



**Federal Aviation
Administration**

Draft Programmatic Environmental Assessment for Reentry Vehicle Operations in the Marine Environment

September 2026

Programmatic Environmental Assessment for Reentry Vehicle Operations in the Marine Environment

AGENCIES: Federal Aviation Administration (FAA), lead federal agency; National Aeronautics and Space Administration (NASA), cooperating agency; U.S. Coast Guard, cooperating agency.

This Programmatic Environmental Assessment (PEA) is submitted for review pursuant to section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code 4321, et seq.), and FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures*.

DEPARTMENT OF TRANSPORTATION, FEDERAL AVIATION ADMINISTRATION: FAA has prepared this PEA to evaluate the potential environmental impacts associated with issuing vehicle operator licenses or experimental permits to commercial reentry vehicle operators, which would authorize reentry operations of vehicles in the marine environment. Issuing a commercial space license or permit is considered a major federal action subject to environmental review under NEPA. In addition to issuing a license or permit, FAA's federal action includes issuing airspace closures to ensure reentry operations are conducted safely. FAA intends to use this PEA to comply with its NEPA requirements for subsequent reviews of license or permit applications involving reentry operations in the marine environment, as well as to establish three new categorical exclusions (CATEXs).

PUBLIC REVIEW PROCESS: In accordance with the applicable requirements, FAA is initiating a public review and comment period for the Draft PEA and proposed CATEXs. The public comment period for the NEPA process begins with the publication of the Draft PEA. FAA provided public notice of availability of the Draft PEA for public review and comment in the Federal Register and on the Office of Commercial Space Transportation's NEPA website: https://www.faa.gov/space/environmental/nepa_docs. Public comments can be submitted electronically to www.regulations.gov under Docket No. FAA-2026-10264, or by postal mail to: FAA Environmental Protection Specialist, c/o ICF, 1902 Reston Metro Plaza, Reston, VA 20190. Comments are due on October 19, 2026.

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This PEA becomes a federal document when evaluated, signed, and dated by the Responsible FAA Official.

Responsible FAA Official:

Stacey M. Zee
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Date: _____

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Acronyms & Abbreviations

Acronym	Definition
AGL	above ground level
CO	carbon monoxide
CATEX	categorical exclusion
CEQ	Council on Environmental Quality
CDNL	C-weighted DNL metric
CZMA	Coastal Zone Management Act
DNL	Day-Night Average Sound Level
DOT	U.S. Department of Transportation
dB	decibel
ESA	Endangered Species Act
EA	environmental assessment
EIS	environmental impact statement
EFH	essential fish habitat
FAA	Federal Aviation Administration
FONSI	finding of no significant impact
HAP	hazardous air pollutant
HAPC	habitat area of particular concern
Pb	lead
LOA	letter of agreement
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSAT	Mobile Source Air Toxic
NASA	National Aeronautics and Space Administration
NAS	National Airspace System
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NM	nautical mile
NO ₂	nitrogen dioxide
NOTAM	notices to airmen
NOTMAR	notices to mariners
O ₃	ozone
PM	particulate matter
psf	pounds per square foot

Acronym	Definition
PEA	programmatic EA
PLOC	Programmatic Letter of Concurrence
RSR	reentry, splashdown, and recovery
SO ₂	sulfur dioxide
USCG	U.S. Coast Guard
EPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USSF	U.S. Space Force

Chapter 1

Introduction

The National Environmental Policy Act (NEPA)¹ is the United States' basic national charter for protection of the environment. It is intended to ensure Federal agencies consider the environmental impacts of their actions in the decision-making process. The Federal Aviation Administration's (FAA) policies and procedures for compliance with NEPA are contained in U.S. Department of Transportation (DOT Order 5610.1D, *DOT's Procedures for Considering Environmental Impacts*, and FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures*.²

NEPA requires Federal agencies to assess the environmental effects of proposed major Federal actions prior to making decisions. Major FAA actions include issuing vehicle operator licenses³ or experimental permits⁴ to commercial space operators to conduct launch and reentry vehicle operations, including reentry, splashdown, and recovery (RSR) operations in the marine environment. In addition to issuing a license or permit, FAA issues airspace closures to ensure reentry operations are conducted safely. FAA has completed six environmental assessments (EAs) for individual reentry vehicle proposals that include RSR operations in the marine environment. Each EA resulted in a finding of no significant impact (FONSI).⁵

To support the environmental review process for commercial space license or permit applications involving RSR operations in the marine environment, FAA has prepared this programmatic EA (PEA) in accordance with NEPA, DOT Order 5610.1D, and FAA Order 1050.1G. FAA invited the National Aeronautics and Space Administration (NASA) and U.S. Coast Guard (USCG) to participate as cooperating agencies;⁶ both agencies agreed to participate as cooperating agencies (see Section 1.1.2, *Cooperating Agencies*, for more information).

Programmatic NEPA documents address the general environmental issues relating to broad decisions, such as those establishing policies, plans, programs, or groups of related actions.⁷ Programmatic NEPA documents can also identify best management practices or mitigation measures to avoid environmental impacts on resources and alleviate the need for subsequent tiered reviews. Thus, these documents can

¹ 42 U.S.C. § 4321 et seq.

² Available at:

https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.current/documentNumber/1050.1.

³ A vehicle operator license authorizes a licensee to conduct one or more launches or reentries using the same vehicle or family of vehicles [14 CFR § 450.3(a)].

⁴ An experimental permit authorizes launch or reentry of a reusable suborbital vehicle [14 CFR § 437.7].

⁵ See Appendix B.

⁶ A *cooperating agency* means any federal agency (and a state, Tribal, or local agency with agreement of the lead agency) other than a lead agency that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action that may significantly affect the quality of the human environment. [NEPA § 111(2); 42 U.S.C. § 4336a(a)(3)]

⁷ 42 U.S.C. § 4336e(11).

effectively frame the scope of any subsequent “tiered” documents supporting project-specific Federal actions. In a tiered document, the NEPA analysis only needs to incorporate the previous programmatic review by reference, discuss the relationship between the new document and the previous review, provide access to the document, and concentrate the analysis on project-specific impacts or new information not covered by the earlier programmatic document.⁸

According to FAA Order 1050.1G, FAA may programmatically evaluate proposals in one of the following ways: (1) geographically, including actions occurring in the same general location, such as a body of water, region, or metropolitan area; (2) generically, including actions that have relevant similarities, such as common timing, effects, alternatives, methods of implementation, media, or subject matter; or (3) by stage of technological development.⁹

FAA intends to use this PEA to comply with its NEPA requirements for subsequent reviews of license or permit applications involving RSR operations in the marine environment, as well as to establish new categorical exclusions (CATEX) (see Section 1.3, *Establishment of Categorical Exclusions*).¹⁰ Upon receiving an application, FAA will evaluate the proposal against the CATEXs supported by this PEA to determine if the proposal and its potential environmental impacts fall within the scope of the applicable CATEX (see Chapter 2, *Description of Proposed Action and Alternatives*). If *extraordinary circumstances* exist that may have a reasonably foreseeable significant impact when applying the CATEX (i.e. if the proposal falls outside the scope of this PEA),¹¹ FAA will conduct further environmental review, which could include preparing another NEPA document that tiers from this PEA.

The completion of the environmental review process does not guarantee FAA will issue licenses or permits for RSR operations. License or permit applications must also meet FAA safety, risk, and financial responsibility requirements per 14 CFR Chapter III.

1.1 Federal Agency Roles

1.1.1 Federal Aviation Administration

As the lead federal agency, FAA is responsible for analyzing the potential environmental impacts of issuing vehicle operator licenses or experimental permits for RSR operations in the marine environment. The Commercial Space Launch Act of 1984 (CSLA), as amended and codified at 51 United States Code (U.S.C.) sections (§§) 50901–50924, authorizes the Secretary of Transportation to oversee, license, and regulate commercial launch and reentry activities, and the operation of launch and reentry sites within the United States or as carried out by U.S. citizens. Section 50905 directs the Secretary to exercise this

⁸ FAA Order 1050.1G, § 3.1(c); *see also* FAA Order 1050.1G, § 6.1(bb) (defining tiering).

⁹ FAA Order 1050.1G, § 3.1(a).

¹⁰ The term *categorical exclusion* means a category of actions that a federal agency has determined normally does not significantly affect the quality of the human environment within the meaning of NEPA § 102(2)(C). [NEPA § 111(1); 42 U.S.C. 4336e(1)]. The authority to utilize a programmatic environmental document to establish new categorical exclusions is established in Section 9(i) of DOT Order 5610.1D and Section 1.4(a) of FAA Order 1050.1G.

¹¹ *Extraordinary circumstances* are factors or circumstances that indicate a normally categorically excluded action may have a significant effect. [FAA Order 1050.1G, § B-1(a)]

responsibility consistent with public health and safety, safety of property, and the national security and foreign policy interests of the United States. In addition, section 50903 requires the Secretary to encourage, facilitate, and promote commercial space launches and reentries by the private sector. As codified at 49 Code of Federal Regulations (CFR) § 1.83(b), the Secretary has delegated authority to carry out these functions to the FAA Administrator. FAA is also responsible for creating airspace closure areas in accordance with 49 U.S.C. § 40103 and FAA Order 7400.2R, *Procedures for Handling Airspace Matters*, to ensure public safety.

1.1.2 Cooperating Agencies

FAA invited the USCG and NASA to participate in the NEPA process as cooperating agencies.¹² The USCG has regulatory authority over waters subject to jurisdiction of the United States pursuant to the Ports and Waterways Safety Act.¹³ The USCG evaluates every launch and reentry activity with potential risk to the marine transportation system. The USCG and FAA maintain a memorandum of agreement establishing a process for USCG input into FAA's process for issuing licenses and permits for commercial space launch and reentry activities specific to operations in, on, and immediately adjacent to the navigable waters of the United States. The agreement covers coordination on matters of public health, safety of property, safe navigation, and national security as they relate to those waters.

NASA provides special expertise with respect to environmental issues concerning reentry vehicles. Also, NASA may contract with a commercial operator to use the operator's reentry vehicle to fulfill NASA statutorily mandated objectives.

If necessary, any agency could adopt this PEA to support their own federal actions and environmental findings associated with activities covered in this PEA.

1.2 Purpose and Need

NEPA states that an environmental document must include a statement of purpose and need that briefly summarizes the underlying purpose and need for the proposed agency action.¹⁴ FAA's Federal actions analyzed in this PEA include (1) issuing (and potentially renewing or modifying) vehicle operator licenses or experimental permits to applicants to conduct RSR operations in the marine environment, and (2) issuing airspace closures so that reentry operations can be conducted safely. FAA's authority with respect to reentry vehicle operators' license or permit applications and airspace closures is stated in Section 1.1.1, *Federal Aviation Administration*.

FAA Order 1050.1G states that when the proposed FAA action concerns FAA's duty to act on an application for authorization or other approval of non-federal activity, the purpose and need for FAA's

¹² A *cooperating agency* means any federal agency (and a state, Tribal, or local agency with agreement of the lead agency) other than a lead agency that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major federal action that may significantly affect the quality of the human environment. [NEPA § 111(2); 42 U.S.C. § 4336a(a)(3)]

¹³ See 46 U.S.C. § 700.

¹⁴ NEPA, § 107(d); 42 U.S.C. 4336a(d).

federal action will be informed by the goals of the applicant.¹⁵ The purpose of applicant proposals to conduct RSR operations in the marine environment is typically to transport cargo and/or crew from space to Earth. For example, SpaceX has contracts with NASA to transport crew and cargo from Earth to the International Space Station and then back to Earth. The need for such applicant proposals varies but may include the need to fulfill government or private contracts, provide public services, conduct test operations, crew training, or advance space capabilities. U.S. space policy stresses the need for a robust commercial space industry to conduct these critical operations, as most recently expressed in Executive Order 14335, *Enabling Competition in the Commercial Space Industry*: “Ensuring that United States operators can efficiently launch, conduct missions in space, and reenter United States airspace is critical to economic growth, national security, and accomplishing Federal space objectives.”

1.3 Establishment of Categorical Exclusions

Under DOT Order 5610.1D, Section 9.i(1), and FAA Order 1050.1G, Section 1.4(b)(1), FAA may establish new CATEXs through a decision document supported by a programmatic environmental document, such as this PEA. In accordance with this authority, FAA is proposing to establish three CATEXs relevant to the scope of actions analyzed in this PEA. The analysis and documentation in this PEA substantiate these CATEXs, and serves as the written record required under FAA Order 1050.1G, Section 1.4(b)(1). FAA is also consulting with the Council on Environmental Quality (CEQ) regarding the proposed CATEXs, as required under FAA Order 1050.1G, Section 1.4(b)(2). Public notice of FAA’s proposed establishment of these CATEXs, along with the availability of this PEA, will be provided as required under FAA Order 1050.1G, Section 1.4(b)(3).

Establishment of these CATEXs would enable a more efficient and effective environmental review process for FAA actions while maintaining compliance with all applicable environmental laws and regulations. This section describes these proposed CATEXs, including any associated conditions or limitations. Appendix B, *Categorical Exclusions*, provides materials to support FAA’s evaluation of future vehicle operator license or experimental permit applications involving RSR operations in the marine environment and how FAA will determine if an extraordinary circumstance(s) exists, consistent with FAA Order 1050.1G, Section 1.4(f).

CATEX 1. New Vehicle Operator License or Experimental Permit for Reentry Operations in the Marine Environment

Issuance of FAA vehicle operator licenses or experimental permits for RSR operations within the scope of operations described in Chapter 2, *Description of Proposed Action and Alternatives*, of this PEA. All FAA-licensed or -permitted reentry operations would occur within the study area analyzed in this PEA and the applicant’s annual frequency of reentry operations would not exceed the cumulative number of annual FAA-licensed and -permitted reentries described in this PEA.

¹⁵ FAA Order 1050.1G, Section 1.5(b)(i).

CATEX 2. Vehicle Operator License or Experimental Permit Renewal for Reentry Operations in the Marine Environment

Renewals of FAA vehicle operator licenses or experimental permits for RSR operations within the scope of operations described in Chapter 2, *Description of Proposed Action and Alternatives*, of this PEA. All FAA-licensed or -permitted reentry operations would occur within the study area analyzed in this PEA and the applicant's annual frequency of reentry operations would not exceed the cumulative number of annual FAA-licensed and -permitted reentries described in this PEA.

CATEX 3. Vehicle Operator License or Experimental Permit Modification for Reentry Operations in the Marine Environment

Modification of FAA vehicle operator licenses or experimental permits for RSR operations within the scope of operations described in Chapter 2, *Description of Proposed Action and Alternatives*, of this PEA. Such modifications might include new splashdown locations within the study area analyzed in this PEA or new expended or reused components within the type and frequency described in Chapter 2.

1.4 Public Involvement

FAA provided public notice of availability of the Draft PEA for public review and comment on the FAA's website.¹⁶ Following the close of the public comment period, FAA will revise the Draft PEA, as appropriate, in response to comments received, and a Final PEA will be prepared. The Final PEA will reflect the FAA's consideration of comments and will provide responses to substantive comments. Following review of the Final PEA, FAA will either issue a FONSI or issue a Notice of Intent to prepare an Environmental Impact Statement (EIS).

1.5 Other Authorizations

In addition to satisfying NEPA environmental review requirements and licensing and permitting regulations in 14 CFR Chapter III, FAA has identified additional potential environmental requirements for RSR operations, but others might be required. Chapter 3, *Affected Environment and Environmental Consequences*, and Appendix B describe environmental review requirements that have been covered during the preparation of this PEA and which would be covered during use of a CATEX for a specific reentry vehicle operator's license or permit application.

- Endangered Species Act (ESA) Section 7 consultation
- Coastal Zone Management Act federal consistency provision
- Clean Air Act compliance
- Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) compliance

¹⁶ https://www.faa.gov/space/environmental/nepa_docs.

Chapter 2

Description of Proposed Action and Alternatives

As stated in Section 1.2, *Purpose and Need*, NEPA requires FAA to consider the purpose and need for the proposed action and from that, “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.”¹⁷ As discussed in Chapter 3, *Affected Environment and Environmental Consequences*, FAA has not identified any unresolved conflicts concerning alternative uses of available resources associated with the Proposed Action. Therefore, in accordance with NEPA as amended and FAA Order 1050.1G, Section 1.5(b)(ii), this PEA only considers the No Action Alternative and the Proposed Action.

2.1 No Action Alternative

In instances involving Federal decisions on proposals for projects, “no action” means the proposed action would not take place, and the resulting environmental effects from taking no action are compared with the effects of authorizing the proposed action. In the context of this PEA, the No Action Alternative means there would be no change to current reentry operations as authorized by existing FAA licenses. This alternative assumes reentry vehicle operators would continue conducting reentry operations in the marine environment according to existing approvals. FAA would review new requests for reentry licenses or permits on a case-by-case basis. These reviews can take up to one year to complete (assuming an EA is the appropriate level of NEPA review). As stated at the beginning of Chapter 1, *Introduction*, FAA has completed six EAs for individual reentry vehicle proposals that include RSR operations in the marine environment. Each EA resulted in a FONSI.¹⁸ The following vehicle operator licenses¹⁹ currently authorize RSR operations in the marine environment.

- VOL 26-136 – SpaceX Dragon reentry vehicle: Up to 10 reentries in the Pacific Ocean per year.
- VOL 24-132 – Inversion Space Company Ray reentry vehicle: Up to two reentries (total) in the Pacific Ocean.
- VOL 26-135 (Order A-5) – SpaceX Starfall reentry capsule: Up to two reentries (total) in the Pacific Ocean.

The No Action Alternative is carried forward for analysis in the PEA to provide a comparison of existing conditions to the Proposed Action. The No Action Alternative reflects the status quo and serves as a benchmark against which effects of the Proposed Action can be evaluated.

¹⁷ NEPA § 102(H); 42 U.S.C. § 4332(H)

¹⁸ See Appendix A, *Categorical Exclusion Process*.

¹⁹ See: https://www.faa.gov/data_research/commercial_space_data.

2.2 Proposed Action

FAA's Federal actions analyzed in this PEA include (1) issuing (and potentially renewing or modifying) vehicle operator licenses or experimental permits to applicants to conduct RSR operations in the marine environment, and (2) issuing corresponding airspace closures so that the reentry operations can be conducted safely. A vehicle operator license is valid for the period of time determined by the FAA Administrator as necessary to conduct the licensed activity but may not exceed five years from the issuance date.²⁰ An experimental permit lasts for one year from the date it is issued.²¹

The Proposed Action is for reentry vehicle operators to conduct RSR operations in the marine environment, including the Pacific Ocean, Gulf of America, and Atlantic Ocean. For purposes of analysis and to streamline the environmental review of license or permit applications, this PEA assumes a maximum for all FAA-licensed and -permitted RSR operations of up to 70 reentries in the Pacific Ocean per year, 22 reentries in the Gulf of America per year, and 10 reentries in the Atlantic Ocean per year.

The Proposed Action does not include the launch of the reentry vehicle as a payload on a launch vehicle; the environmental impacts of launching reentry vehicles as payloads are analyzed in separate NEPA documents for launch vehicle operations at a specific launch site. The scope of operations analyzed in this PEA is limited to RSR operations as described in Section 2.2.3, *Scope of Reentry Operations*.

2.2.1 Location

The study area analyzed in this PEA includes portions of the Pacific Ocean, Gulf of America, and Atlantic Ocean, as depicted in Figure 2-1 to Figure 2-3. The capsule splashdown area begins 5 nautical miles (NM) offshore the coast of the United States or islands, except for Hawaii, where the study area excludes areas within 200 NM of the Hawaiian coastline. The study area includes vessel routes from and to coastal ports during recovery operations. Ports that could be used for recovery operations include all major ports on the U.S. eastern, western (including Alaska), and Gulf coasts.

The study area aligns with the FAA's ESA programmatic consultation with the National Marine Fisheries Services (NMFS) for launch and reentry operations in the marine environment.²² Restricted or excluded areas for the purpose of avoiding or minimizing potential effects to protected marine resources are identified in Figure 2-1 to Figure 2-3 as "avoidance zones" in orange and described in Section 2.2.4, *Mitigation Measures*. This PEA assumes that capsule splashdown would not occur in the avoidance zones, but vessel transit may occur in these areas when conducting recovery operations (e.g., to and from coastal ports).

²⁰ 14 CFR § 450.7.

²¹ 14 CFR § 437.11.

²² <https://www.faa.gov/space/environmental>.

