



January 2019

OFFSHORE OIL SPILLS

Restoration and Federal Research Efforts Continue, but Opportunities to Improve Coordination Remain

Accessible Version

GAO Highlights

Highlights of [GAO-19-31](#), a report to the Chairman, Committee on Energy and Natural Resources, U.S. Senate

Why GAO Did This Study

The *Exxon Valdez* and *Deepwater Horizon* oil spills are two of the largest offshore oil spills in U.S. history, causing long-lasting damage to marine and coastal resources. OPA includes provisions to prevent and respond to such oil spills by authorizing (1) federal-state trustee councils that manage billions of dollars from legal settlements and (2) an interagency committee to coordinate oil pollution research, among other things.

GAO was asked to review the federal government's response, restoration, and research efforts after the *Exxon Valdez* and *Deepwater Horizon* oil spills. This report examines, among other things, (1) how the trustee councils have used the restoration trust funds and the status of restoration and (2) the interagency committee's coordination of oil spill research efforts.

GAO reviewed the councils' plans for the funds and how they were used, federal funding of oil spill research by member agencies, and key laws. Also, GAO evaluated the coordination of such efforts against a leading collaboration practice. GAO interviewed members of the trustee councils and the interagency committee.

What GAO Recommends

GAO recommends, among other things, that the interagency committee coordinate with the trustee councils to support their work and research needs. The agency agreed with GAO's recommendations.

View [GAO-19-31](#). For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov.

January 2019

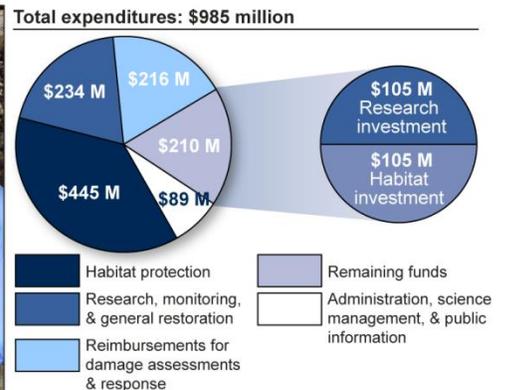
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What GAO Found

The trustee councils, composed of federal and state members, have used portions of the restoration trust funds from the *Exxon Valdez* and *Deepwater Horizon* oil spill settlements to restore natural resources. From October 1992 to January 2018, the Exxon Valdez Oil Spill Trustee Council used about 86 percent of the fund's roughly \$1 billion, primarily on habitat protection and restoration of damaged natural resources. According to the council, all but 5 of the 32 natural resources and human services identified as damaged by the spill have recovered or are recovering. The health of Pacific herring is one example of a resource that has not yet recovered. Further, the presence of lingering oil remains a concern almost 30 years after the spill. In May 2018, GAO accompanied trustee council researchers to the spill area and observed the excavation of three pits that revealed lingering oil roughly 6 inches below the surface of the beach, as captured in the photo below. The Deepwater Horizon Natural Resource Damage Assessment Trustee Council finalized a programmatic restoration plan in 2016; four trustee implementation groups have since issued initial restoration plans for designated restoration areas, and three anticipate issuing restoration plans in 2019 or later. From April 2012 to December 2017, the council used 13 percent of the at least \$8.1 billion restoration trust fund, mostly on habitat protection, enhancing recreation, and marine wildlife and fishery restoration.

A Researcher Collects Lingering Oil from the *Exxon Valdez* Oil Spill on a Beach in Alaska in May 2018 (Left), and the Exxon Valdez Oil Spill Trustee Council Use of Restoration Trust Fund from October 1992 to January 2018 (Right)



Source: GAO and GAO analysis of Exxon Valdez Oil Spill Trustee Council data. | GAO-19-31

The Oil Pollution Act of 1990 (OPA), which was enacted after the *Exxon Valdez* spill in 1989, established the Interagency Coordinating Committee on Oil Pollution Research (interagency committee) to coordinate oil pollution research among federal agencies and with relevant external entities, among other things. However according to the trustee council members that manage the restoration trust funds, the committee does not coordinate with the trustee councils and some were not aware that the interagency committee existed. The research of the member agencies could be relevant to the trustee councils' work on restoration. By coordinating directly with the trustee councils, the interagency committee could ensure better knowledge sharing between groups and leverage its member agencies' resources to inform and support the work of the councils.

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Abbreviations

BP	BP America Production Company
BSEE	Bureau of Safety and Environmental Enforcement
EPA	Environmental Protection Agency
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
NRDA	Natural Resource Damage Assessment
OPA	Oil Pollution Act of 1990
RESTORE Act	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012
RESTORE Council	Gulf Coast Ecosystem Restoration Council
USGS	U.S. Geological Survey

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January 3, 2019

The Honorable Lisa Murkowski
Chairman
Committee on Energy and Natural Resources
United States Senate

Dear Madam Chairman:

In March 1989, the supertanker *Exxon Valdez* ran aground in Alaska's Prince William Sound, spilling an estimated 11 million gallons of oil and contaminating about 1,500 miles of Alaska's south central coastline. At the time, this was the largest offshore oil spill in U.S. history. Enacted following the *Exxon Valdez* oil spill, the Oil Pollution Act of 1990 (OPA) included several provisions to prevent and respond to oil spills, such as requirements to assess damages to natural resources from oil discharges, including spills, and to develop and implement plans for restoration.¹ Approximately 20 years later, in April 2010, an explosion on the BP America Production Company's (BP) leased *Deepwater Horizon* oil rig spilled over 200 million gallons of oil into the Gulf of Mexico, setting a new record as the largest oil spill in U.S. waters.²

OPA established a "polluter pays" system, placing the primary burden of liability and costs of oil spills on the responsible party for the vessel or facility from which oil is discharged. Under this system, the responsible party assumes, up to a specified limit, the burden of paying for spill costs, including both removal costs (for cleaning up the spill) and damage claims (for restoring the environment and paying compensation to parties economically harmed by the spill). Above specified limits, a responsible

¹Pub. L. No. 101-380, 104 Stat. 484 (1990). As defined by regulation, restoration is any action (or alternative) or combination of actions (or alternatives) to restore, rehabilitate, replace, or acquire the equivalent of injured natural resources and services. 15 C.F.R. § 990.30.

²BP Exploration & Production, Inc. and BP America Production Company are direct or indirect wholly-owned subsidiaries of BP p.l.c. For purposes of this report, unless otherwise referring to specific subsidiaries or affiliates, we refer to "BP" as the BP entity responsible for payment under the civil settlement and criminal plea agreement stemming from the *Deepwater Horizon* incident.

party is no longer financially liable, although there are exceptions if, for example, the oil discharge is the result of gross negligence.

Following initial response and cleanup efforts, restoration activities related to a significant offshore oil spill, such as those from *Exxon Valdez* or *Deepwater Horizon*, can endure for decades. Under OPA, federal, state, tribal, and foreign government officials may be designated to act on behalf of the public as trustees of natural resources. In the wake of both oil spills, federal and state trustees entered into legal settlements with responsible parties to resolve certain claims. In October 1992, the federal government and the state of Alaska created the Exxon Valdez Oil Spill Trustee Council (Exxon Valdez Trustee Council) to administer the \$900 million civil settlement designated for cleanup costs, damage assessment, litigation, and restoration after the *Exxon Valdez* oil spill.³ In April 2016, the federal government and affected states established a memorandum of understanding that created the Deepwater Horizon Natural Resource Damage Assessment Trustee Council (Deepwater Horizon Trustee Council) to administer the eventual \$8.8 billion

³The members of the Exxon Valdez Trustee Council are the Attorney General of the state of Alaska, the Commissioner of the Alaska Department of Environmental Conservation, the Commissioner of the Alaska Department of Fish and Game, the Secretary of Agriculture, the Secretary of the Interior, and the Administrator of the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce.

restoration fund⁴ to address natural resource damages resulting from the *Deepwater Horizon* oil spill.⁵

OPA also established the Interagency Coordinating Committee on Oil Pollution Research (interagency committee) to coordinate a comprehensive program of oil pollution research⁶, technology development, and demonstration among federal agencies in cooperation and coordination with external entities, such as industry, universities, research institutions, state governments, and other nations, as

⁴This amount includes up to \$700 million in potential additional payments for unknown conditions and adaptive management, intended to support future restoration and adaptive management by addressing conditions unknown at the time of the settlement. However, this money cannot be demanded before January 1, 2026; therefore, this report considers only the \$8.1 billion minimum settlement amount when calculating the amount of funds used.

⁵The April 2016 memorandum of understanding superseded and replaced a November 2010 memorandum of understanding, which first created the Deepwater Horizon Trustee Council. The members of the Deepwater Horizon Trustee Council are the Department of the Interior, represented by the U.S. Fish and Wildlife Service, the Bureau of Land Management, and the National Park Service; the Department of Commerce, represented by NOAA; the Environmental Protection Agency (EPA); the Department of Agriculture; the Department of Environmental Protection and the Fish and Wildlife Conservation Commission of the state of Florida; the Department of Conservation and Natural Resources and the Geological Survey of the state of Alabama; the Department of Environmental Quality of the state of Mississippi; the Coastal Protection and Restoration Authority, Oil Spill Coordinator's Office, Department of Environmental Quality, Department of Wildlife and Fisheries, and Department of Natural Resources of the state of Louisiana; and the Commission on Environmental Quality, the General Land Office, and the Parks and Wildlife Department of the state of Texas.

⁶OPA established the interagency committee to coordinate a comprehensive program of oil pollution research. However, the interagency committee's research and technology plan refers to both oil pollution research and oil spill research. For the purpose of our report, we refer to oil pollution research when we describe OPA and the interagency committee's statutory responsibilities and to oil spill research in all other instances.

appropriate.⁷ Federal agencies of the interagency committee conduct and fund research projects related to preventing, preparing for, responding to, and restoring the environment after oil spills.⁸ Later in this report, we describe in more detail the extent of research funded by the interagency committee. In accordance with OPA, the chair of the interagency committee—a representative of the U.S. Coast Guard (Coast Guard)—must submit a report to Congress every 2 years on its past and planned activities for oil pollution research. Under OPA, one of the interagency committee’s responsibilities is to coordinate with federal agencies and external entities on an oil pollution research and development program that includes methods to restore and rehabilitate natural resources damaged by oil spills.

