sea turtles, and hawksbill sea turtles to wastes and discharges resulting from the proposed action will be extremely unlikely, and therefore discountable.

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