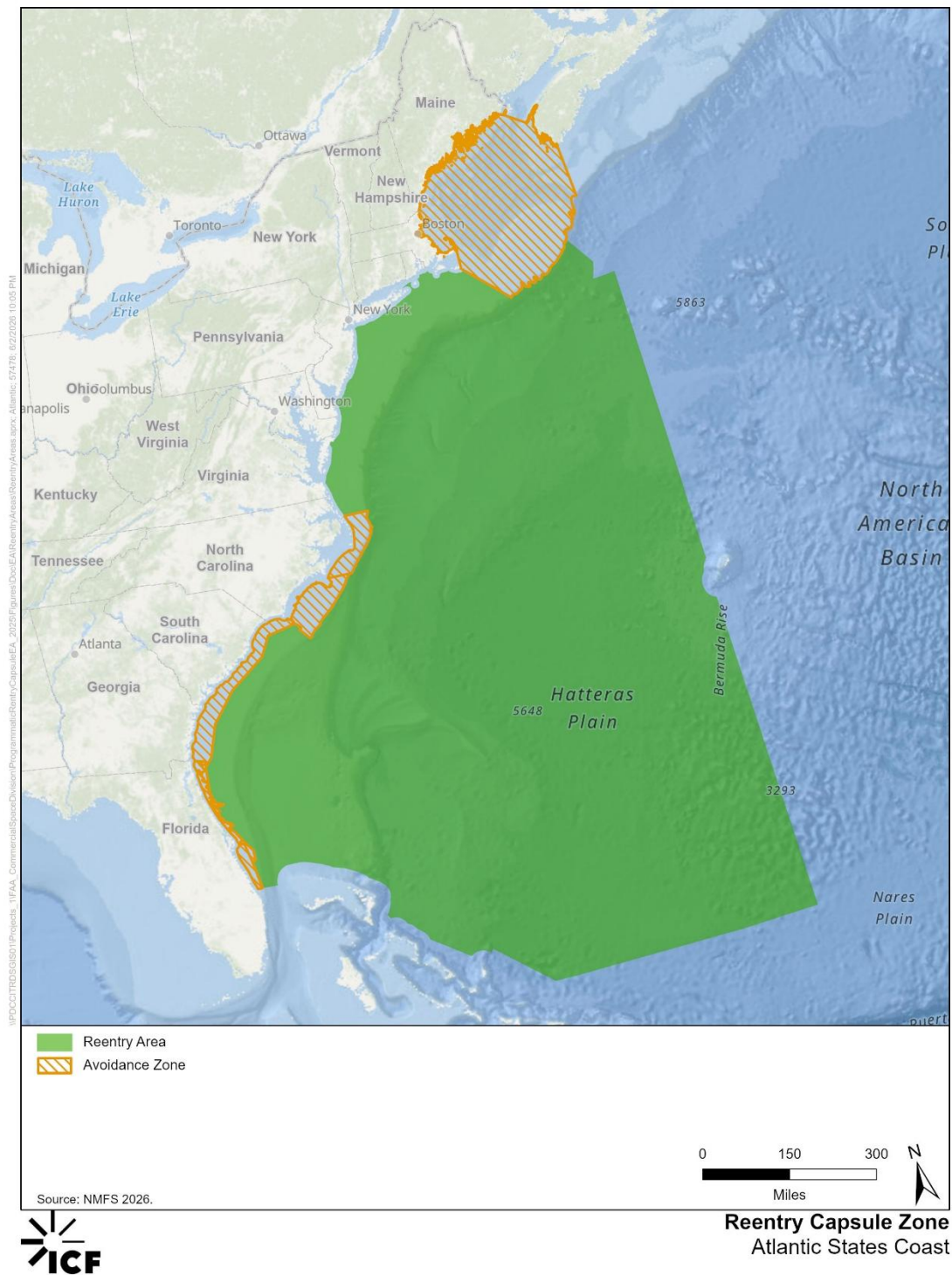


Figure 2-1. Geographic Area for Proposed Reentry and Splashdown in the Atlantic Ocean

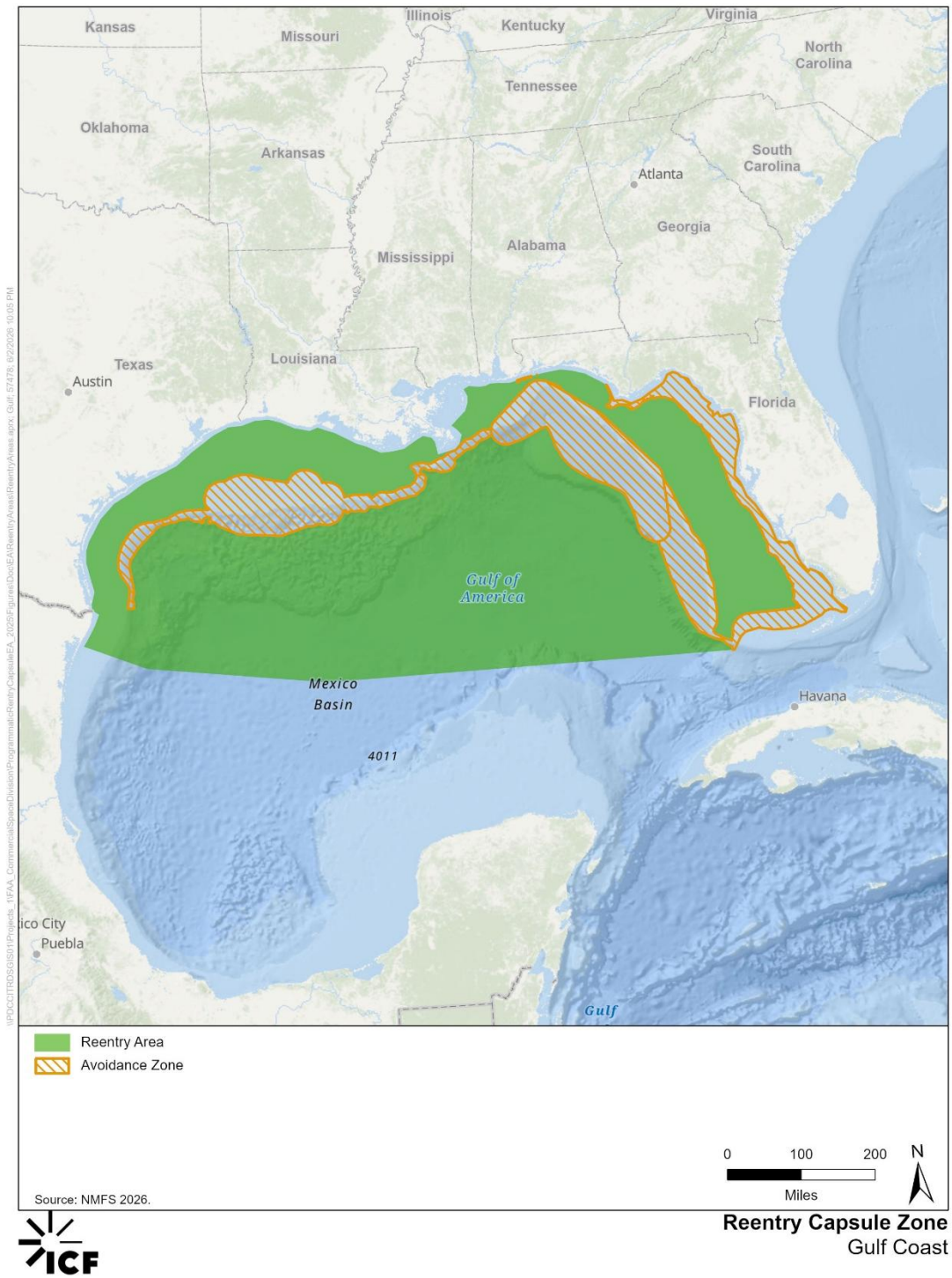


Figure 2-2. Geographic Area for Proposed Reentry and Splashdown in the Gulf of America

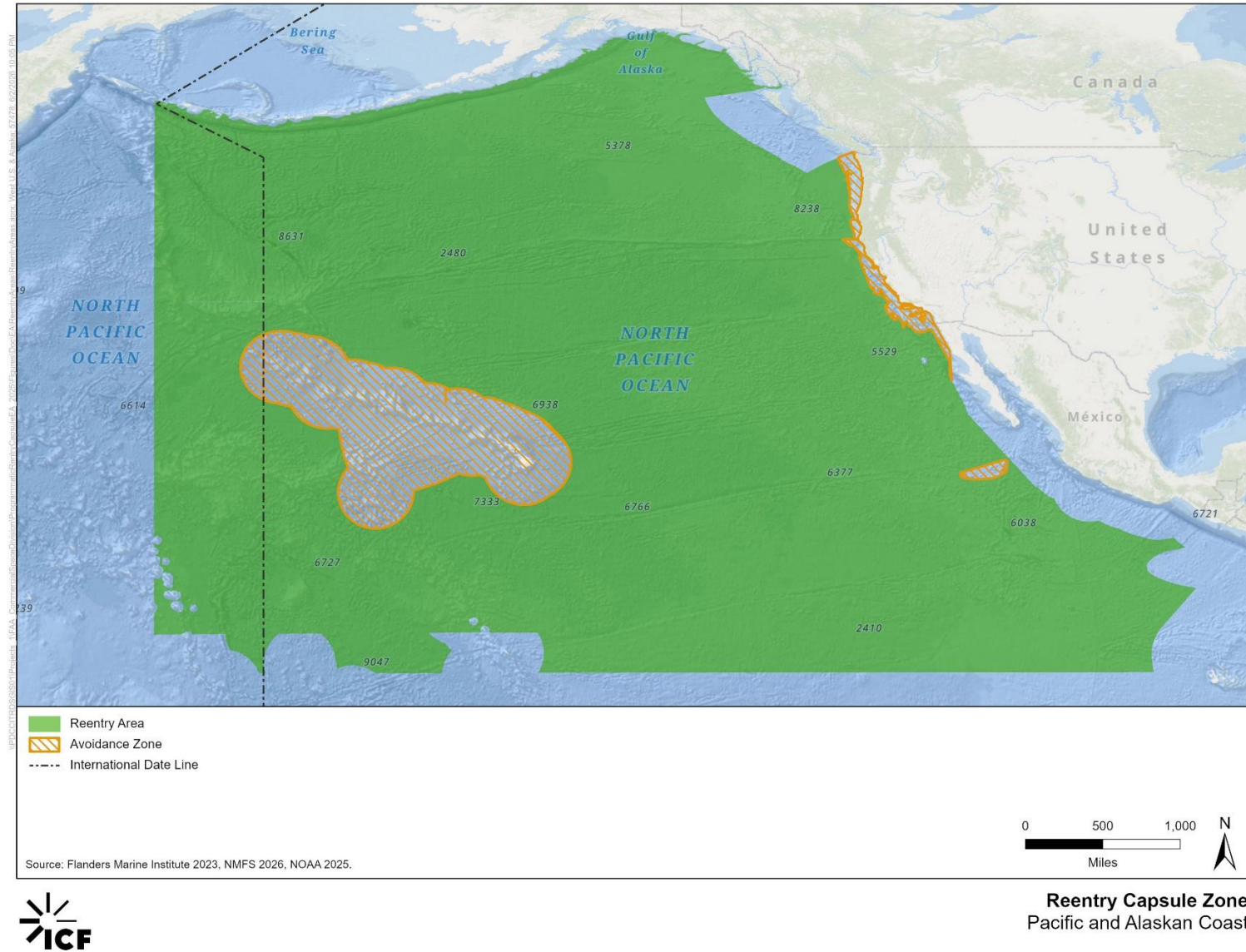


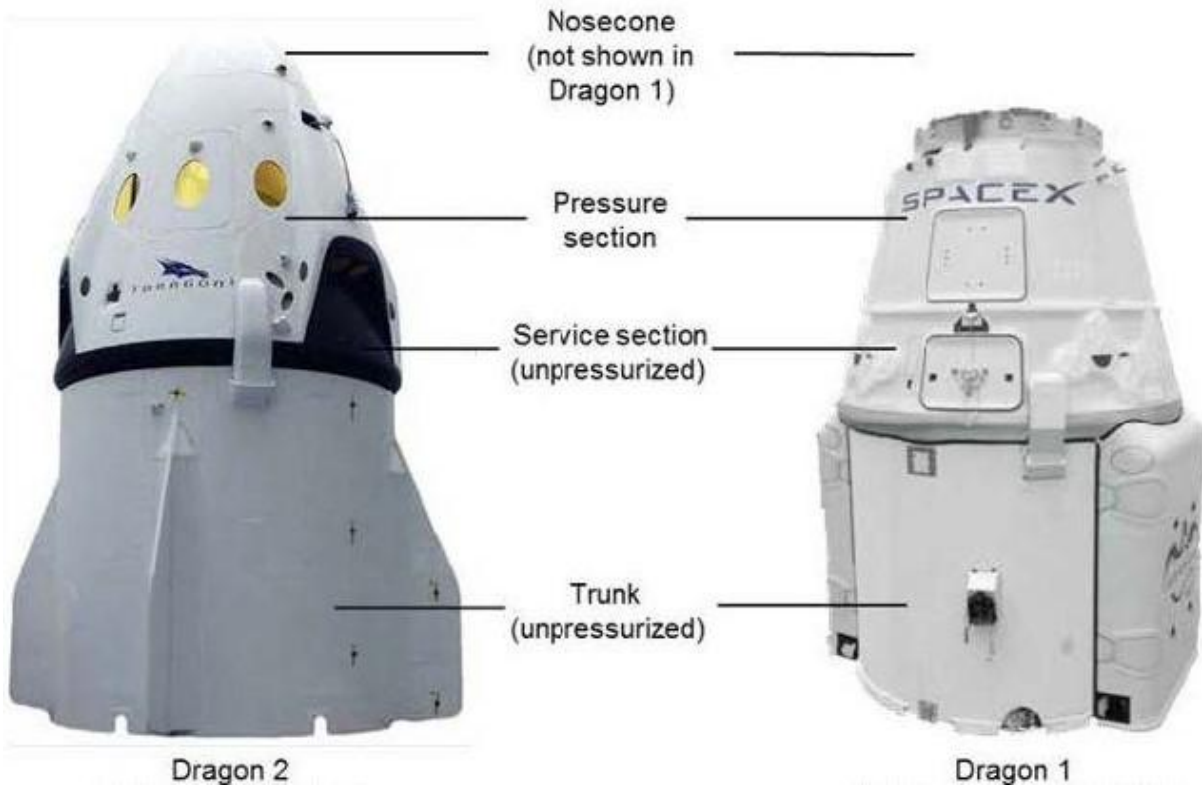
Figure 2-3. Geographic Area for Proposed Reentry and Splashdown in the Pacific Ocean

2.2.2 Reentry Vehicles

This PEA analyzes the potential environmental impacts of RSR operations for reentry vehicles (also referred to as capsules) that fall within the specifications in Table 2-1. The maximum specifications were developed based on previous EAs, including the example reentry vehicles shown in Figure 2-4 through Figure 2-6. If the reentry vehicle contains payload intended to be returned to Earth, the reentry vehicle would retain that payload during reentry, and the vehicle operator would unload the payload after recovery. Reentry vehicles may have a component (commonly called a trunk or cargo module) that is jettisoned and completely or partially burns up during reentry. Any material surviving reentry would land in the ocean and is expected to sink. Any remaining propellants in the reentry vehicle after splashdown could be residual in quantity or contain nominal amounts (e.g., to be used as ballast). Though some operators may be able to recover pilot or drogue parachutes, this PEA assumes that those parachutes would be expended (not recovered). The operator typically recovers the main (larger) parachutes connected to the reentry vehicle, though there might be cases where the main parachute is cut away from the reentry vehicle and not recovered. All unrecovered parachutes are expected to sink in the ocean.

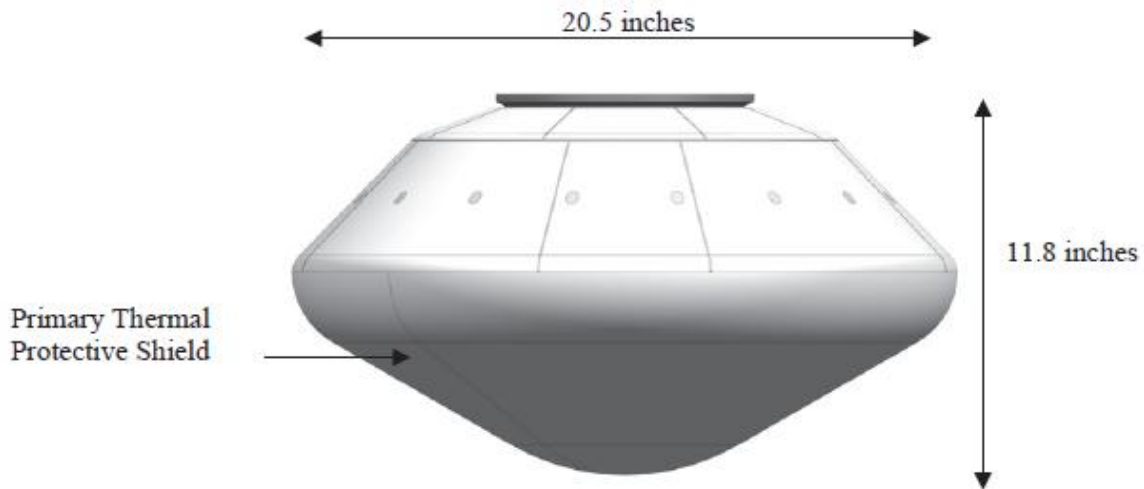
Table 2-1. Maximum Reentry Vehicle and Component Specifications

Reentry Vehicle Component	Maximum Specifications
Reentry vehicle	Height/Length: 30 feet Base width: 15 feet Return-payload capacity: 6,650 pounds
Trunk/cargo module (<i>expended in the ocean</i>)	Number of trunks/modules per reentry vehicle: 1 Surface area: 3,375 square feet
Types of propellants onboard	Dihydrogen dioxide (H ₂ O ₂) Monomethylhydrazine (MMH) Nitrogen tetroxide (NTO or N ₂ O ₄) Rocket Propellant-1 (RP-1) Propene / nitrous oxide (N ₂ O) Liquid oxygen (LOX) Nitrogen gas (N ₂)
Pilot parachute (<i>expended in the ocean</i>)	Number per reentry vehicle: 1 Material: Kevlar, nylon, Spectra, Teflon, or Vectran Size: smaller than drogue parachutes
Drogue parachutes (<i>expended in the ocean</i>)	Number per reentry vehicle: 2 Material: Kevlar, nylon, Spectra, Teflon, or Vectran Area: 200 square feet Risers/suspension: 75 feet Distance landing from reentry vehicle: 1 mile
Main parachutes (<i>typically recovered by the operator</i>)	Number per reentry vehicle: 4 Material: Kevlar, nylon, Spectra, Teflon, or Vectran Area: 10,600 square feet Risers/suspension: 150 feet



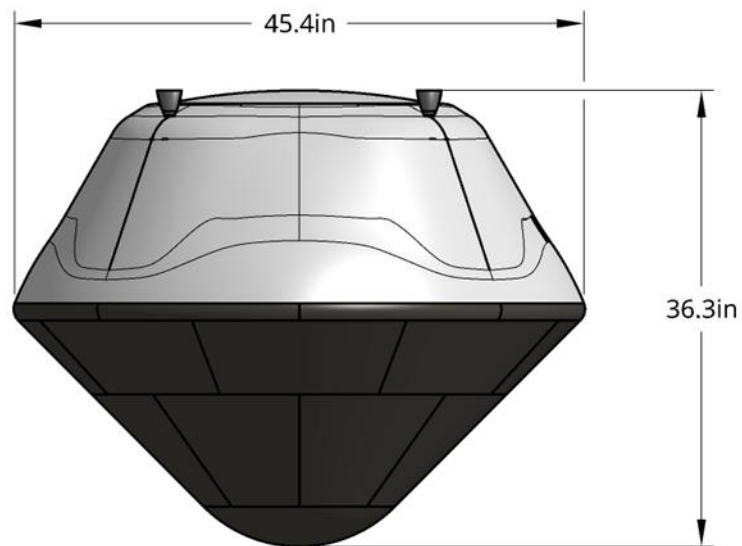
Source: SpaceX (FAA 2025).