In March 2011, we reported that the interagency committee had taken limited actions to foster communication and coordination among member agencies and nonfederal stakeholders.⁹ Among other things, we recommended that the Commandant of the Coast Guard direct the chair of the interagency committee, in coordination with member agencies, to provide a status update regarding the revisions of the committee’s research plan and establish a more systematic process to identify and consult with key nonfederal stakeholders. The agency agreed with the recommendations, and the interagency committee implemented them by publishing an updated Oil Pollution Research and Technology Plan

⁷Under OPA, the interagency committee is to include representatives from the U.S. Coast Guard in the Department of Homeland Security, the Department of Commerce (including the National Oceanic and Atmospheric Administration and the National Institute of Standards and Technology), the Department of Energy, the Department of the Interior (including the Bureau of Safety and Environmental Enforcement, the Bureau of Ocean Energy Management, and the U.S. Fish and Wildlife Service), the Department of Transportation (including the Maritime Administration and the Pipeline and Hazardous Materials Safety Administration), the Department of Defense (including the Army Corps of Engineers and the Navy), the Department of Homeland Security (including the United States Fire Administration in the Federal Emergency Management Agency), the Environmental Protection Agency, the National Aeronautics and Space Administration, the United States Arctic Research Commission, and such other federal agencies the President may designate.

⁸Interagency committee members are not limited to funding research on one incident or spill. In contrast, the Natural Resource Damage Assessment trustee councils cannot fund basic research with restoration trust funds, but can fund research that directly contributes to restoring resources damaged by a specific spill.

⁹GAO, *Federal Oil and Gas: Interagency Committee Needs to Better Coordinate Research on Oil Pollution Prevention and Response*, [GAO-11-319](#) (Washington, D.C.: Mar. 25, 2011).

(research and technology plan) that includes a retrospective analysis of completed research as well as a forecast of new research needs.¹⁰ In addition, the interagency committee has employed several sources of information to better understand ongoing research needs and activities within industry, academia, and the government.

To help inform offshore oil spill response efforts and decision making, government, industry, and academic scientists conduct research on the use and effect of various response techniques in different situations and environments, such as the icy waters of the Alaskan Arctic and the deep waters of the Gulf of Mexico. One such response technique used to manage the environmental impacts after the *Deepwater Horizon* oil spill was the application of chemical dispersants.¹¹ In May 2012, we reported on the use of dispersants and recommended that the Commandant of the Coast Guard direct the chair of the interagency committee in coordination with member agencies to, among other things, identify information on key dispersant research in its research and technology plans and periodically update and disseminate this information in its biennial reports to Congress.¹² We also recommended that the application of dispersants in subsurface and Arctic conditions be among the areas prioritized in future research. The member agencies generally concurred with our recommendations. In its research and technology plan for fiscal years 2015 through 2021, the interagency committee identified dispersants as one of the committee's standing research areas, specifically noting the use of dispersants in cold weather conditions and deep sea environments.

You asked us to review issues related to the federal government's response, restoration, and research efforts following the *Exxon Valdez* and *Deepwater Horizon* oil spills. This report examines (1) how the Natural Resource Damage Assessment (NRDA) trustee councils have used the restoration trust funds from the *Exxon Valdez* and *Deepwater Horizon* oil spills and the status of the restoration efforts, (2) the status of

¹⁰See Interagency Coordinating Committee on Oil Pollution Research, *Oil Pollution Research and Technology Plan Fiscal Years 2015-2021* (September 2015).

¹¹Dispersants help break down oil into small droplets that can more easily mix into the water below the surface, increasing biodegradation rates and potentially decreasing the impact of spilled oil on the shoreline.

¹²GAO, *Oil Dispersants: Additional Research Needed, Particularly on Subsurface and Arctic Applications*, [GAO-12-585](#) (Washington, D.C.: May 30, 2012).

the interagency committee's oil spill research efforts and how coordination of such efforts has changed since we last reported on them in March 2011, and (3) what literature suggests about the effectiveness of various oil spill response techniques in the Arctic and the Gulf of Mexico.

To examine how the NRDA trustee councils used the restoration funds from the *Exxon Valdez* oil spill (from October 1992 to January 2018) and *Deepwater Horizon* oil spill (from April 2012 to December 2017) for restoration and the status of the restoration efforts, we obtained data from each trustee council on the amount of funds (1) ordered by the settlement for each restoration type; (2) authorized by the trustees for, but not yet spent on, restoration activities (authorizations); (3) spent on restoration activities (expenditures); and (4) not yet authorized for restoration activities (remaining balance) through calendar year 2017 for *Deepwater Horizon* and through January 31, 2018, for *Exxon Valdez*.¹³ We assessed the reliability of the financial data that the NRDA trustee councils provided by, among other things, reviewing the annual reports for each trustee council and interviewing knowledgeable council staff about the steps they took to maintain these data and determined that the data were sufficiently reliable for the purposes of our report.¹⁴ We also examined the approved restoration plans and, when available, annual reports on restoration activities, as well as reports and scientific studies that the trustee councils funded.¹⁵ We met with officials from the Exxon Valdez Trustee Council to discuss the distribution of settlement money for restoration purposes after the *Exxon Valdez* oil spill, and with officials from the Deepwater Horizon Trustee Council, the Gulf Coast Ecosystem Restoration Council (RESTORE Council), and the National Fish and Wildlife Foundation to discuss the distribution of settlement money for restoration purposes after

¹³Our review focuses on the role of the NRDA trustee councils; therefore, we excluded the criminal fine and restitution payment for *Exxon Valdez* and the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012 (RESTORE Act) funding and the criminal payments paid to the National Fish and Wildlife Foundation and other entities for *Deepwater Horizon* from the scope of this review.

¹⁴The Exxon Valdez Trustee Council has submitted all of its annual financial statements to a third-party audit. The Deepwater Horizon trustees are each responsible for procuring financial audits no less than once every 3 years, with the first audit occurring in 2017, according to the trustee council's standard operating procedures.

¹⁵Under OPA, damages for injuries to natural resources and services resulting from an oil spill incident must be based on a restoration plan developed after adequate public notice, opportunity for a hearing, and consideration of all public comments.

the *Deepwater Horizon* oil spill.¹⁶ We also traveled to Alaska and the Gulf of Mexico to better understand the status of restoration.

To examine the status of federal oil spill research efforts by the interagency committee and how coordination of such efforts has changed since we last reported on it in March 2011, we requested funding data¹⁷ and project information on oil spill research from all 15 member agencies of the interagency committee.¹⁸ We received data from the nine member agencies that reported funding oil spill research projects from fiscal years 2011 through 2017.¹⁹ These agencies provided data on agency expenditures on oil spill research and the research category of any projects funded. We assessed the reliability of these data by, among other things, reviewing related documentation and interviewing knowledgeable agency officials from the nine member agencies that provided data on the steps they took to maintain this information and determined that in most cases the data were sufficiently reliable for the purposes of our report.

We also interviewed officials at each of the 15 member agencies and compared their coordination practices to one of our federal leading

¹⁶After the *Deepwater Horizon* oil spill, the RESTORE Act established a new trust fund for programs, projects, and activities that restore and protect the environment and economy of the Gulf Coast region. In addition to creating the trust fund, the RESTORE Act established the RESTORE Council, which includes the Governors of Alabama, Florida, Louisiana, Mississippi and Texas; the Secretaries of the Departments of Agriculture, the Army, Commerce, Homeland Security, and the Interior; and the Administrator of the Environmental Protection Agency.

¹⁷For this report we use “funded” to describe money spent of oil spill research projects. We asked member agencies to include the total number of research projects funded from fiscal years 2011 through 2017.

¹⁸As of November 2018, the 15 member agencies of the interagency committee are the Coast Guard, NOAA, EPA, the Bureau of Safety and Environmental Enforcement (BSEE), the U.S. Army Corps of Engineers, the Pipeline and Hazardous Materials Safety Administration, the U.S. Fish and Wildlife Service, the U.S. Navy, the National Aeronautics and Space Administration (NASA), the Department of Energy, the U.S. Fire Administration, the Maritime Administration, the National Institute of Standards and Technology, the Bureau of Ocean Energy Management, and the U.S. Arctic Research Commission.

¹⁹The nine member agencies that reported funding oil spill research from fiscal years 2011 through 2017 were the Bureau of Ocean Energy Management, BSEE, the Coast Guard, the Department of Energy, EPA, NASA, NOAA, the Pipeline and Hazardous Materials Safety Administration, and the U.S. Arctic Research Commission. The other six member agencies reported that they did not fund or conduct oil spill research from fiscal years 2011 through 2017.

practices for interagency collaboration to evaluate the interagency committee's efforts to coordinate oil spill research.²⁰ We chose to focus on the collaboration practice pertaining to participants. In addition, we reviewed the 2013 interagency committee charter, the committee's most recent biennial reports to Congress covering fiscal years 2008 through 2017, and the committee's third multi-year research and technology plan for fiscal years 2015 through 2021. We also attended two committee meetings and reviewed minutes of eight past meetings. We reviewed OPA's provisions that established and govern the interagency committee's coordination efforts and membership, as well as various related executive documents.