Figure 2-4. Example Reentry Vehicle: SpaceX Dragon 1 (Cargo) and Dragon 2 (Crew)



Source: Inversion Space Company (FAA 2024).

Figure 2-5. Example Reentry Vehicle: Inversion's Ray Capsule



Source: Reditus (FAA 2026).

Figure 2-6. Example Reentry Vehicle: Reditus Space ENOS Capsule

2.2.3 Scope of Reentry Operations

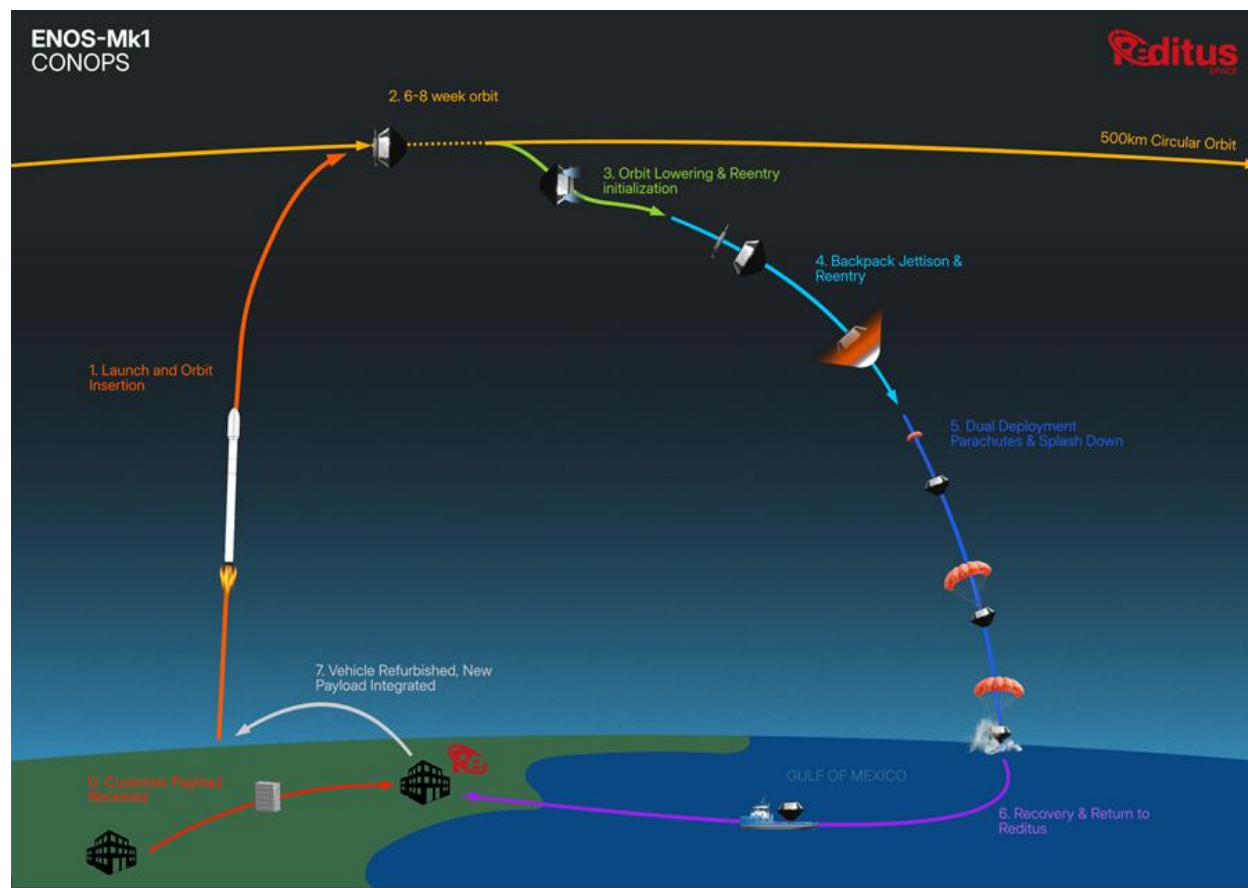
Under FAA regulations implementing the CSLA at 14 CFR Part 450, a vehicle operator license may authorize reentry.²³ Reentry includes activities conducted in Earth orbit or outer space to determine reentry readiness and that are critical to ensuring public health and safety and the safety of property during reentry flight. Reentry also includes activities necessary to return the reentry vehicle, or vehicle component, to a safe condition on the ground after impact or landing.²⁴ Similarly, under FAA regulations at 14 CFR Part 437, an experimental permit may authorize reentry of a reusable suborbital vehicle.²⁵

Figure 2-7 shows an example schematic of reentry vehicle operations, including pre-reentry stages of launch as a payload and orbit, and ending in RSR operations.

²³ 14 CFR § 450.3(c).

²⁴ *Id.*

²⁵ 14 CFR § 437.7.



Source: Reditus (FAA 2026).

Figure 2-7. Example Concept of Reentry, Splashdown, and Recovery Operations

2.2.3.1 Pre-Reentry Operations

Airspace Coordination and Closures

All reentry operations would comply with the necessary notification requirements, including issuance of Notices to Airmen (NOTAMs), as defined in agreements required for a vehicle operator license or experimental permit issued by FAA. A NOTAM provides notice of unanticipated or temporary closures to components of, or hazards in, the National Airspace System (NAS) (FAA Order 7930.2U, *Notices to Airmen [NOTAM]*). FAA issues a NOTAM at least 24 hours prior to a reentry activity in the airspace to notify pilots and other interested parties of temporary conditions. NOTAMs are similarly used by foreign Air Navigation Service Providers to provide notice of temporary airspace closures in their airspace. Advance notice via NOTAMs and the identification of Aircraft Hazard Areas (AHA)²⁶ would assist pilots in scheduling around any temporary disruption of flight activities in the area of operation.

²⁶ Hazard areas are any region of land, sea, or air that must be surveyed, publicized, controlled, or evacuated to control the risk to the public. It includes regions of land, sea, and air potentially exposed to hazardous debris generated during normal flight events and all reasonably foreseeable failure modes.

To comply with the FAA's licensing requirements,²⁷ each vehicle operator would enter into a Letter of Agreement (LOA) with the appropriate Air Route Traffic Control Center(s), appropriate Terminal Radar Approach Control Facility(s), and the Air Traffic Organization Space Operations Office to accommodate the flight parameters of the reentry vehicle within U.S. airspace. If needed, the vehicle operator would also enter into an LOA with the air traffic authority of a foreign country. The LOA would outline procedures and responsibilities applicable to operations including notification of reentry activity; communication procedures prior to, during, and after a reentry; planning for contingencies/emergencies; NOTAM issuance; and any other measures necessary to protect public health and safety. The Proposed Action would not require FAA to alter the dimensions (shape and altitude) of the airspace. However, temporary closures of existing airspace are necessary to ensure public safety during the proposed operations.

The location and size of airspace closures for commercial space operations also vary with each mission type and are influenced by multiple factors, including prior flight/reentry history. The size of airspace closures can grow or shrink as reliability is either decreased or increased with results and analysis from each reentry. The AHAs define the temporarily closed airspace that would be established and published through a NOTAM prior to the reentry.

The vehicle operator would submit a Flight Safety Data Package to FAA in advance of the reentry. The package would include the reentry trajectory and associated AHAs. The AHAs define the temporarily closed airspace that would be defined and published through a NOTAM prior to the reentry. The FAA Air Traffic Organization Space Operations Office uses the AHA information to produce an Airspace Management Plan, which describes the reentry information and any associated impacts to the NAS. Airspace controlled by FAA may be restricted through the activation of airspace closures. The most common type of airspace closures are Temporary Flight Restrictions (TFRs) and altitude reservations. FAA generally uses TFRs to protect airspace over land up to 12 NM offshore and altitude reservations to protect oceanic airspace beyond 12 NM offshore. The NOTAM would establish a closure window that is intended to warn aircraft to keep out of a specific area throughout the time that a hazard may exist. The length of the window is primarily intended to account for the time needed for the operator to meet its mission objectives. The location and size of the closure area is defined to protect the public. For a reentry, typically the keep-out must begin at the start of reentry and ends when the mission has been completed, terminated, or cancelled.

Consistent with 14 CFR § 450.3(c), reentry typically begins with the pre-reentry burn health checks. The end of reentry, defined under 14 CFR § 450.3(c), includes activities necessary to return the reentry vehicle, or vehicle component, to a safe condition on the ground after impact or landing. Reentry typically ends after telemetry confirms splashdown via GPS signal and the vehicle is confirmed to be in a safe condition. Similarly, for reentry of a suborbital vehicle operating under an experimental permit, reentry typically ends once the vehicle is returned to a safe condition after it lands or impacts.²⁸

Airspace closures are immediately released once the mission has successfully cleared the area and no longer imposes a risk to the public. The actual duration of airspace closure is normally much less than the original planned closure, especially if the reentry window is relatively long and the reentry occurs at

²⁷ See 14 CFR § 437.63(b)(2) and 14 CFR § 450.147(a)(3).

²⁸ 14 CFR § 437.7(b).

the beginning of the window. FAA typically begins to clear airspace and reroute aircraft in advance of a reentry and directs aircraft back into the released airspace after the mission to recover to normal aircraft flow and volume.

In conducting its NAS assessment for this PEA, FAA used notional AHAs for the Pacific Ocean, Gulf of America, and Atlantic Ocean; a reentry window of 30 minutes; and aircraft data from 2025. The results of the NAS assessment are presented below by ocean.

Pacific Ocean

Based on the analysis, each reentry event could affect approximately two commercial aircraft per hour during overnight low-traffic periods, increasing to as many as 131 commercial aircraft per hour during peak daytime travel periods (Table 2-2). Additionally, the reentry hazard areas have the potential to affect up to approximately 40 Air Traffic Control (ATC) route structures, including offshore jet routes, oceanic transition routes, coastal arrival and departure corridors, and transpacific entry/exit flows supporting West Coast, Hawaii, Alaska, and Pacific international operations. Aircraft that use these routes may require tactical reroutes around the active hazard areas, shifting traffic onto adjacent inland and coastal sectors.

Table 2-2. Potential Commercial Aircraft Impacted by Reentries in the Pacific Ocean

Operations / Year	Timing	Aircraft/Hour	Max AHA Duration (minutes)	# of Aircraft Impacted / Reentry	# of Aircraft Impacted / Year
70	Lowest Period of Midnight Hours	2	30	1	70
70	Peak Daily Travel Periods	131	30	66	4,620

AHA = Aircraft Hazard Area.

Integration of these reentry operations into the NAS may require traffic management initiatives such as miles in trail (distance between aircraft) for spacing and volume control as well as rerouting of aircraft around the AHA. The AHA is not expected to directly overlay any airports; however, indirect downstream impacts to arrival and departure flows could necessitate ground stops, miles-in-trail restrictions, or reroutes.

Because Pacific routing options are frequently constrained by oceanic track structures, coastal arrival and departure corridors and adjacent international traffic flows, even a 30-minute reentry window might require longer periods of traffic management initiatives than just the duration of the AHA.

There is also potential for international impacts, particularly for aircraft operating between the continental United States and Asia, Oceania, Hawaii, Alaska, and Pacific island destinations, where oceanic entry and exit points may be temporarily unavailable. These impacts may require coordination with adjacent international air navigation service providers to support reroutes and flow restrictions.

While general aviation (GA) operations are similarly affected, they often have more planning flexibility than commercial flights. The absence of rigid connecting schedules may allow GA pilots to more easily reroute or reschedule around active launch times.

For coordination with impacts to an affected country, FAA would contact the U.S. State Department and the affected country/countries in accordance with Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, 44 Fed. Reg.1957 (January 9, 1979).

Gulf of America

Based on the analysis, each reentry could affect approximately 12 commercial aircraft per hour during overnight low-traffic periods and up to 295 commercial aircraft per hour during peak daily travel periods (Table 2-3). Additionally, the hazard area placement has the potential to affect up to approximately 30 offshore and coastal ATC routes within the Gulf of America depending on the exact hazard area location and activation window. Aircraft that use these routes may require tactical reroutes around the active hazard areas, shifting traffic onto adjacent inland and coastal sectors.

Table 2-3. Potential Commercial Aircraft Impacted by Reentries in the Gulf of America

Operations / Year	Timing	Aircraft/Hour	Max AHA Duration (minutes)	# of Aircraft Impacted / Reentry	# of Aircraft Impacted / Year
22	Lowest Period of Midnight Hours	12	30	6	132
22	Peak Daily Travel Periods	295	30	148	3,256

AHA = Aircraft Hazard Area.

Integration of these reentry operations into the NAS may require traffic management initiatives such as miles in trail (distance between aircraft) for spacing and volume control as well as rerouting of aircraft around the AHA. The AHA is not expected to directly overlay any airports; however, indirect downstream impacts to arrival and departure flows could necessitate ground stops, miles-in-trail restrictions, or reroutes.

Because Gulf routing options are frequently constrained by rigid route structures, military reserved airspace, coastal arrival and departure corridors and adjacent international traffic flows, even a 30-minute reentry window may require longer periods of traffic management initiatives than just the duration of the AHA.

There is also potential for international impacts, particularly for aircraft operating between the continental United States, Mexico and Caribbean traffic. These impacts may require coordination with adjacent international air navigation service providers to support reroutes and flow restrictions.

While GA operations are similarly affected, they often have more planning flexibility than commercial flights. The absence of rigid connecting schedules may allow GA pilots to more easily reroute or reschedule around active launch times.

For coordination with impacts to an affected country, FAA would contact the U.S. State Department and the affected country/countries in accordance with Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, 44 Fed. Reg.1957 (January 9, 1979).

Atlantic Ocean

Based on the analysis, each reentry could affect approximately nine commercial aircraft per hour during overnight low-traffic periods and up to 330 commercial aircraft per hour during peak daily travel periods (Table 2-4). Additionally, the reentry hazard area has the potential to affect up to approximately 40 ATC routes structures, including East Coast offshore routes, North Atlantic oceanic transition routes, Caribbean gateway flows, Florida coastal routes, and trans-Atlantic international traffic corridors that support East Coast, Caribbean, and Europe-bound operations. Aircraft that use these routes may require tactical reroutes around the active hazard areas, shifting traffic onto adjacent inland and coastal sectors.

Table 2-4. Potential Commercial Aircraft Impacted by Reentries in the Atlantic Ocean

Operations / Year	Timing	Aircraft/ Hour	Max AHA Duration (minutes)	# of Aircraft Impacted / Reentry	# of Aircraft Impacted / Year
10	Lowest Period of Midnight Hours	9	30	5	59
10	Peak Daily Travel Periods	330	30	165	1,650

AHA = Aircraft Hazard Area.

Integration of these reentry operations into the NAS may require traffic management initiatives such as miles in trail (distance between aircraft) for spacing and volume control as well as rerouting of aircraft around the AHA. The AHA is not expected to directly overlay any airports; however, indirect downstream impacts to arrival and departure flows could necessitate ground stops, miles-in-trail restrictions, or reroutes.

Because Atlantic routing options are frequently constrained by oceanic track structures, coastal arrival and departure corridors and adjacent international traffic flows, even a 30-minute reentry window may require longer periods of traffic management initiatives than just the duration of the AHA.

There is also potential for international impacts, particularly for aircraft operating between the continental United States and Bermuda, the Caribbean, San Juan, Europe-bound oceanic routes. These impacts may require coordination with adjacent international air navigation service providers to support reroutes and flow restrictions.

While GA operations are similarly affected, they often have more planning flexibility than commercial flights. The absence of rigid connecting schedules may allow GA pilots to more easily reroute or reschedule around active launch times.

For coordination with impacts to an affected country, FAA would contact the U.S. State Department and the affected country/countries in accordance with Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, 44 Fed. Reg. 1957 (January 9, 1979).

Maritime Coordination

All reentry operations would comply with necessary notification requirements, including issuance of Notices to Mariners (NOTMARs), as defined in agreements required for a launch license issued by FAA. A NOTMAR provides a notification regarding a temporary hazard within a defined area (an SHA) to ensure

public safety during proposed operations. A NOTMAR itself does not alter or restrict vessel movement; rather, the NOTMAR disseminates relative information regarding maritime activity and temporary hazards within a defined area to ensure public awareness and safety during the proposed operations.

To comply with FAA's licensing requirements, applicants may enter into a Letter of Intent with the USCG in order to safely operate the reentry vehicles over open ocean. The Letter of Intent would describe the required responsibilities and procedures for both the applicant and USCG during a reentry operation resulting in the issuance of a NOTMAR.

The USCG publishes NOTMARs through multiple media platforms, to include Local NOTMAR, Broadcast NOTMAR, and Navigational Telex, as needed, to inform the maritime community of temporary changes in condition, Limited Access Areas (LAAs), Regulated Navigation Areas (RNAs), and hazards on navigable waterways. Notices in international areas are published by the National Geospatial Intelligence Agency. Advance notice via a NOTMAR and the identification of SHAs would assist mariners in voyage planning and scheduling around any temporary operation.

The USCG has broad authority to establish LAAs, which may include Safety and Security Zones, and RNAs on navigable waters subject to U.S. authority and schedule them in advance to minimize interruption to the maritime community. Reentries would be of short duration and scheduled in advance to minimize interruption to ship traffic.

For coordination with impacts to an affected country, FAA would contact the U.S. State Department and the applicable country in accordance with Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, 44 Fed. Reg. 1957 (January 9, 1979).

2.2.3.2 Reentry Operations

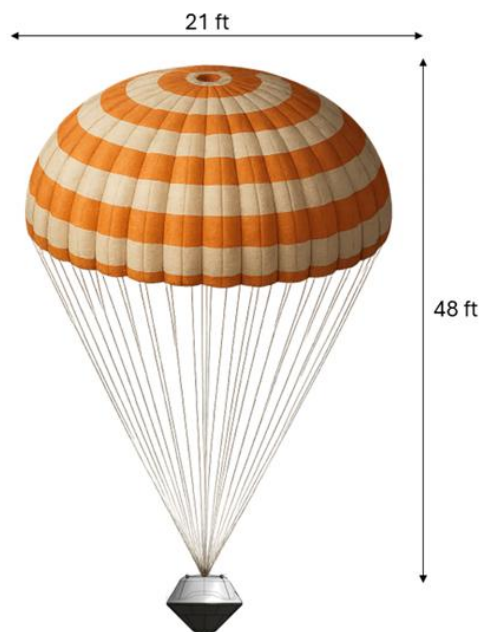
After completing its mission in space, the reentry vehicle would travel back to Earth and reenter the atmosphere. During reentry, the vehicle would be traveling at supersonic speeds and create a sonic boom that may impact Earth's surface (see maximum anticipated sonic boom levels over the water and on land in Section 3.3; any proposed operations exceeding those levels would not be covered by this PEA). Reentry operations likely would not be conducted in any type of stormy weather (i.e., weather that would compromise the success of the mission, such as a severe thunderstorm or hurricane) unless deemed necessary in an emergency (e.g., a medical emergency with an astronaut). RSR operations could occur during daytime or nighttime hours.

Most of the current reentry vehicles use two types of parachutes: drogue parachutes and main parachutes. Some reentry vehicles may also include a third parachute: pilot parachute. A pilot parachute is a small parachute used to deploy a drogue parachute. Drogue parachutes are used to slow and gain control of the vehicle and then are released and land in the ocean. Then, the larger main parachutes are deployed. The main parachutes, which are attached to the vehicle, slow the speed of the vehicle's descent enough to allow for a soft splashdown in the water. This PEA assumes a reentry vehicle may deploy up to one pilot parachute, up to two drogue parachutes, and up to four main parachutes to assist in landing (see parachute specifications in Table 2-1; Figure 2-8 and Figure 2-9 show examples).



Source: SpaceX (FAA 2025).

Figure 2-8. Example of Drogue (Smaller) and Main (Bigger) Parachutes



Source: Reditus (FAA 2026).

Figure 2-9. Reditus Space ENOS Main Parachute

During reentry, the vehicle would reenter Earth's atmosphere on a pre-planned trajectory and would be tracked to a splashdown area in the ocean. Following splashdown, the vehicle operator might use a vessel to recover the vehicle. It is possible that a future proposal includes capsule reentry and splashdown and intentional sinking of the capsule in the ocean (no recovery).

As stated in Section 2.2.2, some amount of propellant (Table 2-1) could be on the vehicle during splashdown. Regardless of the amount, a reentry vehicle's propellant storage is designed to retain the propellant, so any propellant remaining in the vehicle is not expected to be released into the ocean. In an unlikely event the propellant tank ruptures on impact, the propellant would evaporate or be quickly diluted and buffered by seawater.

The vehicle operator's personnel would attempt to recover all main parachutes deployed and would load the vehicle onto the recovery vessel (Figure 2-10 shows an example). Recovery vessels would be up to 200 feet in length and carry rigid-hulled inflatable boats. It is possible some or all of the parachutes are not recovered due to sea or weather conditions; pilot and drogue parachutes often land well beyond sight of the reentry vehicle recovery area and, therefore, are assumed not to be recovered.



Source: SpaceX (FAA 2025).

Figure 2-10. Example Recovery Crane

The recovery vessel would transport the reentry vehicle to the port used by the reentry vehicle operator. The vehicle operator would be responsible for coordinating local approvals with the relevant state and local agencies, including port authorities. As stated in Section 2.2.1, the geographic area for proposed recovery vessel activity includes transits to and from all major ports on the U.S. eastern, western (including Alaska), and Gulf coasts. The distance vessels would have to travel to conduct recovery operations depends on the specific mission and where the reentry vehicle lands in the ocean. The potential environmental impacts associated with vessel travel are described programmatically in this PEA; project-specific impacts would be considered during review of an individual operator's proposal to confirm that environmental impacts would be within the scope of those analyzed in this PEA (see Appendix B). For example, air emissions from a vessel may have an impact on air quality, depending on the frequency of recovery vessel operations, distance traveled, and the National Ambient Air Quality Standards (NAAQSs) attainment area status for the port used for recovery vessel operations.

As stated in Section 2.2.2, *Reentry Vehicles*, reentry vehicles may include a component (trunk or module) that would be jettisoned and expended in the ocean during reentry. These components are expected to break up into pieces and burn during reentry, but all of the pieces may not fully demise, resulting in some debris reaching the ocean. Such reentry debris typically consists of high-strength polymers and metals, which would not be recovered and would eventually sink to the ocean floor. Debris catalogues

for individual reentry vehicles would be reviewed by FAA as part of the license application review. Debris that is expected to survive reentry would be intentionally placed in remote parts of the ocean outside of known major shipping lanes and important marine areas (e.g., sensitive species locations). The placement of the debris areas would be dependent on each mission. The debris areas would also, for a given mission and reentry location, bound the extent of any AHAs that would need to be managed during a reentry operation. Specific AHAs would be calculated and coordinated with FAA and any foreign authorities on a mission-by-mission basis. Debris is expected to land in the same oceanic areas identified for reentry vehicle splashdown (Section 2.2.1).

Spotter aircraft and surveillance vessels (watercraft) may be used during reentry operations to ensure that designated hazard areas are clear of non-participating crafts. Combinations of radar and visual spotter aircraft and surface surveillance and law enforcement vessels (watercraft) may be deployed prior to reentry. Most fixed wing aircraft operate at altitudes of 15,000 feet but may drop to 1,500 feet to visually obtain a call sign from a non-participating vessel.

2.2.4 Mitigation Measures

To avoid or minimize potential environmental impacts, particularly to federally listed threatened and endangered species, FAA would request vehicle operators comply with the following mitigation measures. These measures are the same measures pertaining to reentry operations included in the FAA's ESA programmatic consultation with NMFS (the measures are referred to as Project Design Criteria in the programmatic consultation).²⁹ This PEA assumes operators would comply with these mitigation measures. If an operator elected not to comply with these measures, additional environmental review, including ESA consultation with NMFS, would be required.

Pacific Ocean

- Operations in humpback whale breeding aggregations (see Zone 3a in Figure 2 in the NMFS Programmatic Letter of Concurrence [PLOC]) are limited to vessel transit only from October 1 through April 30.
- Operations within approximately 125 miles from most of the California coastline (see Zone 4 in Figures 2 and 3 in the NMFS PLOC) are limited to vessel transit. This area contains designated critical habitat.
- No operations will occur over areas with sea ice cover off Alaska.
- Steller sea lion critical habitat in:
 - Alaska
 - No operations will occur within the aquatic zone that extends 20 NM seaward in state and federally managed waters from the baseline or basepoint of each major rookery and major haulout that is west of 144° W longitude.

²⁹ <https://www.faa.gov/space/environmental>.

- No operations will occur within the aquatic zone that extends 3,000 feet seaward in state and federally managed waters from the baseline or basepoint of each major rookery and major haulout in Alaska east of 144° W longitude.
 - No operations will occur within the air zone that extends 3,000 feet above the terrestrial zone of each major rookery and major haulout in Alaska (measured vertically from sea level).
 - No vessel operations will occur within 3 NM of all Steller sea lion rookeries west of 150° W longitude.
 - In the unlikely event that debris is expected to occur over or land within the air or aquatic critical habitat zones, debris should be monitored and cleaned up if in the water. If debris lands within 3 NM of a rookery west of 150° W longitude, or if debris occurs on a major rookery or major haulout (i.e., on land), notify the NMFS Alaska Regional Office and the ESA Interagency Cooperation Division at akr.prd.section7@noaa.gov and nmfs.hq.esa.consultations@noaa.gov with the subject line “OPR-2025- 02196 – Debris in Steller sea lion critical habitat.”
- California and Oregon
 - No operations will occur in an aquatic zone that extends 3,000 feet seaward from major rookeries.
 - No operations will occur in an air zone that extends 3,000 feet above the terrestrial zone of major rookeries (measured vertically from sea level).

Gulf of America

- Operations in portions of the Gulf of America (see Zone 3 in Figure 4 in the NMFS PLOC) are limited to vessel transit only to protect Rice’s whale (*Balaenoptera ricei*).
- No operations will occur within Rice’s whale core distribution area (see Figure 4 in the NMFS PLOC).
- No operations will occur within 20 NM of the Flower Garden Banks National Marine Sanctuary and the Florida Keys National Marine Sanctuary or listed coral reef areas.
- Vessels will slow to 10 knots or less and maintain a minimum distance of 1,500 feet from Rice’s whale. If a whale is observed but cannot be confirmed as a species other than a Rice’s whale, the vessel operator must assume that it is a Rice’s whale.
- Vessels will maintain speeds to 10 knots or less in Rice’s whale proposed critical habitat.

Atlantic Ocean

- Operations in Zone 3b (see Figure 5 in the NMFS PLOC) are limited to vessel transit only, from November 1 through April 30.
- Operations in Zone 3c (see Figure 5 in the NMFS PLOC) are limited to vessel transit only, from January 1 through July 31.

- Operations in Zone 5 (see Figure 5 in the NMFS PLOC) will not include any expended components or debris.
- Operations in Zone 5a (see Figure 5 in the NMFS PLOC) will not include any expended components or debris between November 1 through April 30.
- Operations in Zone 5b (see Figure 5 in the NMFS PLOC) will not include any expended components or debris between April 1 through November 30.
- Vessels will slow to 10 knots or less and maintain a minimum distance of 1,500 feet from North Atlantic right whales.
- Vessels will comply with the Right Whale Ship Strike Reduction Rule (50 CFR § 224.105) and reduce speeds to 10 knots or less in Seasonal Management Areas or in Right Whale Slow Zones, which are dynamic management areas established where North Atlantic right whales have been recently seen or heard (the Whale Alert app automatically notifies when entering one of these areas).
- Check various communication media for general information regarding avoiding vessel strikes and specific information regarding North Atlantic right whale sightings in the area. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners.
- Aircraft will maintain a baseline minimum height of 1,500 feet above North Atlantic right whales.

General Measures

- Components or debris will not be expended over coral reef areas.
- Operations will not occur in a National Marine Sanctuary or Marine National Monument, or affect National Marine Sanctuary or Marine National Monument resources, without the appropriate authorization, permit, or consultation.
- In the event of a launch failure, launch operators will follow the emergency response and cleanup procedures outlined in their Hazardous Material Emergency Response Plan (or similar plan).
- Operators will instruct all personnel associated with reentry operations about ESA-listed marine species and critical habitat, and species protected under the Marine Mammal Protection Act (MMPA) that may be present in the operating area. Launch operators will notify personnel associated with reentry operations of the civil and criminal penalties for unauthorized take of ESA-listed and MMPA-protected species.
- All vessel operators will be on the lookout for and attempt to avoid collision with ESA-listed and MMPA-protected species.
- Operators will provide a dedicated observer(s), defined as a biologist or person other than the vessel operator who can recognize ESA-listed and MMPA-protected species, for all in-water operations. The observer(s) is responsible for continuous monitoring of ESA-listed and MMPA-

protected species with the aid of binoculars during all in-water operations (e.g., surveillance, recovery, etc.).

- The dedicated observer will a) alert the vessel operators to implement the appropriate vessel speed restrictions and vessel avoidance measures, and b) gather relevant data.
- Dedicated observers will record the date, time, GPS location, species, number of animals, distance and bearing from the vessel, direction of travel, behavior, effects to the animals from commercial space operations, and other relevant information for all sightings of ESA-listed or MMPA-protected species.
- Dedicated observers will monitor the landing and recovery areas for effects to ESA-listed and MMPA-protected species. Any effects, including injury and mortality, will be reported as noted below.
- When an ESA-listed or MMPA-protected species is observed, vessel operators will do the following:
 - Maintain a minimum distance of 150 feet from sea turtles.
 - Maintain a minimum distance of 300 feet from all other ESA-listed and MMPA-protected species.
 - If the distance from the vessel to the ESA-listed or MMPA-protected species becomes less than the distance specified in these measures, reduce vessel speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area and transit route.
 - Reduce vessel speed to 10 knots or less when mother/calf pairs or groups (more than two individuals) of marine mammals are observed.
 - Attempt to remain parallel to (e.g., when animals are bow-riding), or move the vessel away from, an ESA-listed or MMPA-protected species' course while the vessel is in transit and avoid excessive speed or abrupt changes in direction until the animal(s) have left the area or transit route.
- Operators will immediately report any ESA-listed or MMPA-protected species collision(s), injury(ies), mortality(ies), entanglement(s), or stranding(s) to the appropriate NMFS regional contact listed below (see also <https://www.fisheries.noaa.gov/report>), and to Tanya Dobrzynski, Chief, ESA Interagency Cooperation Division, by email at Tanya.Dobrzynski@noaa.gov, and to nmfs.hq.esa.consultations@noaa.gov with the subject line "OPR-2025-02196 – Collision, Injury, Mortality, or Stranding Report."
 - For operations near Virginia: for marine mammals and sea turtles 866-755-6622 (also report North Atlantic right whales to the U.S. Coast Guard via VHF Channel 16 and through the Whale Alert app) and for sturgeon 978-281-9328 or noaa.sturg911@noaa.gov.
 - For operations off North Carolina through Texas: for marine mammals (877) WHALE-HELP (877-942-5343; also report North Atlantic right whales to the U.S. Coast Guard via VHF

Channel 16 and through the Whale Alert app) and for sea turtles (844) SEA-TRTL (844-732-8785) and for sturgeon 844-788-7491 or noaa.sturg911@noaa.gov.

- For operations off California, Oregon, and Washington: for marine mammals and sea turtles (877) SOS-WHALE (877-767-9425) or 866-767-6114.
- For operations off Alaska: for marine mammals and sea turtles 877-925-7773.
- For operations off Hawaii: for marine mammals and sea turtles 888-256-9840.
- For operations off Florida, report any smalltooth sawfish sightings to (844) 4SAWFISH (844-472-9347) or via email to sawfish@fwc.com.
- Report any giant manta ray sightings to (727) 824-5312 or via email to manta.ray@noaa.gov.
- Aircraft will maintain a baseline minimum height of 1,000 feet above ESA-listed or MMPA-protected species.
- Aircraft will avoid flying in circles over any marine mammals and sea turtles, if observed, to avoid harassing behaviors.

Chapter 3

Affected Environment and Environmental Consequences

3.1 Introduction

In considering the potentially affected environment, FAA may consider, as appropriate to the specific action, the affected area and its resources. FAA Order 1050.1G, Section 1.2, identifies the list of resources for which FAA will consider when preparing a NEPA document:

- Aviation emissions and air quality
- Biological resources (including fish, wildlife, and plants)
- Coastal resources
- Department of Transportation Act Section 303 (referred to as “Section 4(f)”) and Land and Water Conservation Fund (referred to as “Section 6(f)”)
- Farmlands
- Hazardous materials, solid waste, and pollution prevention
- Historical, architectural, archeological, and cultural resources
- Land use
- Natural resources and energy supply
- Noise and noise-compatible land use
- Socioeconomics and children’s health and safety risks
- Visual effects (including light emissions)
- Water resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)

The level of detail provided in this chapter is commensurate with the importance of the potential impact on these resources. The following resources are not analyzed in detail for the reasons stated.

- **Department of Transportation Act Section 303 (referred to as “Section 4(f)”) and Land and Water Conservation Fund (referred to as “Section 6(f)”):** Section 4(f) protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. Section 4(f) provides that the Secretary of Transportation may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance, or land of an historic site of national, state, or local significance, only if there is no feasible and prudent alternative to using that land and the program or project includes all possible planning to

minimize harm resulting from the use. Section 6(f) requires that the conversion of lands or facilities acquired with Land and Water Conservation Act funds under the State Assistance program be coordinated with the National Park Service.³⁰ Since there are no Section 4(f) or 6(f) resources within the vicinity of the study areas and the Proposed Action does not require land-based construction or access to Section 4(f) or 6(f)-protected sites, there would be no physical use of Section 4(f) resources. The Proposed Action would not result in any effects to public parks, refuges, historic sites, or marine protected areas. There are no Section 4(f) or Section 6(f) properties within the vicinity of the study area, and no facilities would be constructed at the splashdown area. Therefore, there would be no constructive use of Section 4(f) or Section 6(f) properties. The maximum sonic boom overpressure expected to impact a coastal/inland area is 1 psf, which is similar in duration and intensity to a clap of thunder, and would occur infrequently over the course of a year. Therefore, the Proposed Action is not expected to impact resources or properties protected by Section 4(f) or 6(f).

- **Farmlands:** There are no designated agricultural lands in the study area and the Proposed Action does not have the potential to convert prime or unique farmland to non-agricultural uses. Therefore, the Proposed Action would not impact farmlands.
- **Hazardous Materials, Solid Waste, and Pollution Prevention:** Reentry vehicle recovery operations would generate only small amounts of hazardous waste; small amounts of propellants are expected to be on some but not all reentry vehicles during splashdown. A reentry vehicle's propellant storage is designed to retain propellant, so any propellant remaining in the vehicle is not expected to be released into the ocean. In an unlikely event the propellant tank ruptures on impact, the propellant would evaporate or be quickly diluted and buffered by seawater. Additionally, notifications issued before recovery would prevent conflicts with marine vessels. All hazardous materials and solid waste would be handled in accordance with all applicable federal, state, Tribal, and local laws and regulations. The Proposed Action would not increase hazardous waste production, and continued implementation of existing handling and management procedures for hazardous materials and wastes would limit the potential for exposure. Therefore, impacts related to hazardous materials, solid waste, and pollution prevention are not expected.
- **Historical, Architectural, Archeological, and Cultural Resources:** The Proposed Action would not result in impacts to historical, architectural, archeological, or cultural resources, because RSR operations would occur in the ocean and do not involve construction or ground-disturbing activities. There are no historical, architectural, archaeological, or cultural resources in the study area that could be affected by reentry, including noise or debris. As noted in Section 2.2.4, operations will not occur in a National Marine Sanctuary or Marine National Monument, or affect National Marine Sanctuary or Marine National Monument resources, without the

³⁰ Section 6(f) resources are parks, recreation areas, or facilities that were acquired or developed using funds from the federal LWCF. They are protected under Section 6(f)(3) of the LWCF Act, which requires that these properties remain dedicated to public outdoor recreation in perpetuity. If any part of a Section 6(f) property is converted to a non-recreational use (e.g., for transportation or development), the conversion must be approved by the National Park Service, and replacement land of equal value and recreational utility must be provided. Many city and county parks, trails, and recreation facilities across the U.S. have Section 6(f) status because they received LWCF grants.

appropriate authorization, or permit, or consultation. The maximum sonic boom overpressure produced during reentry is expected to be approximately 3 psf and would occur over the ocean. The maximum sonic boom overpressure experienced on land is expected to be around 1 psf, which is similar in duration and intensity to a clap of thunder and would occur infrequently. FAA has determined that RSR operations occurring entirely in the broad ocean authorized by the Federal action (referred to as an *undertaking* under 36 CFR part 800) do not have the potential to affect historic properties and therefore consultation under Section 106 of the National Historic Preservation Act is not required.

- **Land Use:** RSR operations would occur in the ocean and would not affect existing uses of land. Therefore, the Proposed Action would not impact land use.
- **Natural Resources and Energy Supply:** The Proposed Action would not result in any measurable effect on local supplies of energy or natural resources. Propellants and fuels used for reentry and recovery are relatively abundant. Recovery vessel fuel use for RSR operations would be minimal and consistent with existing operations. The Proposed Action would not result in the development of new facilities, changes in local energy demands, consumption of other natural resources, and would not require additional sources of power or other public utilities. Therefore, the Proposed Action would not affect natural resources and energy supply.
- **Socioeconomics and Children's Environmental Health and Safety Risks:** The Proposed Action does not involve onshore activities that could affect economic activity and income, employment, population and housing, or public services and social conditions. Vehicle operators are expected to use existing workforces for RSR operations. The Proposed Action would not significantly affect any local housing markets and would not negatively affect any local economies.

Potential socioeconomic impacts from re-routing aircraft or marine vessels due to commercial space operations are expected to be negligible relative to other causes leading to the re-routing of aircraft and marine vessels. Other issues or activities such as weather and military exercises also require airspace or seaspace closures and may have longer and larger closure areas than the proposed reentry operations. Each RSR operation would comply with the necessary notification requirements, including issuance of NOTAMs and NOTMARs, consistent with current procedures.

Potential socioeconomic impacts include additional airline operating costs for increased flight distances and times resulting from re-routing aircraft and increased passenger costs as a result of impacted passenger travel, including time lost from delayed flights, flight cancellations, and missed connections. However, estimating the economic impact that the proposed action may have on airspace and maritime activities is challenging and is unlikely to produce reasonable and defensible estimates. Any estimate of the economic impact to airspace and maritime users resulting from reentry activity is sensitive to the timing of reentry notification as well as the timing and duration of the closure, which itself may be further impacted by any off-nominal reentry-related events.

The economic impacts would vary significantly based on aircraft/vessel type, operational flexibility, alternative routing options, scheduling constraints, and any buffers within these operational scenarios.

Economic theory also recognizes that self-interested entities whose decisions are primarily driven by gain, logical analysis and preferences may adjust their behavior to recurring, predictable constraints. As such, airlines and other users of the airspace may incorporate known operational constraints from repeated launch and reentry operations as they become more reliable and predictable into their routing, scheduling, and pricing decisions. FAA does not expect the temporary airspace closures associated with reentry operations to result in significant socioeconomic impacts.

Operations supported by this PEA would neither result in the closure of any public airport during the operation nor so severely restrict the use of the surrounding airspace as to prevent access to an airport for an extended period of time. Further, local air traffic control facilities would coordinate with airports and aircraft operators to minimize the effect on airport traffic flows as well as traffic flows in en-route airspace.

In sum, FAA does not expect the temporary airspace closures associated with reentry operations to result in significant socioeconomic impacts. As RSR operations would occur completely within the marine environment, no component of the Proposed Action would result in a disproportionate health and safety risk to children.

- **Visual Effects (including light emissions):** The Proposed Action would not result in visual effects due to the offshore location of RSR operations and minimal (if any) lighting on the reentry vehicle. Reentry vehicle splashdowns would occur at least 5 NM offshore, making light emissions from operations not visible from the coast. Any light emissions would be negligible and unlikely to cause annoyance or interfere with normal activities. The only portion of RSR operations occurring near shore is the transit of recovery vessels to and from ports, where light emissions would blend with existing vessel traffic in a well-lit industrial port environment. Similarly, RSR operations would not impact visual resources or the visual character of the coastline, as they would occur far offshore, out of sight from coastal areas. Vessel traffic associated with the Proposed Action would be consistent with current maritime activity at ports, occur occasionally throughout the year, and would not introduce visual elements that contrast with existing industrial settings. The Proposed Action would not introduce new permanent infrastructure, obstruct coastal views, or create noticeable visual disruption.
- **Water Resources (including wetlands, floodplains, groundwater, and wild and scenic rivers):** The Proposed Action does not include any construction on or alteration of a floodplain, wetland, or wild and scenic river. RSR operations would occur entirely over the ocean and would not have the potential to affect groundwater. Therefore, the Proposed Action is not expected to impact floodplains, wetlands, or wild and scenic rivers. Surface waters are addressed in Section 3.6.