To examine what literature suggests about the effectiveness of various oil spill response techniques in the Arctic and the Gulf of Mexico, we conducted a literature search for studies that analyzed and summarized the effectiveness of various oil spill response techniques in those regions. We identified existing literature from 1989 (the year of the *Exxon Valdez* oil spill) to March 2018 by conducting searches of various databases, such as Scopus and ProQuest. We chose to focus on three primary response techniques—mechanical recovery, in-situ burning, and the use of dispersants—used to clean up offshore oil spills. Our subject matter expert helped the team narrow the list of literature results and we relied on 16 studies and articles that we determined were relevant to our research objective. These studies and articles covered both regions and the three response techniques, but each study did not cover the entire range of these topics. For example, some of the studies were focused on one response technique in a specific region or environment. We supplemented the list of studies from these databases with information from our previous reports and those of the Congressional Research Service, the National Academies Press, the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), the Coast Guard, the American Academy of Microbiology, and the Arctic Oil Spill Response Joint Industry Program. For a complete list of the literature, see the bibliography. We shared our summary of the literature search findings with agency officials representing some of the

²⁰GAO, *Managing for Results: Key Considerations for Implementing Interagency Collaborative Mechanisms*, [GAO-12-1022](#) (Washington, D.C.: Sept. 27, 2012). Because OPA requires coordination of the interagency committee, we use the term coordination to describe the committee's efforts and the term collaboration when referring to our prior work on collaboration leading practices. In our prior work, we use "collaboration" broadly to include interagency activities that others have variously defined as "cooperation," "coordination," "integration," or "networking."

interagency committee members and included their perspectives where relevant. We did not independently evaluate the effectiveness of these response techniques.

For more details on our objectives, scope, and methodology, see appendix I.

We conducted this performance audit from July 2017 to January 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

OPA amended the Clean Water Act and established provisions expanding and consolidating the federal government's authority to prevent and respond to oil spills. This includes providing the federal government with the authority to perform cleanup immediately after a spill using federal resources, monitor the response efforts of the spiller, or direct the spiller's cleanup activities. OPA also established a "polluter pays" system, placing the primary burden of liability and costs of oil spills on the responsible party for the vessel or facility from which oil is discharged. Under this system, the responsible party assumes, up to a specified limit, the burden of paying for spill costs, including both removal costs (for cleaning up the spill) and damage claims (for restoring the environment and paying compensation to parties economically harmed by the spill).

OPA authorized the use of the Oil Spill Liability Trust Fund to fund up to \$1 billion per spill incident for pollution removal costs and damages resulting from oil spills and mitigation of a substantial threat of an oil spill in navigable U.S. waters when a responsible party cannot or does not pay

for the cleanup.²¹ After the *Deepwater Horizon* oil spill, the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012 (RESTORE Act) established a new trust fund for programs, projects, and activities that restore and protect the environment and economy of the Gulf Coast region as well as the RESTORE Council, which is to summarize its activities for each calendar year's activities in an annual report to Congress.

In addition, NOAA finalized regulations in 1996 for assessing natural resource damages resulting from a discharge or substantial threat of a discharge of oil.²² The NRDA regulations recognize that OPA provides for designating federal, state, and tribal officials as natural resource trustees and authorizes them to make claims against the parties responsible for the injuries.^{23, 24} Under NRDA regulations, a trustee council's work usually occurs in three steps: (1) a pre-assessment phase, (2) the restoration planning phase, and (3) the restoration implementation phase.²⁵ During the pre-assessment phase the trustees are to determine whether they have jurisdiction to pursue restoration. In the restoration planning phase the trustees are to evaluate information on potential injuries and use that information to determine the need for, type of, and scale of restoration. Finally, the restoration implementation phase describes the process for implementing restoration.

Under OPA, federal, state, tribal, and foreign government officials may be designated to act on behalf of the public as trustees of natural resources. In the wake of both the *Exxon Valdez* and *Deepwater Horizon* oil spills, federal and state trustees entered into legal settlements with responsible

²¹The Coast Guard administers the fund through its National Pollution Funds Center. We previously examined the Coast Guard's management of the fund and made several recommendations to address uncertainty regarding future funding and the Coast Guard's internal controls for oil removal disbursements, among other things. GAO, *U.S. Coast Guard National Pollution Funds Center: Improved Controls Needed for Oil Removal Disbursements and Action Needed for Sustainable Funding*, [GAO-15-682](#), (Washington, D.C.: Sept. 15, 2015).

²²61 Fed. Reg. 440 (Jan. 5, 1996). We refer to these regulations as the NRDA regulations.

²³The NRDA regulations define injury as an observable or measurable adverse change in a natural resource or impairment of a natural resource service.

²⁴15 C.F.R. 990.11.

²⁵15 C.F.R. 990.12.

parties to resolve certain claims. The Exxon Valdez Trustee Council is in the restoration implementation phase, while the Deepwater Horizon Trustee Council is in both the restoration planning and implementation phases. The National Oil and Hazardous Substances Pollution Contingency Plan, commonly known as the National Contingency Plan, contains the federal government's framework and operative requirements for preparing and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. It establishes that federal oil spill response authority is determined by the location of the spill: the Coast Guard has response authority in the U.S. coastal zone, and EPA covers the inland zone.²⁶ In addition, NOAA is to provide scientific analysis and consultation during oil spill response activities in the coastal zones.

Exxon Valdez Oil Spill

The *Exxon Valdez* oil spill in Alaska's Prince William Sound in 1989 contaminated portions of national wildlife refuges, national and state parks, a national forest, and a state game sanctuary—killing or injuring thousands of sea birds, marine mammals, and fish and disrupting the ecosystem in its path. In October 1991, the U.S. District Court for the District of Alaska approved a civil settlement and criminal plea agreement among Exxon, the federal government, and the state of Alaska for recovery of natural resource damages resulting from the oil spill. Exxon agreed to pay \$900 million in civil claims in 11 annual payments and \$125 million to resolve various criminal charges.²⁷

In August 1991, the federal government and the state of Alaska signed a memorandum of agreement and consent decree to act as co-trustees in collecting and using natural resource damage payments from the spill. The 1991 memorandum states that all decisions related to injury

²⁶The terms inland zone and coastal zone are defined in the National Contingency Plan (40 C.F.R. § 300.5). The coastal zone covers all waters subject to the tide; the Great Lakes; specified ports and harbors on inland rivers; waters of the contiguous zone; other waters of the high seas subject to the National Contingency Plan; and the land surface or land substrata, ground waters, and ambient air proximal to those waters. The inland zone refers to the environment inland of the coastal zone excluding the Great Lakes and specified ports and harbors on inland rivers. Spills in inland waters can potentially affect coastal waters and ecosystems, particularly if a spill occurs in water systems near the coast.

²⁷Of the \$125 million, \$25 million was a criminal fine and \$100 million was restitution for the impact of the violations.

assessment, restoration activities, or other use of the natural resource damage payments are to be made by unanimous agreement of the trustees. According to the memorandum, the trustees are to use the natural resource damage payments to restore, replace, rehabilitate, enhance, or acquire the equivalent of the natural resources injured as a result of the oil spill and the reduced or lost services provided by such resources. The memorandum also recognized that EPA was designated to coordinate restoration activities on behalf of the federal government. In 1992, the trustees established the Exxon Valdez Trustee Council to ensure coordination and cooperation in restoring the natural resources injured, lost, or destroyed by the spill.

In 1994, the Exxon Valdez Trustee Council prepared a restoration plan for use of the funds, which consisted of five categories: (1) general restoration; (2) habitat protection and acquisition; (3) monitoring and research; (4) restoration reserve; and (5) public information, science management, and administration.²⁸ The restoration plan noted that in addition to restoring natural resources, funds may be used to restore reduced or lost services (including human uses) from injured natural resources, which includes subsistence, commercial fishing, recreation, and tourism services. The Exxon Valdez Trustee Council is advised by members of the public and a panel of scientists, and its Executive Director manages the day-to-day administrative functions. The Exxon Valdez Trustee Council has published documents that are on the council's public website, such as the Injured Resources and Services list (current as of 2014), lingering oil updates (current as of 2016), annual reports (current as of 2018), and annual project work plans (current as of 2018).

Deepwater Horizon Oil Spill

The *Deepwater Horizon* oil spill in the Gulf of Mexico in 2010 resulted in the tragic loss of 11 lives and a devastating environmental impact and affected the livelihoods of thousands of Gulf Coast citizens and

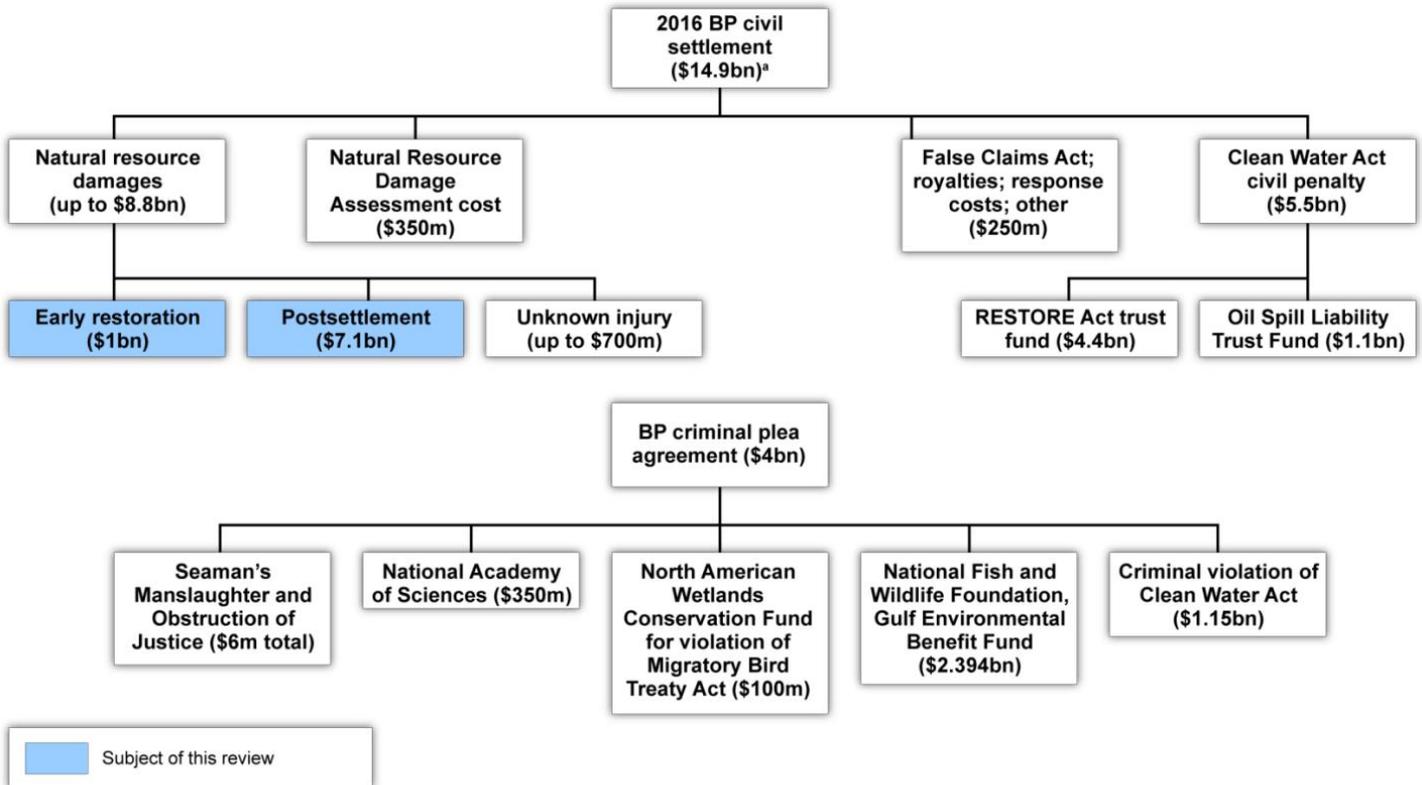
²⁸Exxon Valdez Oil Spill Trustee Council, *Exxon Valdez Oil Spill Restoration Plan* (Anchorage, Alaska: November 1994). Under the terms of the consent decree for the settlement, in addition to providing for the restoration of injured natural resources, the \$900 million civil settlement payments were to cover the costs for spill response and cleanup, damage assessment, and litigation. As of early 2018, the governments received \$177 million as reimbursement for damage assessments and response, including cleanup and litigation, and Exxon received roughly \$40 million as reimbursement for cleanup work it conducted in 1991 and 1992.

businesses. In April 2016, BP, the federal government, and the five Gulf Coast states agreed to a settlement resolving multiple claims for federal civil penalties and natural resource damages related to the spill totaling up to \$14.9 billion.²⁹ Under the terms of the consent decree for the settlement, BP must pay up to \$8.8 billion in natural resource damages under OPA, which includes \$1 billion BP previously committed to pay for early restoration projects, and up to \$700 million to address injuries that were unknown to the trustees as of July 2, 2015, including for any associated Natural Resource Damage assessment and planning activities, or to adapt, enhance, supplement, or replace restoration projects or approaches that the trustees initially selected. BP is to make these payments into the Deepwater Horizon Oil Spill Natural Resource Damages Fund managed by the Department of the Interior (Interior), to be used jointly by the federal and state trustees of the Deepwater Horizon Trustee Council for restoration of injured or lost natural resources.

Two additional, separate restoration funds are to receive money from the BP civil and criminal penalties: (1) the Gulf Coast Restoration Trust Fund established under the RESTORE Act is to receive 80 percent of the \$5.5 billion Clean Water Act civil penalty paid by BP to support environmental restoration and economic recovery projects in the Gulf Coast region and (2) the Gulf Environmental Benefit Fund managed by the nonprofit National Fish and Wildlife Foundation is to receive \$2.394 billion in criminal penalties. For more information on the amount and distribution of the BP civil and criminal payments, see figure 1.

²⁹In a separate, parallel agreement with the Gulf Coast states, BP agreed to pay up to \$5.9 billion to resolve economic damages claims of state and local governments, bringing the total for all civil claims to \$20.8 billion.

Figure 1: Distribution of BP’s *Deepwater Horizon* Oil Spill Civil and Criminal Penalties



bn: billion
 BP: BP America Production Company
 m: million

NOAA: National Oceanic and Atmospheric Administration
 RESTORE Act: Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012

Source: GAO analysis of Department of Justice and RESTORE Council data. | GAO-19-31

^aThere was a separate agreement for state and local economic claims; however, we excluded it from the figure because it was outside the scope of our review.

Prior to reaching the settlement in 2016, BP signed an agreement in April 2011 to provide \$1 billion toward early restoration projects in the Gulf of Mexico to address injuries to natural resources caused by the spill. Early restoration projects may be developed prior to the completion of the injury assessment, which can take months or years to complete. Payments by BP for early restoration projects are counted towards its liability for the \$8.8 billion in natural resource damages resulting from the spill.

The designated trustees are to administer these payments for natural resources, according to OPA. The designated trustees include federal officials from Interior, NOAA, the U.S. Department of Agriculture, and

EPA, as well as state officials from the five Gulf States that were affected by the spill—Alabama, Florida, Louisiana, Mississippi, and Texas. In February 2016, the Deepwater Horizon Trustee Council finalized the Programmatic Damage Assessment and Restoration Plan (programmatic restoration plan) that provided the council's injury assessment and proposed a framework for identifying and developing project-specific restoration plans.³⁰ The five goals of the programmatic restoration plan are to (1) restore and conserve habitat; (2) restore water quality; (3) replenish and protect living coastal and marine resources; (4) provide and enhance recreational opportunities; and (5) provide for monitoring, adaptive management, and administrative oversight to support restoration implementation. According to the 2016 programmatic restoration plan, the Deepwater Horizon Trustee Council is to coordinate with other Deepwater Horizon restoration programs, such as those funded by the RESTORE Act, the National Fish and Wildlife Foundation, and other entities.

The 2016 programmatic restoration plan established Trustee Implementation Groups for each of the seven designated restoration areas—one for each of the five Gulf States, the Region-Wide implementation group, and the Open Ocean implementation group.³¹ Each trustee implementation group is to plan, decide on, and implement restoration activities, including monitoring and adaptive management, for the funding that the consent decree allocated to its restoration area. Federal trustees serve in all the trustee implementation groups, and state trustees serve on the Region-Wide implementation group and the trustee implementation groups for their states; decisions are to be made by consensus. The Deepwater Horizon Trustee Council is to coordinate the work of the trustee implementation groups by establishing standard procedures and practices to ensure consistency in developing and implementing restoration activities.

³⁰Deepwater Horizon Natural Resource Damage Assessment Trustees, *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Silver Spring, Maryland: Feb. 2016).

³¹In addition, the 2016 programmatic restoration plan established the Unknown Conditions and Adaptive Management implementation group, for which funding was set aside for use in the future.

Interagency Coordinating Committee on Oil Pollution Research

OPA created the interagency committee to provide a comprehensive, coordinated federal oil pollution research program and promote cooperation with industry, universities, research institutions, state governments, and other nations through information sharing, coordinated planning, and joint funding of projects. It also designated member agencies and authorized the President to designate other federal agencies as members of the interagency committee. As of November 2018, the interagency committee consisted of 15 federal members representing independent agencies, departments, and department components. OPA directs that a representative from the Coast Guard serve as the chair, and the interagency committee charter designates that a representative from NOAA, EPA, or the Bureau of Safety and Environmental Enforcement (BSEE) serve as the vice-chair and that the committee's Executive Director provide staff support. The interagency committee's charter notes that it shall meet at least semi-annually or at the decision of the chair. According to OPA, the chair's duties include reporting biennially to Congress on the interagency committee's activities related to oil pollution research, development, and demonstration programs.³² OPA also required the interagency committee to prepare and submit a research and technology plan, which has been updated periodically.

In September 2015, the interagency committee released the research and technology plan for fiscal years 2015 through 2021. This research and technology plan updates the interagency committee's 1992 plan, revised in 1997, and provides a new baseline of the nation's oil pollution research needs. The plan is primarily directed at federal agencies with responsibilities for conducting or funding such research, but it can also serve as a research planning guide for nonfederal stakeholders such as, industry, academia, state governments, research institutions, and other nations, according to interagency committee documents. The 2015 research and technology plan established a common language and planning framework to enable researchers and interested parties to identify and track research in four classes or categories that represent general groupings of oil spill research:

³²As of November 2018, the most recent biennial report to Congress by the interagency committee covers fiscal years 2016 and 2017 and was published on November 7, 2018.

- **Prevention:** Research that supports developing practices and technologies designed to predict, reduce, or eliminate the likelihood of discharges or minimize the volume of oil discharges into the environment.
- **Preparedness:** Research that supports the activities, programs, and systems developed prior to an oil spill to improve the planning, decision-making, and management processes needed for responding to and recovering from oil spills.
- **Response:** Research that supports techniques and technologies that address the immediate and short-term effects of an oil spill and encompasses all activities involved in containing, cleaning up, treating, and disposing of oil to (1) maintain the safety of human life, (2) stabilize a situation to preclude further damage, and (3) minimize adverse environmental and socioeconomic effects.
- **Injury assessment and restoration:** Research that involves collecting and analyzing information to (1) evaluate the nature and extent of environmental, human health, and socioeconomic injuries resulting from an incident; (2) determine the actions needed to restore natural resources and their services to pre-spill conditions; and (3) make the environment and public whole after interim losses.