The following sections provide a description of the affected environment and potential environmental consequences for the resources that are analyzed in detail. Impacts are estimated for RSR operations within the scope of those described in Chapter 2, *Description of Proposed Action and Alternatives*. Where the impacts are reasonably foreseeable based on the envelope of reentry vehicle and RSR operation characteristics, this PEA provides representative analyses of environmental impacts. Where a large range of potential operational parameters makes it infeasible to identify reasonably foreseeable future operations and therefore impacts, the analysis describes a maximum bounding of impact that

covers a range of commonly anticipated proposed reentry vehicles and RSR operations by incorporating analyses for representative vehicles and operations that have been previously completed.

When FAA receives vehicle operator license or experimental permit applications involving RSR operations in the marine environment, FAA will determine whether the scope of the proposed action is consistent with that described in Chapter 2 and whether the anticipated impacts are within the range of those analyzed in this chapter. To apply one of the CATEXs for RSR operations established by this PEA (Section 1.3, *Establishment of Categorical Exclusions*), FAA will follow the process described in Appendix B. FAA will consider new license and permit applications in the context of all determinations previously covered (or under ongoing review) by this PEA to ensure that the maximum number of operations in the proposed action and associated analyzed impacts are not exceeded. FAA may supplement this PEA in the future to increase the number of operations as needed.

3.2 Aviation Emissions and Air Quality

3.2.1 Definition of Resource and Regulatory Setting

Air quality is the measure of the condition of the air expressed in terms of ambient pollutant concentrations and their temporal and spatial distribution. Air quality regulations in the United States are based on concerns that high concentrations of air pollutants can harm human health—especially for children, the elderly, and people with compromised health conditions—as well as adversely affect public welfare by damaging crops, vegetation, buildings, and other property.

Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) developed the NAAQS for six common air pollutants known as *criteria* pollutants (EPA 2025). These criteria air pollutants are carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM), sulfur dioxide (SO₂), and lead (Pb). The EPA determined these criteria air pollutants may harm human health and the environment and may cause property damage. The EPA regulates these pollutants to permissible levels through human health-based (primary standards) and environmental-based (secondary standards) criteria. Short-term standards (1-, 3-, 8-, and 24-hour averaging periods) are established for pollutants contributing to acute health effects, while long-term standards (rolling 3-month and annual averages) are established for pollutants contributing to chronic health effects.

Based on measured ambient criteria pollutant data, the EPA designates all areas of the United States as having air quality better than the NAAQS (attainment), worse than the NAAQS (nonattainment), or unclassifiable (40 CFR part 81, subpart C, section 107). The EPA designates former nonattainment areas that have achieved attainment as maintenance areas. The designation of attainment for any NAAQS is based on the evaluation of ambient air quality monitoring data collected through federal, state, and/or local monitoring networks.

The EPA General Conformity Rule (40 CFR part 93, subpart B) ensures the actions taken by federal agencies in nonattainment and maintenance areas conform to a state's plan to meet the NAAQS. The General Conformity Rule applies only to federal actions occurring in nonattainment or maintenance areas. It provides that a federal agency cannot issue a permit for or support an activity unless the agency

determines the action will conform to the most recent EPA-approved State Implementation Plan. This means that projects using federal funds or requiring federal approval must not:

1. Cause or contribute to any new violation of a NAAQS.
2. Interfere with provisions in the applicable State Implementation Plan for maintenance of any standard.
3. Increase the frequency or severity of any existing violation.
4. Delay the timely attainment of any standard, interim emission reduction, or other milestone.

The General Conformity Rule established emissions thresholds (40 CFR § 93.153[b]), known as *de minimis* levels, for use in evaluating the conformity of an action. To evaluate conformity, all changes in emissions due to the action are compared to the *de minimis* threshold specified in the General Conformity Rule for each pollutant. If the net emissions increases due to the action are less than the *de minimis* thresholds, the action is presumed to conform to the State Implementation Plan, and no further conformity evaluation is required. If the emission increases exceed any of the thresholds, then further assessment is required. In attainment areas, conformity does not apply, but the *de minimis* levels can be used as screening thresholds.

Toxic air pollutants, also called hazardous air pollutants (HAPs), are a class of pollutants that do not have ambient air quality standards but are examined on an individual basis when there is a source of these pollutants. Mobile sources of air emissions include launch vehicles, commercial ships, recreational boats, cruise ships, and aircraft. HAPs emitted from mobile sources are called Mobile Source Air Toxics (MSAT). MSATs are compounds emitted from highway vehicles and non-road equipment that are known or suspected to cause cancer or other serious health and environmental effects. In 2001, EPA issued its first MSAT Rule, which identified 21 compounds as being HAPs that required regulation (EPA 2001). A subset of six of these MSATs compounds were identified as having the greatest influence on health, including benzene, 1,3-butadiene, formaldehyde, acrolein, acetaldehyde, and diesel PM. The EPA issued a second MSAT Rule in February 2007, which generally supported the findings in the first rule and provided additional recommendations of compounds having the greatest impact on health.

More information about air quality can be found in Chapter 1 of the FAA Order 1050.1 Desk Reference (FAA 2020a).

3.2.2 Study Area

The study area for air quality includes coastal areas around all major ports on the U.S. eastern, western (including Alaska), and Gulf coasts where recovery vessels would transit to and from during reentry operations. The study area extends up to 3,000 feet above ground level (AGL) (the mixing height). Above this height, pollutants that are released generally do not mix with ground-level emissions and do not have an effect on ground level concentrations in the local area (FAA 2000). The majority of recovery vessel emissions would be released well offshore in the ocean, where attainment status is unclassified and the NAAQS do not apply. For each applicant's proposed RSR operations, the exact location of the air quality study area would be defined based on the port(s) used, the distance the recovery vessels travel, and the NAAQS attainment area status in the study area.

Emissions associated with reentry vehicles would be generated by the combustion of propellant during the reentry burn but these emissions would occur at elevations well above 3,000 feet AGL and over the broad ocean and, therefore, are not expected to affect air quality over land.

3.2.3 Existing Conditions

Table 3-1 displays the current NAAQS. The existing air quality conditions and attainment status for an individual applicant's reentry proposal would depend on the port(s) used for recovery operations and would be identified during FAA's review of each applicant's proposed RSR operations. For reference, Appendix C illustrates the nonattainment status for areas along the east, west (including Alaska), and Gulf coasts. FAA would review the current NAAQS (Table 3-1) against the study area for an application to determine the current attainment status at the time FAA is evaluating an application.

Table 3-1. National Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS Value (Primary/ Secondary)
O ₃	8-hour	0.070 ppm (primary and secondary)
CO	8-hour	9 ppm (primary only)
	1-hour	35 ppm (primary only)
NO ₂	Annual arithmetic mean	53 ppb (primary and secondary)
	1-hour	100 ppb (primary only)
SO ₂	1- hour	75 ppb (primary only)
	1-year	10 ppb (secondary only)
PM ₁₀	24-hour	150 µg/m ³ (primary and secondary)
PM _{2.5}	Annual arithmetic mean	9 µg/m ³ (primary)
		15 µg/m ³ (secondary)
	24-hour	35 µg/m ³ (primary and secondary)
Pb	Rolling 3-Month Average	0.15 µg/m ³ (primary and secondary)

Source: EPA 2025.

CO = carbon monoxide; NO₂ = nitrogen dioxide; O₃ = ozone; Pb = lead; ppb = parts per billion; PM₁₀ = particulate matter with an aerodynamic diameter equal to or less than 10 micrometers; PM_{2.5} = particulate matter with an aerodynamic diameter equal to or less than 2.5 micrometers; ppm = parts per million; SO₂ = sulfur dioxide; µg/m³ = micrograms of pollutant per cubic meter of air.

3.2.4 Environmental Consequences

FAA considers air quality impacts to be significant if the proposal would cause pollutant concentrations to exceed one or more of the NAAQS, as established by the EPA, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations (FAA Order 1050.1G).

3.2.4.1 No Action Alternative

The No Action Alternative assumes reentry vehicle operators would continue to conduct reentry operations in accordance with their existing FAA licenses and FAA would process new license applications for reentry operations on a case-by-case basis. Operators with current licenses authorizing reentry are provided in Section 2.1, *No Action Alternative*. As described in the EAs supporting the

existing licenses, most emissions generated by reentry operations occur substantially offshore, beyond state boundaries where attainment status is unclassified, and the NAAQS do not apply. Additional emissions from recovery vessel operations occur near shore at whatever port is used by the operator. As described in the previous EAs, recovery operations are exempt from a General Conformity Evaluation given that emissions produced are expected to be below *de minimis* levels and would not exceed national or regional ambient air quality standards. As documented in previous EAs for reentry operations, the No Action Alternative is not expected to cause significant impacts on air quality.

3.2.4.2 Proposed Action

Air emissions potentially affecting ambient air quality would be generated by recovery vessels. Reentry vehicles covered by this PEA would not generate air emissions below 3,000 feet AGL because they land via parachutes over water. Potential air quality impacts from recovery vessels would depend on the location of activities proposed by the applicant (i.e., the port(s) used by the recovery vessel). This PEA assumes recovery operations would contribute at maximum *de minimis* emissions (if in a non-attainment area for the relevant criteria pollutant) and would, therefore, have little to no impact on regional air quality. When evaluating a license or permit application, FAA would verify that all proposed recovery operations, up to the maximum analyzed, remain within these assumptions, including proposed operations involving different operators and ports. Emissions of criteria air pollutants would generally not cause an exceedance of the NAAQS. MSATs would be the primary HAPs emitted by the recovery vessel during recovery operations. Based on previous NEPA reviews for reentry vehicle proposals, recovery vessels and equipment are expected to produce negligible ambient pollutant emissions in a widely dispersed area. Additionally, most of the emissions would occur substantially offshore, beyond state boundaries where attainment status is unclassified, and the NAAQS do not apply.

Emissions associated with the combustion of diesel fuel being consumed by recovery vessels would have the potential to affect air quality. The primary combustion products of diesel fuel would be nitrogen, oxygen, carbon dioxide, water vapor, and pollutant emissions. Common pollutants contained in these emissions would include unburned hydrocarbons, carbon monoxide, nitrogen oxides, and particulate matter.

Table 3-2 and Table 3-3 provide total emissions for example RSR operations: recovery vessel and crew transport helicopter emissions associated with 10 annual SpaceX Dragon reentry operations per year in the Pacific Ocean, as analyzed in the FAA's 2025 EA (FAA 2025; 2025 EA). Currently, of all the licensed operators that conduct capsule reentry, SpaceX conducts the most capsule reentries. The analyzed Dragon RSR operations use ports in San Diego County and Los Angeles County, both of which are in non-attainment for some criteria pollutants. The 2025 EA determined that estimated emissions associated with 10 annual Dragon reentry operations in the Pacific Ocean would be well below the General Conformity Rule *de minimis* thresholds and would, therefore, be expected to have little or no impact on regional air quality; FAA determined that the emissions would not violate any federal or state air quality standards because they represent a negligible percentage of regional emissions and would not cause an exceedance of any NAAQS.

When evaluating a license or permit application and determining if the project qualifies for a CATEX, FAA would consider total annual emissions from the applicant's associated recovery vessels and vehicles, as well as attainment status and General Conformity Rule *de minimis* thresholds.

Table 3-2. SpaceX Dragon Reentry Operational Emissions (Los Angeles County) (tons per year)

Emissions	VOC	NOx	CO	SOx	PM₁₀	PM_{2.5}	Pb
Proposed Action	0.12	2.73	0.25	0.06	0.04	0.03	-
General Conformity Threshold	10	10	100	N/A	100	70	25
Exceedance of Threshold?	No	No	No	No	No	No	No

Source: FAA 2025.

VOC = volatile organic compounds; NOx = oxides of nitrogen; CO = carbon monoxide; SOx = sulfur oxides; PM₁₀ = particulate matter with an aerodynamic diameter equal to or less than 10 micrometers; PM_{2.5} = particulate matter with an aerodynamic diameter equal to or less than 2.5 micrometers; Pb = lead.

Table 3-3. SpaceX Dragon Operational Emissions (San Diego County) (tons per year)

Emissions	VOC	NOx	CO	SOx	PM₁₀	PM_{2.5}	Pb
Proposed Action	0.08	2.11	0.19	0.05	0.03	0.02	-
General Conformity Threshold	25	25	N/A	N/A	N/A	N/A	N/A
Exceedance of Threshold?	No	No	No	No	No	No	No

Source: FAA 2025.

VOC = volatile organic compounds; NOx = oxides of nitrogen; CO = carbon monoxide; SOx = sulfur oxides; PM₁₀ = particulate matter with an aerodynamic diameter equal to or less than 10 micrometers; PM_{2.5} = particulate matter with an aerodynamic diameter equal to or less than 2.5 micrometers; Pb = lead.

Airspace closures associated with reentry operations would result in additional aircraft emissions mainly from aircraft being re-routed and expending more fuel. These emissions would occur above 3,000 feet AGL (the mixing layer) and, therefore, would not affect ambient air quality. Any delays in aircraft departures from affected airports would be short-term and only in airports within the AHA if that were to extend over land. Thus, any increases in air emissions from grounded aircraft are expected to be minimal and are not expected to result in an exceedance of a NAAQS for any criteria pollutant.

In summary, the Proposed Action is not expected to result in significant air quality impacts. When evaluating a license application for reentry operations, FAA would use the checklist in Appendix B to determine if additional environmental review is required.

3.2.5 Mitigation

As described above, any temporary air quality impacts are expected to be minimal; therefore, FAA is not proposing any mitigation.

3.3 Noise and Noise-Compatible Land Use

3.3.1 Definition of Resource and Regulatory Setting

Sound is a physical phenomenon consisting of pressure fluctuations that travel through a medium, such as air, and are sensed by the human ear. Noise is considered any unwanted sound that interferes with normal activities (such as sleep, conversation, student learning) and can cause annoyance. Noise sources can be constant or of short duration and contain a wide range of frequency (pitch) content. Determining

the character and level of sound aids in predicting the way it is perceived. Sonic booms are classified as short-duration events; sonic booms generated by reentry vehicles last less than a second.

FAA has determined the cumulative noise energy exposure of individuals to noise resulting from FAA actions must be established in terms of yearly Day-Night Average Sound Level (DNL), the FAA's primary noise metric. DNL accounts for the noise levels of all individual noise events, the number of times those events occur, and the period of day/night in which they occur. The DNL metric logarithmically averages sound levels at a location over a 24-hour period, with a 10-decibel (dB) adjustment added to those noise events occurring from 10:00 p.m. to 7:00 a.m. The 10-dB adjustment is added because of the increased sensitivity to noise during normal nighttime hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours.

The C-weighted Day-Night Average Sound Level (CDNL) metric is a version of the DNL metric described above calculated based on C-weighted decibel (dBC) levels. Because C-weighted sound levels are different from A-weighted sound levels and are associated with different effects, CDNL cannot be added to A-weighted DNL to yield meaningful results and must be discussed separately.

More information about noise and noise-compatible land use can be found in Chapter 11 of the FAA Order 1050.1 Desk Reference (FAA 2020b).

3.3.2 Study Area

The study area for noise and noise-compatible land use includes coastal areas around all major ports on the U.S. eastern, western (including Alaska), and Gulf coasts where proposed recovery vessel activity would generate noise while transiting to and from the reentry landing location. The study area also includes all oceanic areas within the reentry areas depicted in Figure 2-1 to Figure 2-3. Each applicant's proposed RSR operations would be confined to the study area defined in this PEA. The study area for each applicant's proposal would be defined based on reentry landing location and the port(s) used and would be identified during FAA's review of each applicant's proposed RSR operations.

3.3.3 Existing Conditions

Noise and noise-compatible land use conditions would differ for each applicant's proposed RSR operations. As the study area is primarily located over the broad ocean, the existing noise levels are low. Within the study area, ambient noise levels are dominated by natural ocean sounds, wind, and occasional vessel traffic. Regularly occurring sources of instantaneous noise include natural sources, such as thunder and vocalizations from marine mammals and birds, as well as anthropogenic sources, such as commercial shipping, fishing vessels, aircraft overflights, and other maritime activities. Rocket launches, ships, and aircraft overflights create louder intermittent noise levels. For example, a jet flyby 300 meters overhead is approximately 135 to 145 dB, and a sound emitted from a supply ship is approximately 174 dB (Boyd 1996). While maritime traffic may occur in the broader region, vessels are generally dispersed and would be distant from the reentry location because of the issuance of NOTMARs.

3.3.4 Environmental Consequences

FAA considers noise impacts to be significant if the action would increase noise by DNL 1.5 dB or more for a noise-sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the No Action Alternative for the same timeframe (FAA Order 1050.1G). For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB. For impulsive noise sources, such as sonic booms, the C-weighted DNL metric (CDNL) is used; CDNL 60 dB is equivalent to the DNL 65 dB significance threshold.³¹

3.3.4.1 No Action Alternative

The No Action Alternative assumes reentry vehicle operators would continue to conduct reentry operations in accordance with their existing FAA licenses and FAA would process new license applications for reentry operations on a case-by-case basis. Operators with current licenses authorizing reentry are provided in Section 2.1, *No Action Alternative*. As described in the EAs supporting the existing licenses, noise from reentry operations includes a sonic boom generated during the capsule's landing in the ocean, noise from recovery vessels, and aircraft engine noise during re-routing or ground delays due to temporary airspace closures. The overpressure associated with the sonic booms is expected to impact the ocean's surface. It is possible low-level sonic booms are heard in coastal areas if the capsule lands close (e.g., 5-15 NM) to shore and atmospheric conditions (e.g., upper levels winds) at the time of reentry cause the overpressures to shift toward land. As documented in previous EAs, any sonic booms heard during capsule reentry are not expected to result in significant human disturbance or adverse human impacts. Reentry missions would not affect the same aircraft routes or the same airports, and re-routing associated with potential reentry-related closures represents a small fraction of the total amount of rerouting that occurs due to all other reasons in any given year. Any incremental increases in noise levels at individual airports would only last the duration of the airspace closure on a periodic basis and are not expected to meaningfully change existing DNL sound levels at the affected airports and surrounding areas. As documented in previous EAs for reentry operations, the No Action Alternative is not expected to cause significant impacts on air quality.

3.3.4.2 Proposed Action

The Proposed Action would result in noise from (1) sonic booms generated during reentry vehicle reentry, (2) operation of recovery vessels, and (3) aircraft engine noise during re-routing or ground delays due to temporary airspace closures. The latter two types of noise impacts are analyzed qualitatively, as impacts are expected to be minimal and not exceed the FAA's significance threshold.