Trustee Councils Use Restoration Trust Funds for Approved Activities, Which Are Largely Completed for *Exxon Valdez* and in the Early Stages for *Deepwater Horizon*

In response to the *Exxon Valdez* and *Deepwater Horizon* oil spills and by forming trustee councils, federal and state trustees have used the restoration trust funds to authorize money for activities in accordance with approved restoration plans. The Exxon Valdez Trustee Council has largely completed restoration work and authorized approximately \$985 million, roughly 86 percent of the restoration trust fund, primarily on habitat protection and general restoration, research, and monitoring activities. As a result of these restoration activities and natural recovery, the majority of the injured natural resources and human services in the spill area has recovered or is recovering, according to the council's assessment. However, the Exxon Valdez Trustee Council continues to monitor the lack of recovery of Pacific herring and the presence of lingering oil in the spill area. The Deepwater Horizon Trustee Council is completing early restoration work and initial post-settlement restoration

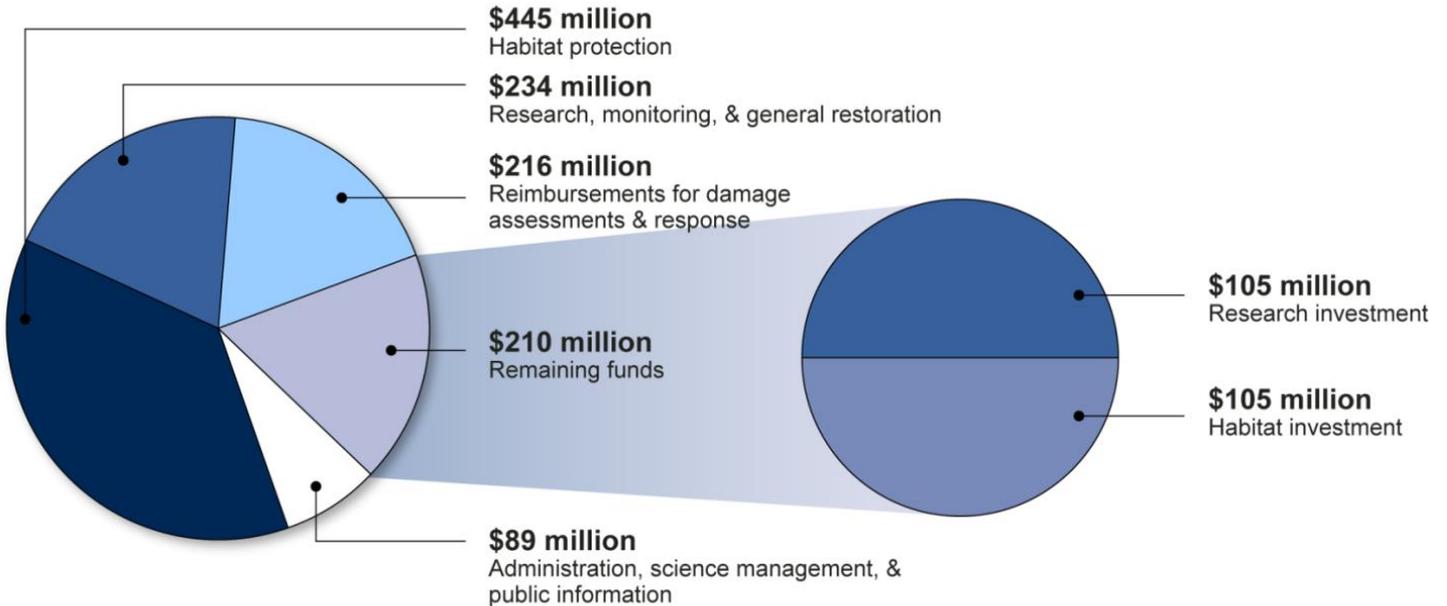
planning. It has authorized approximately \$1.1 billion for restoration activities, roughly 13 percent of the restoration trust fund, and spent \$368 million, roughly 5 percent of the restoration trust fund, primarily on habitat protection and enhancing recreation, such as building boat ramps and other recreational facilities.

The Exxon Valdez Trustee Council Has Used 86 Percent of the Restoration Trust Fund, and Most Injured Natural Resources Have Recovered

Exxon's payments to the restoration trust fund totaled approximately \$900 million, and the interest earnings, as of January 2016, totaled \$247 million. From 1992 to 2018, the Exxon Valdez Trustee Council authorized the expenditure of approximately \$985 million or 86 percent of the roughly \$1.15 billion in principal funds plus interest from the restoration trust fund, primarily on habitat protection (\$445 million) and general restoration, research, and monitoring of injured natural resources (\$234 million). The remaining unspent restoration trust fund balance as of January 2018 was \$210 million, split evenly between the habitat investment subaccount for future habitat protection activities and the research investment subaccount for future general restoration activities (see fig. 2).

Figure 2: Exxon Valdez Oil Spill Trustee Council Use of Restoration Trust Fund from October 1992 to January 2018

Total expenditures: \$985 million



Source: GAO analysis of Exxon Valdez Oil Spill Trustee Council data. | GAO-19-31

According to the Exxon Valdez Trustee Council, as of January 2018, it had spent approximately \$445 million to protect and enhance habitat, including acquiring 628,000 acres of lands and interest in lands.³³ As outlined in the trustee council's 1994 restoration plan, the habitat program is intended to minimize further injury to resources and services and allow recovery to continue with the least interference by authorizing funds for federal and state resource agencies to acquire title or conservation easements on ecologically valuable lands. For example, in 2017 the Exxon Valdez Trustee Council authorized about \$5.5 million to acquire a conservation easement on 1,060 acres at the northeastern end of Kodiak Island in the Gulf of Alaska, known as Termination Point. The trustee council authorized funds for this acquisition to (1) protect the property from timber logging and development and (2) provide habitat and feeding areas for marine birds injured by the spill, such as marbled murrelets and pigeon guillemots. According to the Exxon Valdez Trustee Council, habitat acquisitions prevent additional injury to species during recovery, promote restoration of spill-affected resources and services, and are the

³³The Exxon Valdez Trustee Council estimated that an addition \$56 million was leveraged from other sources, such as state and federal agencies, to help acquire these lands.

primary tool for acquiring equivalent resources harmed by the spill. The habitat program also supports habitat enhancement projects, which, according to the Exxon Valdez Trustee Council, aim to repair human-caused harm to natural resources, their habitats, and the services they provide to humans. For example, the trustee council authorized \$2.2 million to the Alaska Department of Natural Resources to stabilize stream bank vegetation and install elevated steel walkways to provide less-damaging access to the Kenai River, a popular fishing destination.

The Exxon Valdez Trustee Council has spent roughly \$234 million from October 1992 to January 2018 on hundreds of general restoration, monitoring, and research activities. As outlined in the 1994 restoration plan, general restoration includes activities that manipulate the environment, manage human use, and reduce marine pollution. Research and monitoring activities also provide information on the status and condition of resources and services, including (1) whether they are recovering, (2) whether restoration activities are successful, and (3) factors that may be constraining recovery, according to the 1994 plan. For example, since 2012, the trustee council has authorized money for a program called Gulf Watch Alaska that provides long-term monitoring data on the status of environmental conditions—such as waters temperature and salinity—and the marine and nearshore ecosystems. Gulf Watch Alaska provides data to federal, state, and tribal agencies, as well as the public, that informs resource conservation programs and aid in the management of species injured by the spill. According to the trustee council, its expenditures for research projects have resulted in hundreds of peer-reviewed scientific studies and increased knowledge about the marine environment that benefits the injured resources.

The Exxon Valdez Trustee Council has spent roughly \$89 million from October 1992 to January 2018 on administration, science management, and public information. According to the 1994 restoration plan, expenditures under this category cover the cost to (1) prepare work plans, (2) negotiate habitat purchases, (3) provide independent scientific review, (4) involve the public, and (5) operate the restoration program. Although the Exxon Valdez Trustee Council set a target of 5 percent administrative costs in the 1994 restoration plan, according to a written statement that the trustee council provided, administrative costs averaged around 6 percent from 1994 through 2001. The trustees and council staff we interviewed told us that in hindsight the 5 percent target was unrealistic as it did not reflect the actual administrative costs at that time, although such costs were included in project budgets or were absorbed by federal and state agencies. Therefore, in 2012, the Exxon Valdez Trustee Council

changed the way it accounted for administrative costs and has included these costs in the administrative budget. According to the trustee council, under the new accounting policy, administrative costs were recalculated and estimated at around 19 percent for the period 2002 through 2018.

The remaining \$210 million Exxon Valdez restoration trust fund balance is held by the Alaska Department of Revenue in two interest-bearing subaccounts.³⁴ As of January 2018, the research subaccount and the habitat subaccount each held approximately \$105 million.³⁵ In the 1994 restoration plan, the Exxon Valdez Trustee Council established the need for a restoration reserve to ensure that restoration activities could continue to be supported after the final annual payments from the Exxon Corporation were received in September 2001. According to the 1994 restoration plan, the trustee council planned to set aside \$12 million per year for a period of 9 years into the restoration reserve, totaling \$108 million plus interest. In 1999, the Exxon Valdez Trustee Council resolved to transfer the estimated remaining balance of \$170 million to the restoration reserve and split the money into two subaccounts. Since 2002, the trustee council is to make allocations for its annual work plans and ongoing habitat acquisition using these accounts.

In 2010, the trustee council established a 20-year strategic plan to spend the remaining trust funds using four 5-year incremental work plans. In November 2010, the trustee council issued a call for project proposals for the first 5-year work plan, for fiscal years 2012 through 2016. Although the Exxon Valdez Trustee Council solicited invitations on a 5-year cycle, it has authorized money for each project annually. In a written statement, the trustee council also stated that it continues to pursue and acquire from willing sellers remaining parcels of land that prior studies have identified as high-priority habitat. According to the Exxon Valdez Trustee Council's long-term spending scenario, both of the subaccounts are

³⁴These funds are invested in the stock market, and interest earned is based on market returns. According to the Exxon Valdez Trustee Council, these funds have been invested with a fairly aggressive asset allocation and have had historic market returns in recent years; however, over the coming years the investment portfolio will shift to a more conservative one with a lower-risk profile to allow for consistent funding flows in the fund's final years.

³⁵According to the Exxon Valdez Trustee Council, additional funds have been obligated since January 2018 but not yet spent, and taking these amounts into account, the total remaining funds from both accounts would be approximately \$169 million as of June 2018.

expected to be depleted by 2032 or earlier as determined by the market's performance.

The Status of Restoration Efforts

According to the Exxon Valdez Trustee Council's 2014 restoration plan update—its most recent assessment of injured resources and services—all but 5 of the 32 natural resources and human services identified as injured by the spill have recovered, are recovering, or are very likely recovered.³⁶ In the 1994 restoration plan, the trustee council established a list of resources and services that suffered injuries from the spill, and developed specific, measurable recovery objectives for each injured resource and service.³⁷ The Exxon Valdez Trustee Council has periodically assessed the status of those resources, most recently in 2014. As of the 2014 assessment, the following 4 resources were listed as not recovering: (1) marbled murrelets, (2) Pacific herring, (3) pigeon guillemots, and (4) one group of killer whales. In addition, the recovery of Kittlitz's murrelets was listed as unknown.³⁸ According to the Exxon Valdez Trustee Council, the status of these resources in 2018 is largely similar to their status in 2014 except that one population of pigeon guillemots has likely increased as a result of a predator-control project that the council supported. However, the overall status of this species has not been determined. In a written statement, the trustees stated that the

³⁶Exxon Valdez Oil Spill Trustee Council, *Exxon Valdez Oil Spill Restoration Plan: 2014 Update, Injured Resources and Services* (Anchorage, AK: November 2014). This document provides an update on the status of injured resources and services that were first identified in the 1994 restoration plan, called the Injured Resources and Services List. In 2010, the Exxon Valdez Trustee Council introduced a fifth recovery status (very likely recovered) to reflect the status of species for which (1) there has been limited scientific research on the resource's recovery status in recent years; (2) prior studies suggest that there had been substantial progress toward recovery in the decade following the spill; and (3) so much time has passed since any indications of some spill injury, including exposure to oil, that it is unlikely that there are any residual effects of the spill.