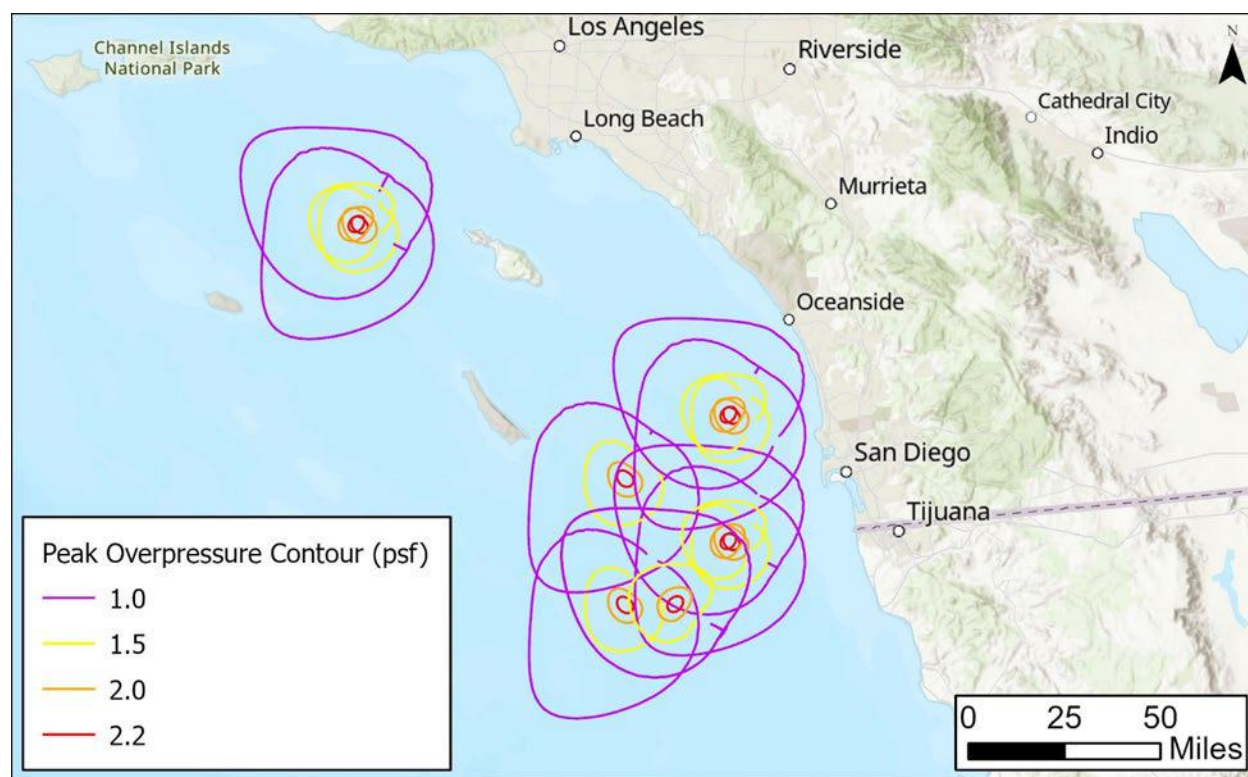
Sonic Booms

Sonic booms are expected to occur entirely over the ocean for most reentries. The maximum previously analyzed sonic boom overpressure reentry in the marine environment is 2.2 psf for the SpaceX Dragon reentry vehicle (FAA 2025). SpaceX's Dragon reentry vehicle is currently the largest FAA-licensed reentry vehicle and is used to transport crew and cargo. FAA estimates that the maximum sonic boom

³¹ FAA Order 1050.1G, Appendix A, Exhibit A-1.

overpressure for a future applicant's proposed reentry operations in the marine environment would be 3 psf or less. The maximum overpressure is expected to occur entirely over the ocean. FAA expects overpressures reaching inland to be 1 psf or less because landing occurs offshore. A 1-psf sonic boom is noticeable, similar to a clap of thunder, and could potentially cause a startle response; however, it is not expected to result in significant disturbance or adverse impacts. Sonic booms below 1 psf are even less likely to be perceptible. No structural damage is expected from sonic booms at these overpressures (Haber and Nakaki 1989). This PEA assumes reentry operations would not produce a sonic boom greater than 3 psf over water or 1 psf over land.

Based on a hypothetical situation where the maximum number of annual reentries in the Pacific Ocean (70) all occur in the same landing site, if all of these reentries generate overpressures of 1 psf over noise-sensitive areas on land, the cumulative annual noise levels on land would be less than a C-weighted day-night average noise level (CDNL) of 52 dBC (C-weighted dB), which is below the FAA's significance threshold.³² Therefore, sonic booms generated during reentry would not result in significant noise impacts.



Source: SpaceX; FAA 2025.

Figure 3-1. Example Sonic Boom Contour: SpaceX Dragon Reentry in the Pacific Ocean

³² This analysis assumes a 50 percent day-night split of RSR operations.

Recovery Vessel Operations

Potential noise impacts could also occur from recovery vessel operations within the study area, which includes all major ports on the U.S. eastern, western (including Alaska), and Gulf coasts where proposed recovery vessels would transit to and from the reentry landing location. The noise generated would be short-term, infrequent, and consistent with existing maritime activity already occurring in the study area. Therefore, noise generated by recovery vessel operations is not expected to cause significant impacts.

Airspace Closures

Airspace closures associated with the Proposed Action could result in temporarily grounded aircraft at affected airports and re-routing of en-route flights on established alternate flight paths. Aircraft could be temporarily grounded if airspace above or around the airport is closed. Ground delays are also used under some circumstances to avoid airborne reroutes. If aircraft were grounded, noise levels at the airport could temporarily increase if the planes sit idle; some aircraft would likely shut down engines altogether until the closure has lifted. Also, depending on the altitude at which aircraft approach an airport, there could be temporary increases in noise levels in communities around the airports. Aircraft would travel on existing routes and flight paths that are used on a daily basis to account for weather and other temporary restrictions. Reentry missions would not affect the same aircraft routes or the same airports, and re-routing associated with launch-related closures represents a small fraction of the total amount of rerouting that occurs due to all other reasons in any given year. Any incremental increases in noise levels at individual airports would only last the duration of the airspace closure on a periodic basis and are not expected to meaningfully change existing DNL sound levels at the affected airports and surrounding areas. Therefore, airspace closures due the Proposed Action are not expected to result in significant noise impacts.

3.3.5 Mitigation

As described above, any temporary noise impacts are expected to be minimal; therefore, FAA is not proposing any mitigation.

3.4 Biological Resources

3.4.1 Definition of Resource and Regulatory Setting

Biological resources are valued for their intrinsic, aesthetic, economic, and recreational qualities, and they include fish, wildlife, plants, and their respective habitats. Typical categories of biological resources include terrestrial and aquatic plant and animal species, game and non-game species, special-status species (state or federally listed threatened or endangered species, marine mammals, or species of concern, such as species proposed for listing or migratory birds), and environmentally sensitive or critical habitats.

Section 7(a)(2) of the ESA requires that each federal agency—in consultation with the U.S. Fish and Wildlife Service (USFWS) or NMFS—ensures that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse

modification of designated critical habitat. FAA is required to consult the USFWS or NMFS if an action may affect a federally listed species or critical habitat.

The MMPA of 1972 prohibits, with certain exceptions, the *take* of marine mammals in U.S. waters and by U.S. citizens on the high seas. Vehicle operators are required to obtain authorization from the USFWS (for sea and marine otters, walruses, polar bears, three species of manatee, and the dugongs) and/or NMFS (for all other marine mammals) if its project would *take* a marine mammal. Often the marine mammals present in a project area are also listed under the ESA.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §§1801 et seq.) requires federal agencies to consult with NMFS regarding any activity or proposed activity that is authorized, funded, or undertaken by the agency that may adversely affect essential fish habitat (EFH). EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity, and is described and identified by NMFS and regional fishery councils for all federally managed species.

The Migratory Bird Treaty Act (16 U.S.C. §703 et seq.) protects migratory birds by prohibiting the taking, killing, or possessing of migratory birds (including their eggs, nests, and feathers). Vehicle operators are responsible for complying with the Migratory Bird Treaty Act.

More information about biological resources can be found in Chapter 2 of the FAA Order 1050.1 Desk Reference (FAA 2020c).

3.4.2 Study Area

The study area for biological resources is the oceanic area where RSR operations would occur, plus ocean and coastal areas where recovery vessels would transit. Specific study areas for each applicant's proposed RSR operations would be smaller than the overall study area for this PEA.

3.4.3 Existing Conditions

3.4.3.1 General Wildlife

Wildlife species occurring in the study area include various marine species, such as marine mammals, fish, reptiles, seabirds, and invertebrates (e.g. shrimp, mollusks, jellyfish). The specific species that might be affected by reentry operations would depend on the applicant's proposed RSR operations and would be identified during FAA's review of each applicant's proposed RSR operations.

3.4.3.2 Special-Status Species

To support the commercial space industry and streamline environmental reviews of license and permit applications, FAA (along with NASA and the U.S. Space Force [USSF]) conducted an ESA programmatic consultation with NMFS to address potential effects of launch and reentry operations on ESA-listed species in the marine environment. FAA determined the actions included in the consultation, which include reentry operations, *may affect, but are not likely to adversely affect*, ESA-listed species under NMFS jurisdiction. NMFS concurred with the action agencies and issued a PLOC. The PLOC contains a list

of ESA-listed marine species that live in the study area. Refer to the PLOC for information about these protected species.³³

ESA-listed species under USFWS jurisdiction in the study area include pelagic birds and species that live in or use coastal areas, such as southern sea otter (*Enhydra lutris nereis*), California least tern (*Sterna antillarum browni*), western snowy plover (*Anarhynchus nivosus nivosus*), piping plover (*Charadrius melodus*), West Indian manatee (*Trichechus manatus*), Hawaiian petrel (*Pterodroma sandwichensis*), short-tailed albatross (*Phoebastria albatrus*), roseate tern (*Sterna dougallii*), and black-capped petrel (*Pterodroma hasitata*).

Examples of marine mammals in the study area include whales, dolphins, and pinnipeds (seals). The specific species that might be affected by reentry operations would depend on the applicant's proposed RSR operations and would be identified during FAA's review of each applicant's proposed RSR operations.

3.4.3.3 Essential Fish Habitat

EFH communities range from naturally occurring hardbottom areas and artificial reefs to floating mats of *Sargassum* algae. Habitat utilized by a species can change with life history stage, abundance of the species and competition from other species, and environmental variability in time and space. The type of habitat available, its attributes, and its functions are important to species productivity and societal benefits. Some potential threats to habitat include certain fishing practices, marine construction, navigation projects, dredging, alteration of freshwater input into estuaries, and runoff.

In addition to establishing EFH, the MSA also directs the identification of habitat areas of particular concern (HAPCs). HAPCs are subsets of EFH that exhibit one or more of the following traits: rare, stressed by development, provide important ecological functions for federally managed species, or are especially vulnerable to anthropogenic degradation. They can cover a specific location (a bank or ledge, spawning location) or cover habitat that is found at many locations (e.g., coral, nearshore nursery areas, or pupping grounds).

Designated EFH overlaps with the study area, but specific EFH and HAPCs that might be affected by reentry operations would depend on the applicant's proposed RSR operations. These potential impacts would be identified during FAA's review of each applicant's proposed RSR operations. If FAA determined that EFH might be adversely affected by an applicant's proposed RSR operations, FAA would consult with NMFS.

3.4.4 Environmental Consequences

FAA considers impacts on biological resources to be significant if the USFWS or NMFS determines that the action would likely jeopardize the continued existence of a federally listed threatened or endangered species or would result in the destruction or adverse modification of federally designated critical habitat (FAA Order 1050.1G). FAA has not established a significance threshold for unlisted

³³ <https://www.faa.gov/space/environmental>.

species. Factors to consider when assessing the significance of potential impacts on unlisted species include whether the action would have the potential for:

- A long-term or permanent loss of unlisted plant or wildlife species (e.g., extirpation of the species from a large project area, such as from a new commercial service airport).
- Adverse impacts on special status species or their habitats.
- Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations.
- Adverse impacts on a species' reproductive success rates, natural mortality rates, non-natural mortality (e.g., road kills and hunting), or ability to sustain the minimum population levels required for population maintenance (FAA Order 1050.1G).

3.4.4.1 No Action Alternative

The No Action Alternative assumes reentry vehicle operators would continue to conduct reentry operations in accordance with their existing FAA licenses and FAA would process new license applications for reentry operations on a case-by-case basis. Operators with current licenses authorizing reentry are provided in Section 2.1, *No Action Alternative*. As described in the EAs supporting the existing licenses, RSR operations present a low risk to wildlife being exposed to sonic booms, experiencing a strike/impact from reentry vehicles or recovery vessels. Reentry operations generate debris that is expected to land in the ocean and sink to the ocean floor. The debris consists of pieces of reentry vehicle components that survive atmospheric reentry and break up. This has the potential to affect EFH. Previous EAs for operations within EFH determined there could be a minimal adverse effect to EFH. FAA has previously consulted NMFS to address potential adverse effects to EFH from debris. NMFS has provided Conservation Recommendations to offset or compensate for the potential effects. FAA requires operators to implement NMFS's Conservation Recommendations. As documented in previous EAs for reentry operations, the No Action Alternative is not expected to cause significant impacts on biological resources.

3.4.4.2 Proposed Action

Potential stressors to biological resources from the Proposed Action include noise, vehicle or vessel strikes, and debris strike, entanglement, or ingestion. Each of these potential stressors is described below.

Noise

Reentries may potentially expose wildlife to sonic booms (overpressures) during the reentry/landing. These sonic booms last less than a second. The maximum sonic boom overpressure produced during reentry is expected to be approximately 3 psf and would occur over the ocean near the landing location. The maximum sonic boom overpressure expected in any inland areas is expected to be around 1 psf.

Studies on the effects of noise on wildlife indicate that species exhibit a wide range of responses depending on factors such as noise intensity, duration, frequency, and individual experience (Manci et al. 1988; Bowles 1995). Noise can cause primary effects, such as temporary behavioral disruptions, and

secondary effects, including stress or interference with communication, mating, or foraging. However, most noise-related disturbances are short-lived and difficult to distinguish from other environmental stressors such as predators or weather (Shannon et al. 2016). The startle response, a common reaction to sudden noise, varies in intensity based on species, group size, and prior exposure (Manci et al. 1988). While avian species are often more sensitive to noise than mammals, studies on sonic booms and aircraft noise suggest that many birds, including raptors and game species, experience minimal long-term effects and often habituate to repeated exposures (Ellis et al. 1991; Lynch & Speake 1978).

Sonic booms from reentry vehicles are unlikely to affect marine species underwater due to the limited transmission of sound through the air-water interface. While marine mammals and sea turtles could theoretically be exposed to sonic booms while surfacing, this overlap is extremely unlikely due to the brief duration of the noise (less than a second). Therefore, the noise generated during RSR operations is not expected to result in significant impacts on marine species in the ocean.

Seabirds and terrestrial species along coastal areas could be exposed to overpressures if the reentry vehicle landed near the coast. The short duration of the sound exposure and low intensity of the overpressure (around 1 psf or less) are not expected to result in significant impacts on species. Previous NEPA reviews of commercial space projects involving species exposure to sonic booms, including sonic booms generated from reentry operations, have concluded that the activities are not expected to result in significant impacts on wildlife.

Reentry Vehicle and Recovery Vessel Strike

Reentry vehicles have the potential to strike species during splashdown. The potential reentry areas are vast expanses of ocean and species are expected to be sparsely distributed with low densities. The reentry vehicles would descend using parachutes, providing opportunity for any species present to disperse if they were present at the splashdown site. Given the large potential reentry areas, and the fact that marine wildlife spend the majority of their time submerged as opposed to on the surface, it is extremely unlikely that they would be impacted (e.g., struck) by a splashdown. Reentry vehicles would remain on the surface throughout splashdown and recovery operations.

A reentry vehicle's propellant storage is designed to retain residual propellant, so any propellant remaining in the vehicle is not expected to be released into the ocean. In an unlikely event the propellant tank ruptures on impact, the risks of exposure to marine organisms are negligible because the propellant would evaporate or be quickly diluted and buffered by seawater.

Recovery operations involve recovery vessels, which present a minimal risk of ship strikes to species at or near the ocean surface, though such incidents are considered highly unlikely. Compliance with the mitigation measures listed in Section 2.2.4, *Mitigation Measures*, would help avoid or minimize any potential effects.

Any aircraft overflights for monitoring could cause brief noise or visual stimuli for species at the surface, but any impact would be temporary and minimal. Therefore, it is unlikely that biological resources would be significantly impacted by reentry vehicle and recovery vessel strike.

Debris Strike, Entanglement, or Ingestion

The Proposed Action includes potential risk of marine species being struck by or entangled in debris, as well as risk of ingesting debris. Due to the dispersed distribution of marine species and the size of mission-related items and debris relative to the study area, physical strikes would likely be unusual and would not cause detectable impacts on populations. Similarly, entanglement in and ingestion of items such as parachutes, parafoils, and other debris is possible, but the risk of this occurring is low. Vehicle operators would attempt to recover parachutes, preventing the risk of entanglement or ingestion. If parachutes cannot be recovered due to poor sea-state or adverse weather conditions, they would not easily degrade into small digestible pieces and instead would be expected to sink rapidly, thereby minimizing the risk of ingestion or entanglement by marine species.

Endangered Species Act-Listed Species

As described in Section 3.4.3.2 *Special-Status Species*, FAA (along with NASA and USSF) consulted NMFS in accordance with ESA Section 7 to address potential effects on ESA-listed species from launch and reentry operations in the marine environment. NMFS concurred with the action agencies' determination that the actions considered in the consultation, including RSR operations, would not adversely affect ESA-listed species under NMFS jurisdiction and issued a PLOC.³⁴ The PLOC includes measures that operators must comply with to avoid or minimize potential risks to ESA-listed species.

Previous ESA consultations with USFWS to address potential effects of reentry operations on ESA-listed species under USFWS jurisdiction have concluded with USFWS concurring with the FAA's determination that reentry operations *may affect, but are not likely to adversely affect*, ESA-listed species, including seabirds and coastal species. Although potential effects are possible, adverse effects are either extremely unlikely or not meaningfully measurable or detectable, and therefore discountable or insignificant. FAA would review each applicant's proposal and consult with the USFWS as needed.

Essential Fish Habitat

Adverse effects to EFH may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR § 600.810).

Increased reentry operations would generate more debris that would sink to the ocean floor and impact benthic habitats, including EFH. However, because of the small number of unrecovered items relative to the total area of EFH and ocean floor in the study area, adverse effects to EFH from unrecovered items are not expected. A reentry vehicle's propellant storage is designed to retain residual propellant, so any propellant remaining in the vehicle is not expected to be released into the ocean. In an unlikely event the propellant tank ruptures on impact, the risks of chemical or biological alterations to an EFH

³⁴ <https://www.faa.gov/space/environmental>.

ecosystem are negligible because the propellant would evaporate or be quickly diluted and buffered by seawater.

EFH that would potentially be affected would depend on each applicant's proposed RSR operations. These potential impacts would be identified during the FAA's review of each applicant's proposed RSR operations. If FAA determines that EFH may be adversely affected by an applicant's proposed RSR operations, FAA would consult with NMFS. If NMFS determined operations might result in adverse effects to EFH and provided FAA with Conservation Recommendations, FAA would require the operator to implement the recommendations.

In summary, considering the expected impacts of the Proposed Action, implementation of the mitigation measures, and the FAA's significance threshold and factors to consider when evaluating the potential significance of the impacts, the Proposed Action is not expected to result in significant impacts on biological resources.

3.4.5 Mitigation

The NMFS PLOC includes mitigation measures that are intended to avoid or minimize potential effects to ESA-listed species from launch and reentry operations in the marine environment. Those measures are included in Section 2.2.4, *Mitigation Measures*. This PEA assumes operators would comply with these mitigation measures. If an operator elected not to comply with these measures, additional environmental review, including ESA consultation with NMFS, would be required.

Although significant impacts on seabirds and terrestrial species are not expected, potential effects would be identified during FAA's review of each applicant's proposed RSR operations. If this review leads to an ESA Section 7 consultation with the USFWS, the operator would be required to comply with any measures identified in the consultation to avoid or minimize potential effects. Similarly, if FAA consults with NMFS to address potential adverse effects to EFH, the applicant would be required to comply with any Conservation Recommendations developed by NMFS.

3.5 Coastal Resources

3.5.1 Definition of Resource and Regulatory Setting

Coastal resources include natural resources occurring within coastal waters and their adjacent shorelands. Coastal resources include islands, transitional and intertidal areas, salt marshes, wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as fish and wildlife and their respective habitats within these areas. Coastal resources include the coastlines of the Atlantic and Pacific Oceans, the Great Lakes, and the Gulf of America.

Relevant laws pertaining to coastal resources that are applicable to the Proposed Action include the Coastal Zone Management Act (CZMA). The CZMA was enacted to encourage coastal states, Great Lake states, and U.S. territories and commonwealths (collectively "states") to be proactive in managing natural resources for their benefit and the benefit of the Nation. The CZMA is a voluntary program for states. If a state elects to participate, it develops and implements a coastal management program (CMP)

pursuant to federal regulations.³⁵ Thirty-four of the 35 coastal states eligible to participate in the federal coastal management program have federally approved CMPs. Alaska voluntarily withdrew from the program in 2011.

Section 307 of the CZMA—*federal consistency* provision—provides states with a tool to manage coastal uses and resources and to facilitate cooperation and coordination with federal agencies. A non-federal entity applying to the federal government for a license or permit is subject to the requirements of CZMA § 307(c)(3)(A) (16 U.S.C. § 1456(c)(3)(A)) and 15 CFR part 930, subparts A, B, and D (Part 930). All federal license or permit activities occurring in the coastal zone are deemed to affect coastal uses or resources if the state CMP has *listed* the particular federal license or permit in its federally approved CMP. For a *listed* activity occurring in the coastal zone, the applicant must submit a Consistency Certification to the federal agency and the affected state CMP(s). In addition to the Certification, the applicant must provide the state with the *necessary data and information* required by the regulations (15 CFR § 930.58).