³⁷The Injured Resources and Services List does not necessarily contain all species affected by the spill, and the Exxon Valdez Trustee Council may support a species or habitat beyond its prespill status in part to make up for species damaged by the spill that will not likely recover, according to the Exxon Valdez Trustee Council.

³⁸According to the assessment, for resources in the unknown category, data on life history or the extent of injury from the spill are limited. Moreover, given the length of time since the spill, it is unlikely that new or further research will provide information that will help in comprehensively assessing the original injury or determining the residual effects of the spill such that a better evaluation of recovery can occur.

trustee council plans to initiate its next assessment of injured resources in late 2018.

The Exxon Valdez Trustee Council remains particularly concerned about the health of the Pacific herring population and the presence of lingering oil. According to the trustee council's 2014 restoration plan update, Pacific herring are considered an ecologically and commercially important species that in addition to being fished for human consumption is a source of food for various marine species. The assessment noted a combination of factors, including disease, predation, and poor recruitment of additional fish to the stock through growth or migration, appear to have contributed to the continued suppression of herring populations. As a result, the herring fishery has been closed for 23 of the 29 years since the oil spill and has not met the trustee council's recovery objective. To address concerns regarding the Pacific herring, the trustee council plans to authorize additional money for ongoing Pacific herring research and monitoring through the anticipated end date for the fund in fiscal year 2032, for an estimated total cost of roughly \$23 million over 20 years.

The Exxon Valdez Trustee Council also has concerns regarding the presence of lingering oil in the spill area. According to a March 2016 report for the trustee council, approximately 27,000 gallons of lightly weathered oil from the *Exxon Valdez* spill remains, located along almost 22 miles of shoreline at a small number of subsurface sites, where oxygen and nutrients are at levels too low to support microbial degradation.³⁹ In May 2018, we accompanied researchers working with the trustee council to the spill area and observed the excavation of three pits that revealed lingering oil roughly 6 inches below the surface of the beach, as captured in figure 3. According to the researchers, oil previously recovered from this location was identified as belonging to the *Exxon Valdez* oil spill. Evidence of exposure to lingering oil was observed as recently as 2009 in a variety of marine species, including sea otters and harlequin ducks, according to the 2016 lingering oil report. The report also noted that the most recent studies show that the sea otter and

³⁹Research Planning, Inc. and U.S. Geological Survey, *Studies on Exxon Valdez Lingering Oil: Review and Update on Recent Findings* (Anchorage, Alaska: March 2016). This report summarizes the findings of various studies related to lingering oil from the *Exxon Valdez* oil spill. The report estimated that at least 10,800,000 gallons of crude oil spilled from the *Exxon Valdez* into the Prince William Sound in 1989 and that based on data collected from 2001 through 2007, residual oil on the shoreline represented 0.25 percent of the total spill volume—or about 27,000 gallons. The report further stated that there could be any type of subsurface oil on 35 kilometers of shoreline—about 22 miles.

harlequin duck populations have recovered and that lingering oil is no longer causing ecological damage. Further, studies demonstrated that minimally intrusive remediation of the oil would only be effective at a small number of sites, according to the 2016 report. Therefore, although the trustee council has decided not to pursue remediation of the oil, it stated that it has authorized money for projects to study the effects of oil and lingering oil totaling over \$16 million and will continue to monitor the oil to document its physical and chemical changes over time. The Exxon Valdez Trustee Council expects that lingering oil will persist for decades; however, its representatives said that the evidence indicates that there are no current biological effects of the oil.

Figure 3: A Researcher Collects Lingering Oil from the Exxon Valdez Oil Spill on a Beach in Alaska in May 2018



Source: GAO. | GAO-19-31

The Exxon Valdez Trustee Council's priorities for future spending are outlined in the 2014 restoration plan update, and in addition to long-term herring research and lingering oil, the priorities include long-term monitoring of marine conditions and injured resources, shorter-term harbor restoration projects, and habitat protection.

The Deepwater Horizon Trustee Council Has Used 13 Percent of the Restoration Trust Fund, and Most Restoration Activities Are in the Initial Planning Phase

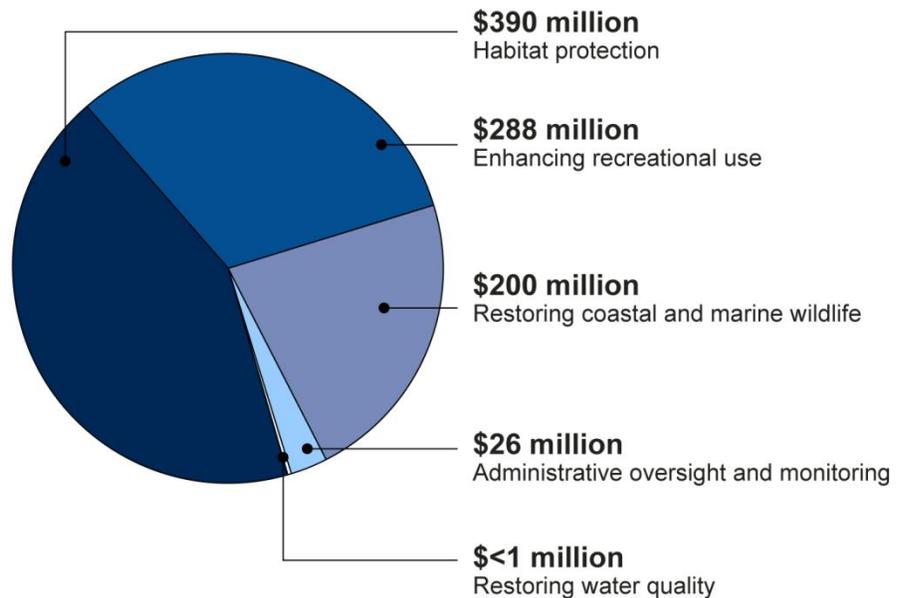
Since the federal and state governments reached a final settlement with BP in 2016 and the Deepwater Horizon Trustee Council finalized a programmatic restoration plan, four trustee implementation groups have issued initial independent restoration plans. Specifically, the Alabama, Louisiana, Mississippi, and Texas trustee implementation groups have issued initial restoration plans. According to the Deepwater Horizon Trustee Council, the trustee implementation groups covering Florida, Open Ocean, and Region-Wide restoration are in the midst of a multiyear planning effort and anticipate issuing initial restoration plans in 2019 or later. The trustee implementation groups are responsible for developing and approving restoration plans and resolutions, which, when approved, authorize money to be spent on restoration projects. This process includes soliciting project ideas, submitting proposed plans for public comment, and ensuring compliance with applicable laws and regulations, such as the National Environmental Policy Act. According to the trustee council, there is no specific timetable for approving future restoration plans, as plans are approved on an ongoing basis—typically for several projects at a time. The four completed restoration plans, together with early restoration spending and other activities, including planning and administrative efforts, account for all authorizations made by the Deepwater Horizon Trustee Council as of December 31, 2017, according to NOAA—the agency that manages the system the trustee councils uses for financial reporting.⁴⁰ As shown in figure 4, these authorizations include approximately \$1.1 billion, or 13 percent, of the \$8.1 billion restoration trust fund on five goals.⁴¹

⁴⁰According to the federal trustees, the trustee council authorizes funds for multiyear restoration activities up front. Therefore, expenditures accrue over subsequent years for these restoration activities. As of the end of 2017, the trustees had spent \$368 million, or 5 percent of the restoration trust fund.

⁴¹The Deepwater Horizon restoration trust fund had received approximately \$1.5 billion in payments from BP as of December 31, 2017. Therefore, the Deepwater Horizon Trustee Council had authorized about 73 percent of the funds received from BP as of the end of 2017. As previously noted, the settlement also orders up to \$700 million for unknown conditions and adaptive management, which is not included in this \$8.1 billion or the following percentage calculations because the funds cannot be demanded before January 1, 2026.

Figure 4: Deepwater Horizon Natural Resource Damage Assessment Trustee Council Use of Restoration Trust Fund by Restoration Goal, from April 2012 to December 31, 2017

Total allocation: \$904 million



Source: GAO analysis of Deepwater Horizon Natural Resource Damage Assessment Trustee Council data. | GAO-19-31

The Deepwater Horizon Trustee Council has authorized roughly \$460 million for habitat protection—about 10 percent of the almost \$4.7 billion ordered for this use by the settlement.⁴² According to the 2016 programmatic restoration plan, habitat protection includes both conservation acquisition and habitat enhancement, such as creating, restoring, or enhancing coastal wetlands. For example, during the first phase of early restoration in 2012, the trustee council authorized \$14.4 million to the Louisiana Coastal Protection and Restoration Authority to create 104 acres of new brackish marsh at Lake Hermitage in Barataria Bay, Louisiana. The project involved dredging sediment and planting native marsh vegetation to restore marsh habitat damaged by the spill. The project is currently in the monitoring phase. As of the end of 2017, the Deepwater Horizon Trustee Council had approved 34 habitat protection projects, many of which were still in progress as of December 2017. The initial results of these projects include the restoration of over

⁴²The total amount of the natural resource damage payments ordered for each restoration goal is defined in the consent decree.

4,000 acres of habitat and the creation of over 40 artificial reefs, according to a written statement by the federal trustees.