FAA commercial space licenses and permits are not currently listed on any state's federally approved CMP. For *unlisted* activities, a state CMP may notify the federal agency, applicant, and the Director of the National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Resource Management (Director) of unlisted activities affecting any coastal use or resource which require state review within 30 days from notice of the license or permit application that has been submitted to the federal agency, otherwise the state waives its right to review the unlisted activity. The waiver does not apply in cases where the state does not receive notice of the federal license or permit application.

In accordance with Part 930, federal agencies or applicants should provide written notice of the submission of applications for federal licenses or permits for unlisted activities to the applicable state. Notice to the state may be constructive if notice is published in an official federal public notification document or through an official state clearinghouse (i.e., the Federal Register, draft or final NEPA document that is submitted to the state, or a state's intergovernmental review process). The notice must contain sufficient information for the state to learn of the activity, determine the activity's geographic location, and determine whether coastal effects are reasonably foreseeable.

Also in accordance with Part 930, the state's notification must also request the Director's approval to review the unlisted activity and must contain an analysis that supports the state's assertion that coastal effects are reasonably foreseeable. Following state notification to the federal agency, applicant, and the Director, the federal agency must not issue the license or permit until the requirements of 15 CFR Part 930, subpart D have been satisfied, unless the Director denies the state's request to review the activity. If the Director denies the state's request, the federal agency may approve the license or permit application and the applicant need not comply with the requirements of subpart D. If the Director approves the state's request, the federal agency and applicant must comply with the consistency certification procedures of subpart D.

More information about coastal resources can be found in Chapter 4 of FAA Order 1050.1 Desk Reference (FAA 2023).

³⁵ See CZMA § 306(d); 15 CFR part 923.

3.5.2 Study Area

The study area for coastal resources includes U.S. coastlines and nearshore areas where environmental effects from reentry vehicles are reasonably foreseeable, as well as where the recovery vessels would be transiting to and from port. The seaward boundary of each of the individual coastal states is generally 3 NM from the coastline. The seaward boundaries of Texas and Florida's Gulf Coast extend 9 NM from the coastline.

3.5.3 Existing Conditions

Coastal resources in the study area include islands, transitional and intertidal areas, salt marshes, wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as fish and wildlife and their respective habitats within these areas. The existing conditions for coastal resources would be unique for each applicant's proposed RSR operations and would be characterized by the coastal resources in and around the port(s) used, as well as the vessel route traveled within the state's coastal zone.

3.5.4 Environmental Consequences

FAA has not established a significance threshold for coastal resources. Factors to consider when assessing the significance of potential impacts on coastal resources include situations in which the action would have the potential to:

- Be inconsistent with the relevant state coastal zone management plan(s).
- Impact a coastal barrier resources system unit (and the degree to which the resource would be impacted).
- Pose an impact on coral reef ecosystems (and the degree to which the ecosystem would be affected).
- Cause an unacceptable risk to human safety or property.
- Cause adverse impacts on the coastal environment that cannot be satisfactorily mitigated.

3.5.4.1 No Action Alternative

The No Action Alternative assumes reentry vehicle operators would continue to conduct reentry operations in accordance with their existing FAA licenses and FAA would process new license applications for reentry operations on a case-by-case basis. Operators with current licenses authorizing reentry are provided in Section 2.1, *No Action Alternative*. As described in the EAs supporting the existing licenses, any impacts to coastal uses or resources are expected to be short term in duration and minor in effect. RSR operations do not include any coastal construction, seafloor disturbance, or land-based operations. Splashdown and recovery activities would continue occur to at least 5 NM offshore. As the modeled sonic boom contours remain entirely over water, coastal areas are not expected to experience impacts from sonic booms during reentry. As documented in previous EAs for reentry operations, the No Action Alternative is not expected to cause significant impacts on coastal resources.

3.5.4.2 Proposed Action

The Proposed Action does not include any coastal construction or seafloor disturbing activities. Reentry vehicle landings would occur at least 5 NM offshore the coast of the United States or islands and at least 200 NM offshore the coastline of Hawaii and foreign countries coastlines (see Section 2.2.1, *Location*, and Figure 2-1 to Figure 2-3). RSR operations would not occur in intertidal areas, salt marshes, estuaries, coral reefs, or National Marine Sanctuaries. The only shore-based/near shore activity occurring in a state's coastal zone would be the vessels transiting to and from a port.

Recovery vessel activity could include transits to and from all major ports on the eastern, western (including Alaska), and Gulf coasts of the United States. The port(s) used would depend on each applicant's proposed RSR operations and would be identified during FAA's review of each applicant's proposed RSR operations. Applicants would be responsible for coordinating any local approvals with the relevant state and local agencies regulating such port(s), including port authorities.

As described in Section 3.2, *Aviation Emissions and Air Quality*, emissions associated with the combustion of diesel fuel being consumed by recovery vessels would have the potential to affect air quality in coastal areas. For example, Dragon recovery efforts use one 160-foot recovery vessel equipped with a helideck and six rigid-hulled inflatable boats to track down, collect, and transport Dragon to shore and execute parachute recovery, if possible. The primary combustion products of diesel fuel are nitrogen, oxygen, carbon dioxide, water vapor, and pollutant emissions. Common pollutants contained in these emissions include unburned hydrocarbons, carbon monoxide, nitrogen oxides, and particulate matter.

As described in Section 3.4, *Biological Resources*, the maximum sonic boom overpressure produced during reentry would be approximately 3 psf and would occur over the ocean. The maximum sonic boom overpressure experienced on the coast/inland would be around 1 psf, which is similar in duration and intensity to a clap of thunder.

The Proposed Action would not (1) be inconsistent with a state coastal zone management plan, (2) impact a coastal barrier resources system unit, (3) pose an impact on coral reef ecosystems, (4) cause an unacceptable risk to human safety or property, or (5) cause adverse impacts on the coastal environment that cannot be satisfactorily mitigated. Therefore, the Proposed Action would not result in significant impacts on coastal resources.

3.5.5 Mitigation

As described above, any impacts on coastal resources are expected to be minimal and temporary; therefore, FAA is not proposing any mitigation beyond the mitigation identified above for biological resources.

3.6 Surface Waters

3.6.1 Definition of Resource and Regulatory Setting

Water resources are surface waters, floodplains, wetlands, and groundwater that are vital to society; they are important in providing drinking water and in supporting recreation, transportation and commerce, industry, agriculture, and aquatic ecosystems. For the reasons described in Section 3.1, this EA focuses only on surface waters (ocean waters). The main law pertaining to surface waters is the Clean Water Act. The Clean Water Act establishes the basic structure for regulating the discharge of pollutants into waters of the United States. More information about water resources can be found in Chapter 14 of the FAA Order 1050.1 Desk Reference (FAA 2020b).

3.6.2 Study Area

The study area for surface waters is the oceanic area where RSR operations would occur, plus ocean and coastal areas where recovery vessels would transit. Each applicant's proposed RSR operations would be confined to the study area defined in this PEA. The study area for each applicant's proposal would be defined based on reentry landing location and the port(s) used and would be identified during FAA's review of each applicant's proposed RSR operations.

3.6.3 Existing Conditions

Ocean waters within the study area consist of offshore, deep, high-salinity marine waters influenced by prevailing ocean currents, as well as near-shore waters of the ports used by recovery vessels. Water quality in offshore waters is characterized by parameters such as temperature, salinity, dissolved oxygen, and nutrient concentrations, which are maintained through natural mixing and circulation processes. The study area does not include wetlands, estuaries, or coastal streams.

3.6.4 Environmental Consequences

Impacts on surface waters would be significant if the action would 1) exceed water quality standards established by federal, state, local, and tribal regulatory agencies; or 2) contaminate public drinking water supply such that public health may be adversely affected.

3.6.4.1 No Action Alternative

The No Action Alternative assumes reentry vehicle operators would continue to conduct reentry operations in accordance with their existing FAA licenses and FAA would process new license applications for reentry operations on a case-by-case basis. Operators with current licenses authorizing reentry are provided in Section 2.1, *No Action Alternative*. As described in the EAs supporting the existing licenses, any impacts on surface waters are expected to be short term in duration and minor in effect. For vehicles containing propellant during reentry, any residual propellant upon splashdown is not expected to be released into the ocean. In the event of a leak, the propellant would rapidly disperse and does not represent a source of substantial environmental degradation to water quality. Recovery vessels would operate along existing maritime routes in compliance with applicable federal, state, and local

regulations, using standard fuel and waste management practices. As documented in previous EAs for reentry operations, the No Action Alternative is not expected to cause significant impacts on water resources.

3.6.4.2 Proposed Action

Potential effects to water resources under the Proposed Action would be limited to highly localized interactions between seawater and reentry vehicles during splashdown, as well as the brief operations of recovery vessels to and from port.

For vehicles with propellants on board, only small amounts of propellants are expected to remain during splashdown. A reentry vehicle's propellant storage, as applicable, is designed to retain propellant, so any propellant remaining in the vehicle is not expected to be released into the ocean. In an unlikely event the propellant tank ruptures on impact, the propellant would evaporate or be quickly diluted and buffered by seawater. Non-recovered reentry vehicle components that would sink to the ocean floor are expected to be comprised of inert materials which are neither chemically or biologically reactive and contain no hazardous materials. Accordingly, they would not affect the marine environment in the short term (while the non-recovered item is floating or descending through the water column) or in the long term (when the non-recovered item has settled into the ocean floor). These activities would not result in measurable effects on water quality.

Recovery vessel operations would also have the potential to release small amounts of oil and gas into the water. However, vessel operations would be conducted in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), which prohibits certain discharges of oil, garbage, and other substances from vessels. The Proposed Action is therefore not expected to have a significant impact on ocean water resources due to hazardous materials.

No measurable changes in ocean water temperature, salinity, or chemistry are anticipated. Given reentry vehicle landings would occur at least 5 NM offshore the coast of the United States or islands and at least 200 NM offshore the coastline of Hawaii and foreign countries coastlines (see Section 2.2.1, *Location*, and Figure 2-1 to Figure 2-3), there would be no impacts to coastal hydrology, groundwater systems, or nearshore water quality. Therefore, the Proposed Action would not result in significant impacts on water resources.

3.6.5 Mitigation

As described above, any temporary surface water impacts are expected to be minimal; therefore, FAA is not proposing any mitigation.

Appendix A

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Appendix B

Categorical Exclusions

B.1 Introduction

The term *categorical exclusion* (CATEX) means a category of actions that a Federal agency has determined normally does not significantly affect the quality of the human environment within the meaning of section 102(2)(C).³⁶ The purpose of establishing a CATEX is to identify actions that normally do not result in significant impacts, thereby streamlining the environmental review of proposed activities falling within the scope of the CATEX. Currently, the Federal Aviation Administration (FAA) has not established a CATEX for the action of issuing (or renewing or modifying) a license or permit that includes reentry, splashdown, and recovery (RSR) operations. With this programmatic environmental assessment (PEA), FAA is proposing to establish CATEXs for actions involving reentry vehicle (capsule) RSR operations in the marine environment and is seeking public comment. In addition to this PEA, FAA has analyzed previously implemented reentry operations in multiple environmental documents prepared in accordance with the National Environmental Policy Act (NEPA) and determined there would not be significant impacts on the human environment (B-1). Each EA resulted in a Finding of No Significant Impact (FONSI).

Table B-1. Previous NEPA Reviews for Commercial Space Reentry, Splashdown, and Recovery (RSR) Operations

NEPA Document	Summary of Proposed RSR Operations
2018 Environmental Assessment for Issuing a Reentry License to SpaceX for Landing the Dragon Spacecraft in the Gulf of Mexico (2018 EA)	Up to 6 RSR operations of the Dragon reentry vehicle in the Gulf of America per year; the maximum number of reentries was increased from 6 to 10 in 2022 following FAA's re-evaluation, which concluded a new or supplemental EA was not needed.
2020 Environmental Assessment for SpaceX Falcon Launches at Kennedy Space Center and Cape Canaveral Air Force Station (2020 EA)	Up to 10 RSR operations of the Dragon reentry vehicle in the Atlantic Ocean per year (plus the use of the Gulf of America and Pacific Ocean as contingency ^a reentry operations for up to 10 and up to 3 reentries per year, respectively).
2024 Environmental Assessment for Reentry, Splashdown, and Recovery Operations of an Inversion Space Company Capsule within the Pacific Ocean off the Coast of Central California	Up to 2 RSR operations of the Ray reentry capsule in the Pacific Ocean.
2025 Environmental Assessment for SpaceX Dragon Reentry Relocation to Pacific Ocean	Up to 10 RSR operations of the Dragon reentry vehicle in the Pacific Ocean.
2026 Environmental Assessment for Reditus Space ENOS Capsule Reentries in the Gulf of America	Up to 12 RSR operations of the ENOS reentry vehicle in the Gulf of America.
2026 Final Environmental Assessment for SpaceX Starfall Reentry Vehicle Operations in the Pacific Ocean	Up to 2 RSR operations of a small reentry vehicle in the Pacific Ocean.

³⁶ 42 U.S.C. § 4336e(1)

^a Contingency = an area that would be used if the nominal landing location was unavailable.

B.2 The Process for Establishing CATEXs

Based on the previous EAs (Table B-1) and associated FONSI, as well as the PEA, FAA has determined the below categories of actions normally do not significantly affect the quality of the human environment. This PEA serves as the written record substantiating FAA's determination that RSR operations as analyzed in this PEA do not have significant effects, individually or in the aggregate (FAA Order 1050.1G, Section 1.4(b)(1)). The FAA's decision document for this PEA "may contain limitations on the application of the CATEX, including within specific geographic areas or habitat types, in the presence or absence of other environmental conditions, duration, associated mitigation measures, and circumstances under which the categorical exclusion would expire or cease to be available" (FAA Order 1050.1G, Section 1.4(b)(1)).

CATEX 1. New Vehicle Operator License or Experimental Permit for Reentry Operations in the Marine Environment

Issuance of FAA vehicle operator licenses or experimental permits for RSR operations within the scope of operations described in Chapter 2, *Description of Proposed Action and Alternatives*, of this PEA. All FAA-licensed or -permitted reentry operations would occur within the study area analyzed in this PEA and the applicant's annual frequency of reentry operations would not exceed the cumulative number of annual FAA-licensed and -permitted reentries described in this PEA.

CATEX 2. Vehicle Operator License or Experimental Permit Renewal for Reentry Operations in the Marine Environment

Renewals of FAA vehicle operator licenses or experimental permits for RSR operations within the scope of operations described in Chapter 2, *Description of Proposed Action and Alternatives*, of this PEA. All FAA-licensed or -permitted reentry operations would occur within the study area analyzed in this PEA and the applicant's annual frequency of reentry operations would not exceed the cumulative number of annual FAA-licensed and -permitted reentries described in this PEA.

CATEX 3. Vehicle Operator License or Experimental Permit Modification for Reentry Operations in the Marine Environment

Modification of FAA vehicle operator licenses or experimental permits for RSR operations within the scope of operations described in Chapter 2, *Description of Proposed Action and Alternatives*, of this PEA. Such modifications might include new splashdown locations within the study area analyzed in this PEA or new expended or reused components within the type and frequency described in Chapter 2.

Per FAA Order 1050.1G, Section 1.4(b)(2), FAA consulted with CEQ on the proposed CATEXs prior to providing public notice. Per FAA Order 1050.1G, Section 1.4(b)(3), FAA is publishing this PEA for public review and provided public notice on the FAA's website.³⁷ Per FAA Order 1050.1G, Section 1.4(b)(4), FAA will update FAA Order 1050.1G, as appropriate, to reflect the establishment of CATEXs through this PEA and FAA's associated decision document.

³⁷ https://www.faa.gov/space/environmental/nepa_docs.

B.3 The Process for Applying CATEXs

When FAA receives a vehicle operator license or experimental permit application involving RSR operations in the marine environment, FAA will determine the appropriate level of NEPA review according to FAA Order 1050.1G, Section 1.2. If FAA determines the applicant's proposal qualifies for a CATEX, FAA will apply the CATEX according to FAA Order 1050.1G, Section 1.4(f), which includes evaluating the action for extraordinary circumstances. This appendix includes a template for the documentation of the FAA's CATEX application (referred to hereafter as the "CATEX Checklist").

First, FAA would compare an applicant's proposed RSR operations to those analyzed in this PEA by filling out Part I of the CATEX Checklist.

- a. If the proposed RSR operations (including reentry vehicle and recovery vessel specifications) are not within those analyzed in this PEA, the CATEX could not be applied. FAA would consider another appropriate level of NEPA review.
- b. If the proposed RSR operations exceed the cumulative number of annual FAA-licensed and -permitted reentries analyzed in the PEA, the CATEX could not be applied. FAA would consider an appropriate level of NEPA review.
- c. If the proposed RSR operations are within those analyzed in the PEA, continue to step #2.

FAA would evaluate the action for extraordinary circumstances per FAA Order 1050.1G, Section 1.4(f), by filling out Part II of the CATEX Checklist. As necessary, FAA and/or the applicant would complete any relevant consultations and coordination (e.g., Endangered Species Act Section 7 consultation), which would be documented in and appended to the completed CATEX Checklist.

- d. Per FAA Order 1050.1G, FAA will determine whether:
 - i. Extraordinary circumstances are not present and the CATEX applies to the action (Section 1.4(f)(1)); or
 - ii. Extraordinary circumstances are present, but the proposed action is not likely to result in reasonably foreseeable adverse significant effects or FAA modifies the proposed action to avoid the significant effects (Section 1.4(f)(2)).

If FAA determines that it cannot apply the CATEX to the proposed action, FAA will prepare an EA or environmental impact statement, as appropriate.

The completed CATEX Checklist will serve as FAA's documentation of its evaluation of the applicability of the CATEX (FAA Order 1050.1G, Section 1.4.(3) and Section 1.4(4)).