The trustee council has authorized roughly \$349 million to enhance recreational use—about 83 percent of the almost \$420 million ordered for this use by the settlement. According to the 2016 programmatic restoration plan, enhancing recreational use includes acquiring land along the coast, building improved or new infrastructure, and improving navigation for on-water recreation. For example, during the first phase of early restoration in 2012, the Deepwater Horizon Trustee Council authorized approximately \$5.3 million to the Florida Department of Environmental Protection to repair and construct boat ramps in Pensacola Bay and Perdido Bay, Florida. Construction was completed in 2016, and the project is currently in the monitoring and operations and maintenance phase. As of the end of 2017, the Deepwater Horizon Trustee Council had approved 43 projects to enhance recreational use, many of which were still in progress as of December 2017. These projects have provided new or enhanced facilities, such as pavilions, picnic areas, and boat ramps, according to a written statement by the federal trustees.

The Deepwater Horizon Trustee Council has authorized roughly \$218 million to restore coastal and marine wildlife—about 12 percent of the almost \$1.8 billion ordered for this use by the settlement, primarily for birds (\$108 million), sea turtles (\$50 million), oysters (\$38 million), and fish (\$20 million). According to the 2016 programmatic restoration plan, restoring coastal and marine wildlife includes activities that restore the resources, such as fish, sea turtles, and deep coral communities, which contribute to a productive, biologically diverse, and resilient ecosystem. For example, during the first phase of early restoration in 2012, the trustee council authorized \$11 million to the Mississippi Department of Environmental Quality to deploy a mixture of oyster shells, limestone, and concrete on 1,430 acres in waters off Hancock and Harrison Counties in Mississippi. This material, when placed in oyster spawning areas, provides a surface for free swimming oyster larvae to attach and grow into oysters. The project is currently in the monitoring and operations and maintenance phase. As of the end of 2017, the Deepwater Horizon Trustee Council had approved 32 projects to restore coastal and marine wildlife.

Although the trustee council authorized millions of dollars to restore coastal and marine wildlife, it authorized 1 percent or less of funds

ordered by the settlement for sturgeon, marine mammals, submerged aquatic vegetation, and other seafloor species—such as corals.⁴³ According to the 2016 consent decree, the Open Ocean implementation group is responsible for authorizing the majority of the restoration funds for these types of wildlife, but that trustee implementation group has not yet completed its initial restoration plan. According to NOAA, the complexity of restoring several of these resources necessitated additional preplanning and restoration technique development prior to considering specific restoration projects for several of these types of wildlife. The trustee implementation group is developing two restoration plans that will include projects for birds and sturgeon, as well as for sea turtles, fish, marine mammals, and corals, according to a Deepwater Horizon Trustee Council press release. The trustee council released the first draft plan for public comment in October 2018, and plans to release the second plan in early 2019. In August 2017, the Deepwater Horizon Trustee Council announced that the Louisiana implementation group was soliciting project ideas to fund the restoration of submerged aquatic vegetation, among other types, to include in a future restoration plan but has not yet submitted such a plan for public review.

Roughly \$27 million has been authorized for administrative oversight and monitoring activities, or about 3 percent of the almost \$810 million that the settlement ordered for this use. The majority of the funding (\$25 million) was for administrative oversight activities, and the balance was for monitoring. According to the 2016 programmatic restoration plan, administrative oversight includes the costs for trustees to guide project selection, implementation, and adaptive management. For the state trustees, all administrative costs are covered by their respective trustee implementation groups, and for federal trustees, all administrative costs are covered by the Open Ocean implementation group.⁴⁴ For example, during the postsettlement phase, the trustee council authorized approximately \$6.6 million to Interior for (1) participation on the trustee council; (2) restoration planning, plan development, and coordination with other trustees; (3) environmental compliance reviews; (4) technical assistance; and (5) financial management, among other uses. As of the

⁴³Corals are an example of a species covered within the type called mesophotic and deep benthic communities.

⁴⁴The exception is costs for the Lead Administrative Trustee functions for the designated federal agency, which are authorized by the Region-Wide implementation group. In addition, according to the consent decree, the Region-Wide restoration area contains funding for Gulf-wide needs, such as monitoring, oversight, planning, and research.

end of 2017, the Deepwater Horizon Trustee Council had approved nine administrative oversight and monitoring projects, which remained ongoing as of December 31, 2017. The results of the trustee council's activities in this area so far include the completion of a monitoring and adaptive management manual and its standard operating procedures.⁴⁵

The Deepwater Horizon Trustee Council has authorized \$4 million to restore water quality—about 1 percent of the \$410 million that the settlement ordered for this use. According to the 2016 programmatic restoration plan, restoring water quality includes both reducing nonpoint nutrient pollution to coastal watersheds and improving water quality in Florida through efforts such as stormwater control and erosion control. As of the end of 2017, the Deepwater Horizon Trustee Council approved two nonpoint nutrient reduction projects to address excessive nutrient loads in Gulf waters but no water quality projects in Florida.⁴⁶ For example, in 2017, the Deepwater Horizon Trustee Council authorized approximately \$224,000 to conduct restoration planning to develop, draft, and finalize a restoration plan addressing nonpoint nutrient reduction, among other goals. The trustee council has authorized few funds to date for this restoration goal because, in part, the Florida implementation group has not yet completed its first postsettlement restoration plan. In September 2017, the trustee council announced that the Florida implementation group was reviewing water quality project ideas for its initial restoration plan, and it released a draft of the plan for public comment in September 2018. According to the Deepwater Horizon Trustee Council, the final plan will be released in January 2019.

⁴⁵Deepwater Horizon Natural Resource Damage Assessment Trustees, *Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0* (December 2017), and *Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the Deepwater Horizon Oil Spill* (Nov. 15, 2016).

⁴⁶Nutrient pollution, caused by excess nitrogen and phosphorus entering the environment, poses significant risks to the nation's water quality and presents a growing threat to public health and local economies. Excess nutrients can enter water bodies from point sources, such as industrial facilities and wastewater treatment plants, and from nonpoint sources, such as runoff from agricultural and urban areas. Nutrient pollution contributes to a trend of increasing numbers of harmful algal blooms in surface waters, which can release toxins that can contaminate drinking water sources and adversely affect recreation, tourism, and fisheries. See GAO, *Water Pollution: Some States Have Trading Programs to Help Address Nutrient Pollution, but Use Has Been Limited*, [GAO-18-84](#) (Washington, D.C.: Oct. 16, 2017).

Interagency Committee Members Funded Oil Spill Research Projects from Fiscal Years 2011 through 2017, but the Committee Did Not Coordinate with All Relevant Entities

Nine of the interagency committee member agencies funded over 100 oil spill research projects per year from fiscal years 2011 through 2017, for a total cost of about \$200 million; however, we found that the interagency committee did not coordinate its research with some key entities.⁴⁷ More specifically, approximately half of the interagency committee members said internal coordination on such research improved during this time, but the committee may not have included all relevant agencies, and we found that the committee did not coordinate with relevant trustee councils.

Nine Member Agencies Funded over 100 Oil Spill Research Projects per Year for a Cost of About \$200 Million from Fiscal Years 2011 through 2017

During fiscal years 2011 through 2017, 9 of the 15 interagency committee member agencies funded oil spill research projects, spending about \$200 million on this research, based on our review of agency data from the member agencies.⁴⁸ These nine agencies were the Bureau of Ocean Energy Management, BSEE, the Coast Guard, the Department of Energy, EPA, NASA, NOAA, the Pipeline and Hazardous Materials Safety Administration, and the U.S. Arctic Research Commission. One of these

⁴⁷The nine interagency committee member agencies reported that many of the oil spill research projects they reported funding are multiyear projects; therefore, they reported ongoing projects for each fiscal year rather than those initiated or completed in a single year. This prevented us from providing an overall number of projects by agency from fiscal years 2011 through 2017.

⁴⁸The nine member agencies that reported funding oil spill research during the time period covering fiscal years 2011 through 2017 are listed in table 1. However, NOAA was unable to provide reliable data on the agency's expenditures so we did not include its estimate in the total provided. Six member agencies reported that they did not fund or conduct oil spill research from fiscal years 2011 through 2017. The Department of Commerce's National Institutes of Standards and Technology, the Department of Defense's U.S. Army Corps of Engineers, the Department of Homeland Security's U.S. Fire Administration (within the Federal Emergency Management Agency), Interior's U.S. Fish and Wildlife Service, the U.S. Navy, and the Department of Transportation's Maritime Administration all reported that they did not fund oil spill research using agency funds during this time period.

agencies—BSEE—spent about \$84 million, or about 40 percent of the total amount spent by all nine agencies (see table 1).

Table 1: Interagency Coordinating Committee on Oil Pollution Research Member Agencies' Expenditures on Oil Spill Research, Fiscal Years 2011 through 2017

Member agency	2011 (fiscal year)	2012 (fiscal year)	2013 (fiscal year)	2014	2015 (fiscal year)	2016 (fiscal year)	2017 (fiscal year)	Total (dollars in millions)
Bureau of Ocean Energy Management	4.3	4.6	3.9	5.5	4.7	4.9	2.5	30.4
Bureau of Safety and Environmental Enforcement (BSEE) ^a	1.1	1.7	8.0	8.1	23.1	23.5	18.0	83.5
Coast Guard	0.8	2.1	1.8	0.2	1.2	1.8	1.5	9.4
Department of Energy	11.8	17.2	3.5	3.8	2.3	2.0	0.8	41.4
Environmental Protection Agency (EPA)	1.1	0.6	0.4	0.7	0.6	0.7	0.2	4.3
National Aeronautics and Space Administration (NASA)	0	0.6	0.4	0.4	0.2	0.2	0.1	1.9
National Oceanic and Atmospheric Administration (NOAA) ^b	NA	NA	NA	NA	NA	NA	NA	NA
Pipeline and Hazardous Materials Safety Administration	5.5	3.2	2.5	2.3	3.1	5.6	5.3	27.5
U.S. Arctic Research Commission ^c	0	NI	\$0	\$0	\$0	\$0	NI	NI
Total	24.6	30.0	20.5	21.0	35.2	38.7	28.4	198.4^d

Legend: NA = data not available; NI = data not included.