B.4 Categorical Exclusion Documentation Checklist

Federal Aviation Administration Office of Commercial Space Transportation

Categorical Exclusion Documentation Checklist for Reentry Operations in the Marine Environment

FAA Official Preparing the Form <i>(Name and Title)</i>
Responsible FAA Official <i>(Name and Title)</i>
Type of Categorical Exclusion Under Review ☐ New Vehicle Operator License or Experimental Permit for Reentry Operations in the Marine Environment ☐ Renewal of Vehicle Operator License or Experimental Permit for Reentry Operations in the Marine Environment ☐ Modification of Vehicle Operator License or Experimental Permit for Reentry Operations in the Marine Environment
<i>Identify additional categorical exclusion(s) under review from the applicable list of FAA categorical exclusions contained in FAA Order 1050.1G, Appendix B, if any.</i>
PART I – COMPARISON OF THE PROPOSED ACTION TO PRIOR ANALYSIS
1) Describe the components of the proposed action:
2) Does the proposed action fall within the study area analyzed in the 2026 PEA (PEA Section 2.2.1)?
3) In considering the maximum number of reentries in the study area, along with other approved vehicle operator licenses for reentry operations in the study area, does the proposed action fall within the operational limitations identified in the 2026 PEA (an annual maximum for all FAA-licensed and -permitted RSR operations of 70 reentries in the Pacific Ocean study area, 22 reentries in the Gulf of America study area, and/or 10 reentries in the Atlantic Ocean study area)? Is there an increase in number of reentries that is outside the scope of the PEA?
4) Does the proposed reentry vehicle fall within the specifications identified in the 2026 PEA (PEA Table 2-1)?
5) Will the proposed action be conducted in accordance with the mitigation measures identified in the 2026 PEA (PEA Section 2.2.4)?
PART II – EXTRAORDINARY CIRCUMSTANCES
<i>An extraordinary circumstance exists if a proposed action involves any of the following circumstances <u>and</u> has the potential for a significant impact. Indicate whether any of the following circumstances are present for the proposed action. For each “yes” response, include an attachment to this form that 1) describes the potential impact, and 2) explains why the extraordinary circumstance will not likely result in reasonably foreseeable adverse</i>

<i>significant effects (per FAA Order 1050.1G, Appendix A), or how the proposed action will be modified to avoid those effects. As needed, provide documentation of consultation with applicable resource agencies. For each "no" response, please provide a brief rationale in the space below.</i>		
(1) An adverse effect on cultural resources protected under the National Historic Preservation Act of 1966, as amended, 54 U.S.C. § 300101 et seq. <i>If "no," provide rationale here:</i> <i>If "yes," provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	Yes ☐	No ☐
(2) An effect on resources protected under Section 4(f) of the Department of Transportation Act. <i>If "no," provide rationale here:</i> <i>If "yes," provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	☐	☐
(3) An effect on a) natural, ecological, or scenic resources of Federal, state, Tribal (including Tribal trust or treaty protected resources), or b) local significance (e.g., federally listed or proposed endangered, threatened, or candidate species, or designated or proposed critical habitat under the Endangered Species Act, 16 U.S.C. §§ 1531-1544). <i>If "no," provide rationale here:</i> <i>If "yes," provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i> <i>If there is a known impact to a listed species, please provide details on the consultation process with FWS or NMFS and any mitigation measures identified to protect the listed species.</i>	☐ ☐	☐ ☐
(4) An effect on the following resources: resources protected by the Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661-667d; wetlands; floodplains; coastal zones; national marine sanctuaries; wilderness areas; National Resource Conservation Service-designated prime and unique farmlands; energy supply and natural resources; resources protected under the Wild and Scenic Rivers Act, 16 U.S.C. §§ 1271-1287 and Coastal Zone Management Act, and rivers or river segments listed on the Nationwide Rivers Inventory (NRI); and solid waste management. <i>If "no," provide rationale here:</i> <i>If "yes," provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	☐	☐

(5) A division or disruption of an established community, or a disruption of orderly, planned development, or an inconsistency with plans or goals that have been adopted by the community in which the project is located. <i>If “no,” provide rationale here:</i> <i>If “yes,” provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	☐	☐
(6) An increase in congestion from surface transportation (by causing decrease in level of service below acceptable levels determined by appropriate transportation agency, such as a highway agency). <i>If “no,” provide rationale here:</i> <i>If “yes,” provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	☐	☐
(7) An effect on noise levels of noise sensitive areas. <i>If “no,” provide rationale here:</i> <i>If “yes,” provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	☐	☐
(8) An effect on air quality or violation of Federal, state, Tribal, or local air quality standards under the Clean Air Act, 42 U.S.C. §§ 7401-7671q. <i>If “no,” provide rationale here:</i> <i>If “yes,” provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	☐	☐
(9) An effect on water quality, sole source aquifers, a public water supply system, or state or tribal water quality standards established under the Clean Water Act, 33 U.S.C. §§ 1251-1387, and the Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-26. <i>If “no,” provide rationale here:</i> <i>If “yes,” provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	☐	☐
(10) Effects on the quality of the human environment that are likely to be highly controversial on environmental grounds.³⁸	☐	☐

³⁸ FAA defines the term “highly controversial on environmental grounds” to mean there is a substantial dispute regarding the analytical outcomes of the environmental review. Controversies on environmental grounds relate to a substantive issue pertaining to the analysis of effects, such as reasonable disagreement over the degree, extent, or nature of a proposed action’s environmental impacts or over the action’s risks of causing environmental harm. Mere opposition is not sufficient for a proposed action or its impacts to be considered highly controversial on environmental grounds. Opposition on environmental grounds by a Federal, state, or local government agency or

<i>If "no," provide rationale here:</i> <i>If "yes," provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>		
(11) Likelihood to be inconsistent with any Federal, state, Tribal, or local law relating to the environmental aspects of the proposed action. <i>If "no," provide rationale here:</i> <i>If "yes," provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	☐	☐
(12) Likelihood to create a significant impact on the human environment, including, but not limited to, actions likely to cause a significant lighting impact on residential areas or commercial use of business properties, likely to cause a significant impact on the visual nature of surrounding land uses, likely to cause environmental contamination by hazardous materials, or likely to disturb an existing hazardous material contamination site such that new environmental contamination risks are created. <i>If "no," provide rationale here:</i> <i>If "yes," provide any rationale that notwithstanding the extraordinary circumstance, the proposed action is no likely to result in reasonably foreseeable adverse significant effect, or how the proposed action can be modified to avoid those effects:</i>	☐	☐
PART III – RECOMMENDATION		
<i>Check one of the following:</i> ☐ No extraordinary circumstances exist, or, if they do, the proposed action has been modified to reduce the potential effects below the level of significance as documented above and in any attachments. ☐ One or more extraordinary circumstances exist as explained in the attached documentation. Therefore, preparation of an EA or EIS is recommended. _____ (Signature of FAA-Preparing Official) (Date)		
Part IV – DECISION		

by a tribe or a substantial number of the persons affected by the action should be considered in determining whether or not reasonable disagreement regarding the impacts of a proposed action exists. However, while a substantial number of persons affected by the action is a consideration, it is not necessarily determinative that extraordinary circumstances exist. FAA Order 1050.1G, Appendix B, Paragraph B-1(b)(10).

Having reviewed the above information and recommendation, it is the FAA's decision that the proposed action:

- ☐ is categorically excluded from further NEPA review (i.e., preparation of an EA or EIS is not required).
- ☐ requires further NEPA review (i.e., preparation of an EA or EIS) to adequately assess the significance of the potential environmental impacts on the quality of the human environment.

(Signature of Responsible FAA Official)

(Date)

Appendix C

Coastal Nonattainment Areas

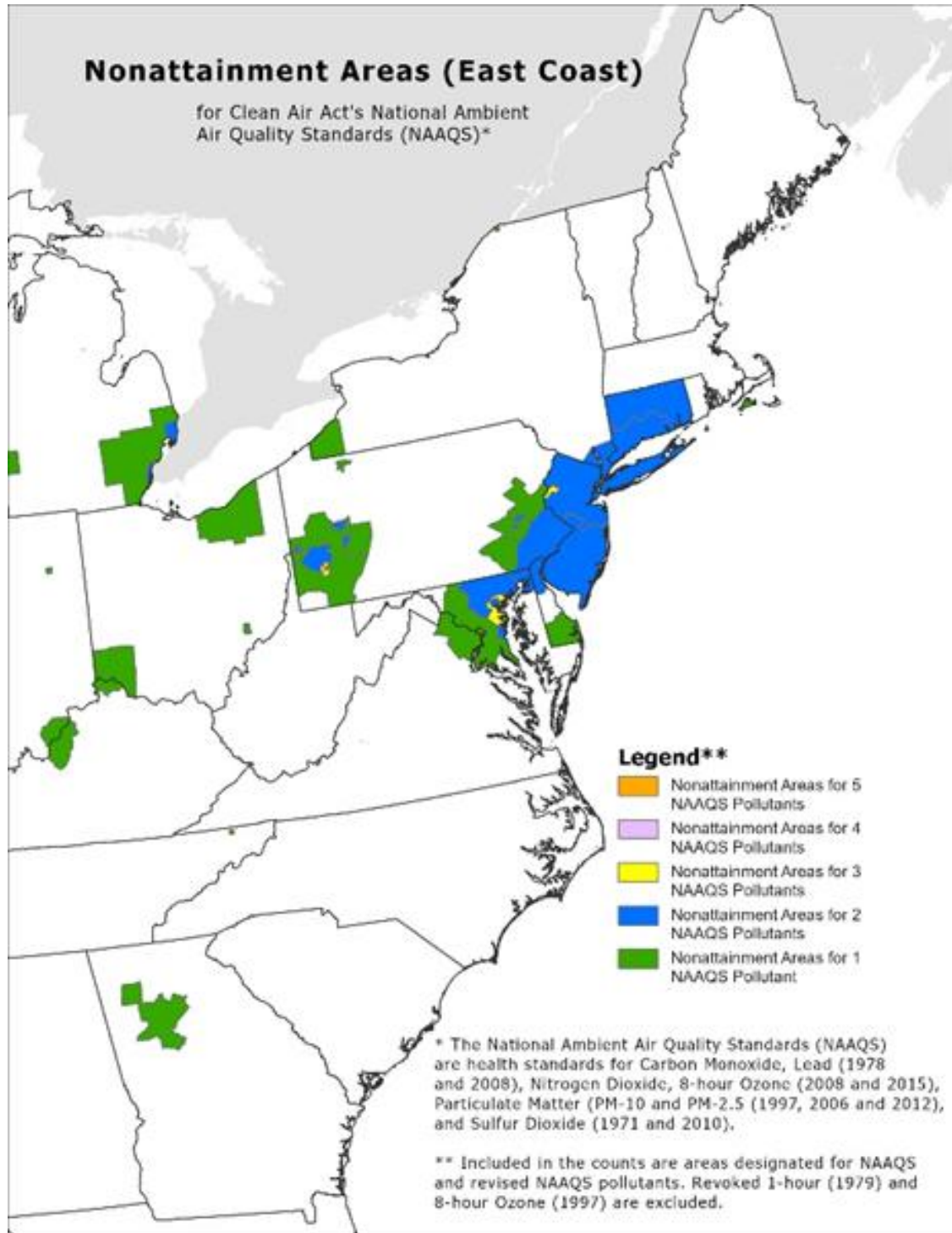


Figure C-1. East Coast Nonattainment Statuses

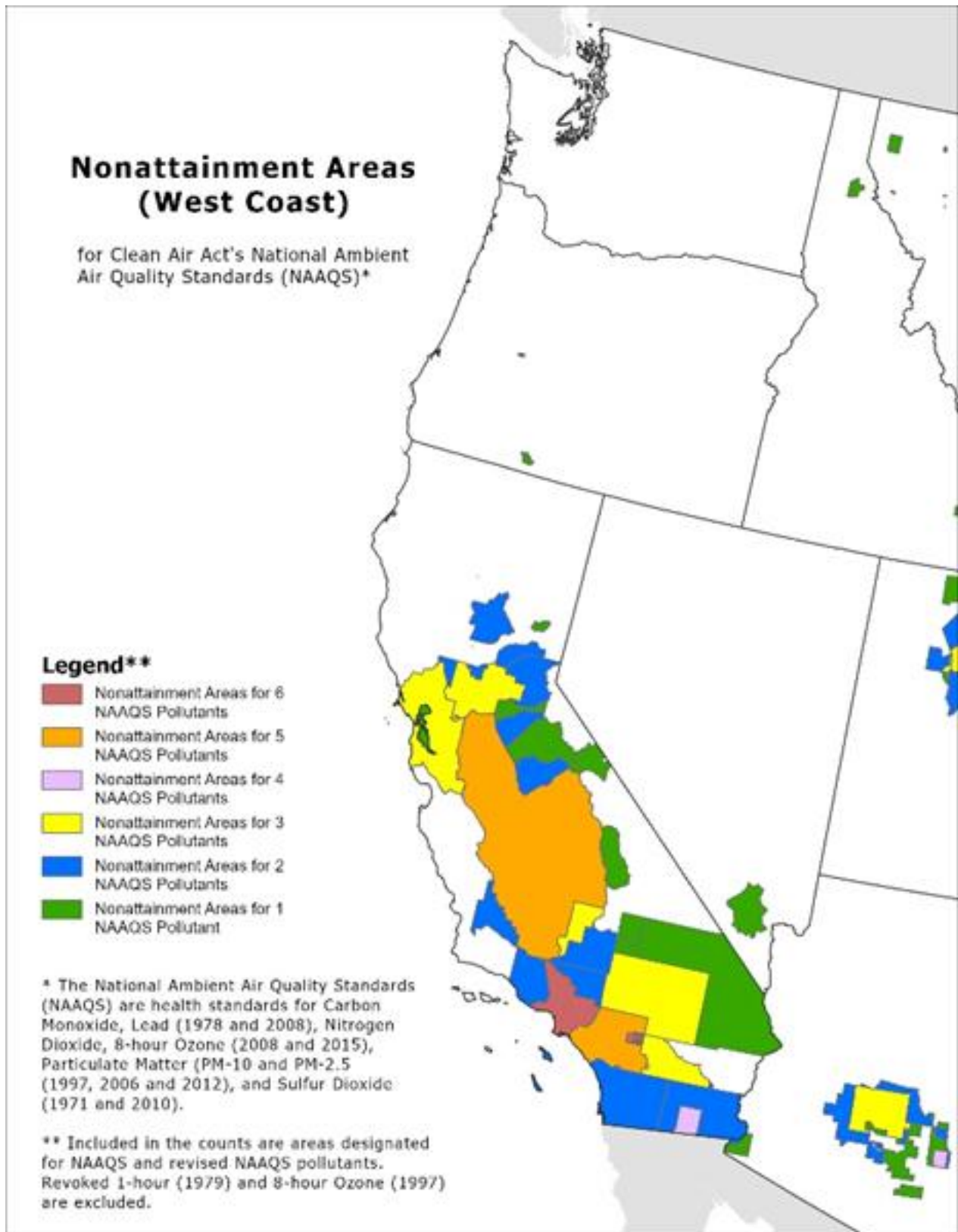


Figure C-2. West Coast Nonattainment Statuses

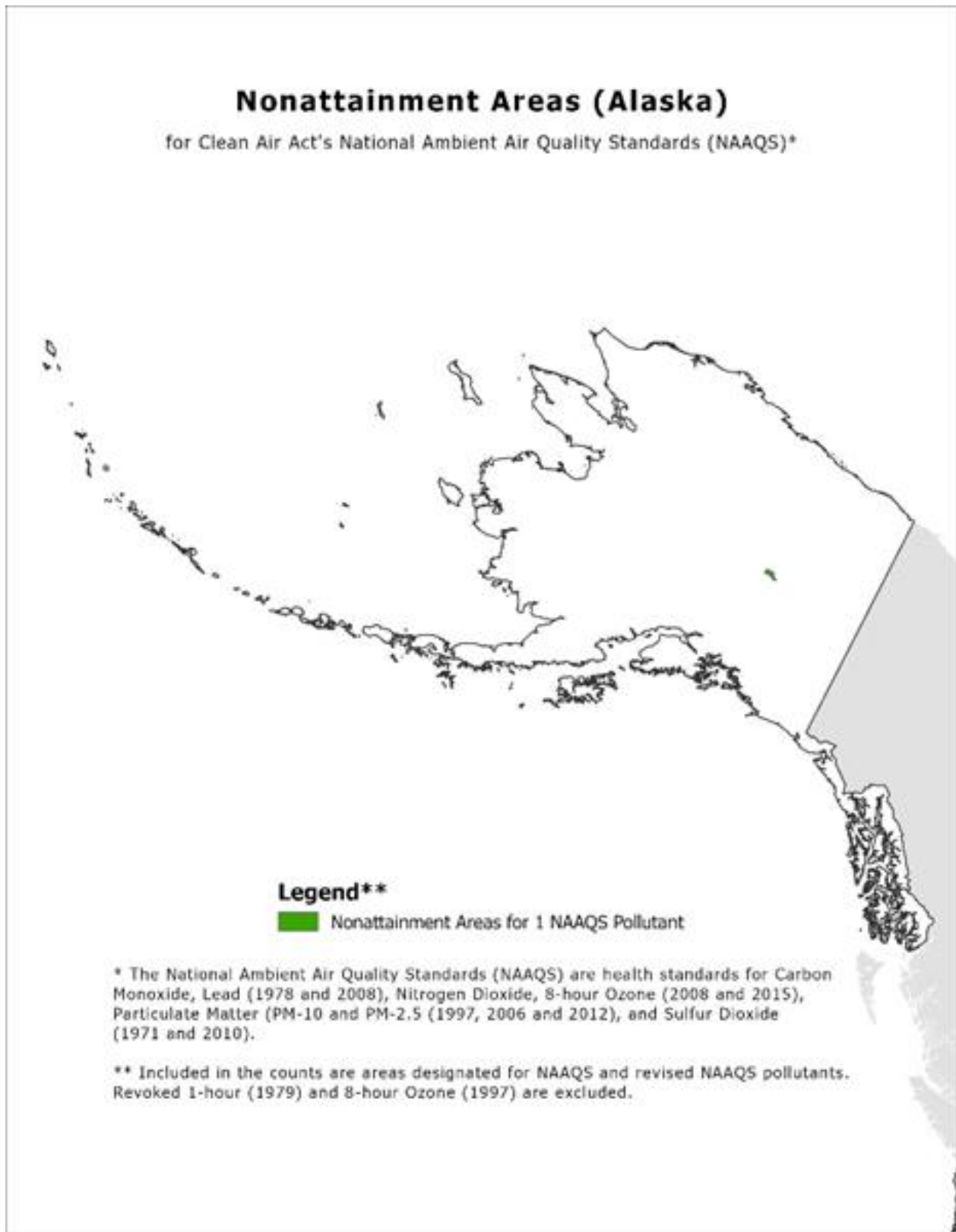


Figure C-3. Alaskan Coast Nonattainment Statuses

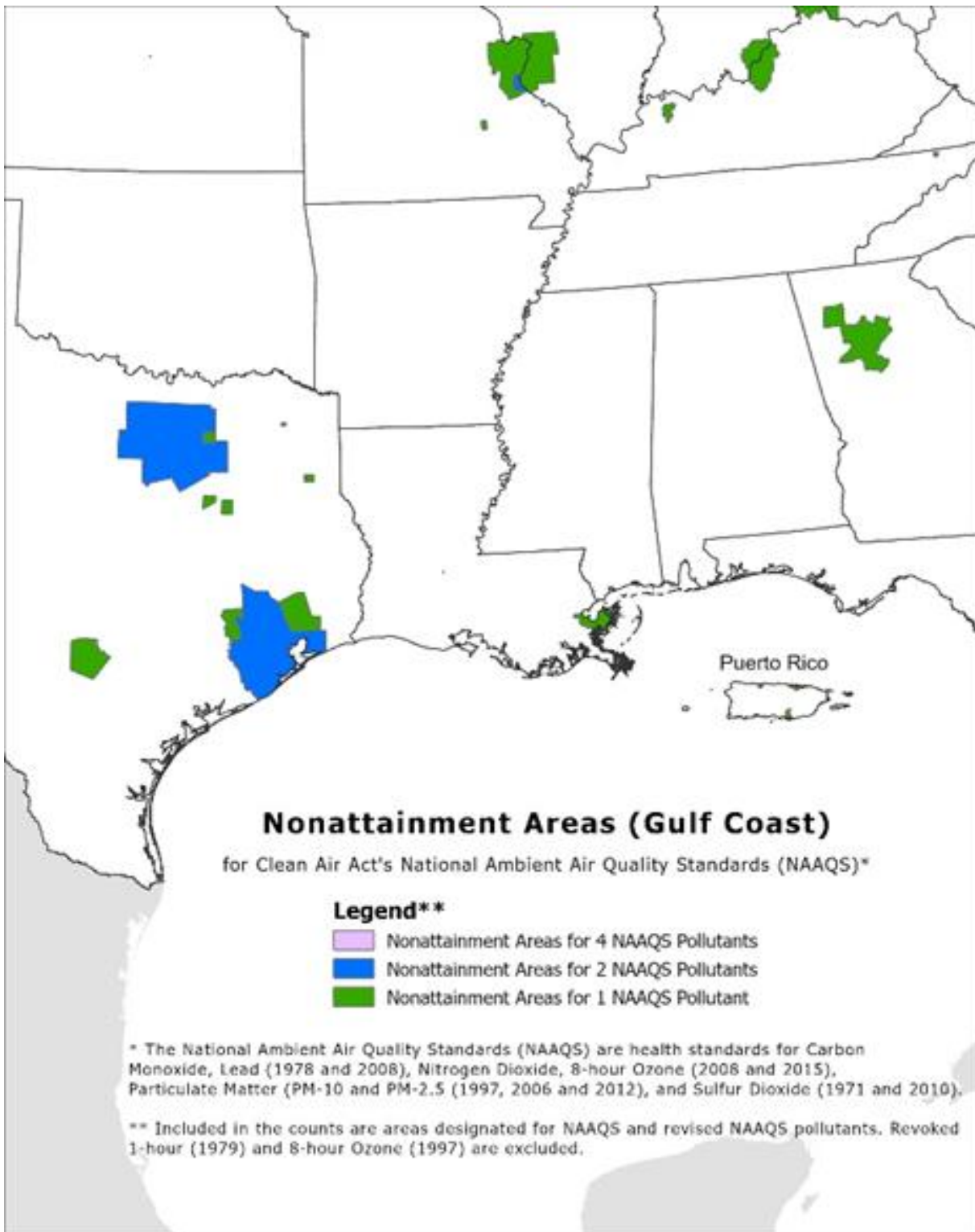


Figure C-4. Gulf Coast Nonattainment Statuses