Source: GAO analysis of interagency committee member agency data. | GAO-19-31

Notes: Agencies reported spending funds from agency appropriations, as well as appropriations from the Oil Spill Liability Trust Fund. Each agency included research expenditures based on the Interagency Coordinating Committee on Oil Pollution Research's definition and categorization of oil spill research.

^aBSEE officials reported expending about \$1.7 million to \$4 million per fiscal year for the operation and maintenance of the Ohmsett National Oil Spill Response Research and Renewable Energy Test Facility located in Leonardo, New Jersey. This facility is used for both full-scale equipment testing and responder training to support oil spill research. These expenditures are not included in the table because agency officials said these funds are used to maintain the facility and not to directly support oil spill research projects.

^bNOAA officials said they believe that the agency spent about \$1 million to \$2 million per fiscal year in this period but were unable to provide reliable data on the agency's expenditures because there is no centralized funding or a tracking mechanism for oil spill research.

^cThe U.S. Arctic Research Commission reported expenditures of \$65,000 in fiscal year 2012 and \$20,000 in fiscal year 2017, but because of rounding, these expenditures would appear as \$0.0 in the table above, so we did not include them. For the other fiscal years in the table, the commission reported that it did not fund any oil spill research.

^dThe total does not include the yearly expenditures from NOAA because the agency was not able to provide reliable data on its expenditures.

In March 2011 we reported that during fiscal years 2000 through 2010, seven interagency committee member agencies spent about \$163 million on oil pollution research, according to officials from those agencies. Since we last reported on the interagency committee, three additional agencies told us that they also fund oil spill research—the Department of Energy, BSEE,⁴⁹ and the U.S. Arctic Research Commission—while the U.S. Navy told us that it no longer funds oil spill research projects.⁵⁰

According to agency officials, the nine interagency committee member agencies funded from 100 to 200 research projects annually from fiscal years 2011 through 2017. These nine agencies reported funding research projects in one or more of the interagency committee’s four oil spill research categories: prevention, preparedness, response, and injury assessment and restoration (see table 2).

Table 2: Interagency Coordinating Committee on Oil Pollution Research Member Agencies’ Oil Spill Research by Category, Fiscal Years 2011 through 2017

n/a Member agency	Interagency committee research category				
	Prevention	Preparedness	Response	Injury assessment and restoration	Cross-cutting
Bureau of Ocean Energy Management	did not report funding	reported funding	reported funding	did not report funding	reported funding
Bureau of Safety and Environmental Enforcement (BSEE) ^a	reported funding	reported funding	reported funding	reported funding	did not report funding
Coast Guard ^b	did not report funding	reported funding	reported funding	did not report funding	did not report funding
Department of Energy	reported funding	did not report funding	did not report funding	did not report funding	did not report funding

⁴⁹In October 2011, Interior created two new, independent agencies—the Bureau of Ocean Energy Management and the Bureau of Safety and Environmental Enforcement—to carry out the offshore energy management and enforcement functions of the previously established Bureau of Ocean Energy Management, Regulation, and Enforcement. In our previous report, this bureau had reported funding \$77.8 million for oil pollution research projects during fiscal years 2000 through 2010. [GAO-11-319](#).

⁵⁰The U.S. Arctic Research Commission requested to be added as a member of the interagency committee. Although the President is authorized to administratively designate additional federal agencies as members of the interagency committee, OPA was amended in 2016 to include the commission as a member. Pub. L. No. 114-120, Title III, § 319, 130 Stat. 66 (2016).

n/a Member agency	Interagency committee research category				
	Prevention	Preparedness	Response	Injury assessment and restoration	Cross-cutting
Environmental Protection Agency (EPA)	did not report funding	did not report funding	reported funding	reported funding	reported funding
National Aeronautics and Space Administration (NASA)	did not report funding	did not report funding	did not report funding	reported funding	reported funding
National Oceanic and Atmospheric Administration (NOAA)	did not report funding	reported funding	reported funding	reported funding	did not report funding
Pipeline and Hazardous Materials Safety Administration	reported funding	did not report funding	did not report funding	did not report funding	did not report funding
U.S. Arctic Research Commission	did not report funding	did not report funding	did not report funding	did not report funding	reported funding

Legend: interagency committee = Interagency Coordinating Committee on Oil Pollution Research; X = the agency reported funding oil spill research in this category; - = the agency did not report funding oil spill research in this category.

Source: GAO analysis of interagency committee member agency data. | GAO-19-31

Notes: The interagency committee organizes research in four categories for its member agencies: (1) prevention, (2) preparedness, (3) response, and (4) injury assessment and restoration. GAO added a fifth category—cross-cutting—to capture those projects that may address more than one category. Each agency included research projects based on the interagency committee’s general definition and categorization of oil spill research.

^aBSEE officials noted that they funded one research project that fell under the injury assessment and restoration category during this time frame and said that restoration is not the focus of the agency’s oil spill research efforts.

^bCoast Guard officials said they also conduct research in the prevention research category that could be relevant to oil spill research but is not specifically classified as oil spill research.

The Interagency Committee Improved Internal Research Coordination Efforts but May Not Have Included All Relevant Agencies and Did Not Include the NRDA Trustee Councils

We reported in March 2011 that federal agencies conducted oil pollution research but that the interagency committee had taken limited actions to foster the communication and coordination of this research among member agencies and nonfederal stakeholders.⁵¹ More specifically, we noted that member agencies were not consistently represented on the interagency committee and interested nonfederal stakeholders reported limited contact with the interagency committee. We recommended,

⁵¹[GAO-11-319](#).

among other things, that the Commandant of the Coast Guard direct the chair of the interagency committee, in coordination with member agencies, establish a more systematic process to identify and consult with key nonfederal stakeholders.

Officials from 8 of the 15 member agencies said they believe that the interagency committee's coordination efforts have improved since the *Deepwater Horizon* oil spill in 2010.⁵² In response to our recommendation on coordination with nonfederal stakeholders, we found that members consistently attend major oil spill conferences and workshops. In addition, we observed that the interagency committee invites outside speakers and researchers to its meetings to update the membership on ongoing research activities in academia, industry, and the government. The committee charter calls for meetings at least semiannually, but since fiscal year 2011 the interagency committee has held quarterly meetings with member agencies as well as meetings with outside groups of knowledgeable stakeholders.⁵³

At the meetings, member agencies have the opportunity to present information on oil spill research they are conducting, share information about upcoming research conferences, and listen to presentations by outside groups. According to member agency officials, some of the benefits of the interagency committee's improved coordination efforts include

- a reduction in research redundancies,
- increased communication,
- increased understanding of the broader oil spill research community,
- the facilitation of relationships,
- the identification of research gaps, and

⁵²Of the remaining seven member agencies, six said they either had no context to judge the changes (e.g., they were not members of the interagency committee at the time of the *Deepwater Horizon* spill) or they were neutral regarding the changes since 2010. One agency did not answer the question.

⁵³Interagency committee member officials noted that they hold meetings with outside groups such as the Prince William Sound Regional Citizens' Advisory Council, the Gulf of Mexico Restoration Initiative, the National Academies of Sciences Gulf Research Program, industry groups, and academia to encourage coordination of oil spill research efforts.

- the ability to leverage resources.

U.S. Navy officials said that the interagency committee facilitated communication between member agencies that use the Navy's equipment for research purposes. As a result of discussions that took place at an interagency meeting, the Navy offered the use of a hydraulic power unit to the Coast Guard for hydraulic testing in Arctic conditions in Alaska. Officials from a few of the member agencies, including the Coast Guard, BSEE, EPA, and NOAA, told us that they collaborate on oil spill-related research efforts with other member agencies of the interagency committee.

In addition, the release of the 2015-2021 research and technology plan provides a new baseline for research, including 150 priority oil pollution research needs within 25 research areas. According to the research and technology plan, future updates will reflect advancements in oil pollution technology and changing research needs by capitalizing on the unique roles and responsibilities of each member agency. According to officials from one member agency, the revised research and technology plan has helped member agencies coordinate with other member agencies to leverage funding and expertise. Member agencies also cooperate with nonfederal research entities on research needs and activities.

The interagency committee has demonstrated key practices that strengthen coordination, such as agreeing on common terminology and priorities for oil spill research in its revised research and technology plan. However, the committee could enhance coordination by ensuring that relevant participants have been included—another key practice.⁵⁴ Under OPA, certain federal agencies are members of the interagency committee, but member agencies may choose which office or official represents them at meetings and coordinates with other members on committee-related work. Officials from 6 of the 15 member agencies told us that their particular research efforts are not the focus of ICCOPR meetings, and therefore ICCOPR's ability to coordinate their research efforts are less valuable. For example, NASA officials said the office representing their agency at meetings is not involved in oil spill research, but other offices within their agency fund or conduct relevant research.

In addition, 7 of the 15 officials we interviewed from member agencies suggested that other federal agencies could be relevant to the

⁵⁴[GAO-12-1022](#).

committee's research efforts. For example, officials we interviewed from several member agencies suggested including the U.S. Geological Survey (USGS) as a full member because of its relevant research and mapping expertise.⁵⁵ According to committee documents, the interagency committee considered adding USGS in 2015 but has not made a decision on USGS's membership. The Commandant of the Coast Guard, under his or her capacity as chair of the interagency committee, has been delegated authority to appoint additional agencies to the committee as appropriate.⁵⁶

A leading practice for collaboration calls for interagency groups to ensure that all relevant participants have been included in collaborative efforts.⁵⁷ According to this leading practice, participants should have the appropriate knowledge, skills, and abilities to contribute to the outcomes of the collaborative effort.

However, interagency committee member agency officials said the committee has not systematically reviewed its membership to determine which offices within current member agencies are the most relevant to its mission and whether adding other federal agencies as members would be beneficial. By systematically reviewing its membership to determine whether any additional agencies should be involved in coordinating oil spill research and that the most appropriate offices within member agencies are represented, the interagency committee could improve its ability to coordinate research among federal agencies.

In addition, agency officials knowledgeable about the work of the NRDA trustee councils are not the same officials representing their agency as members on the interagency committee. The research and technology plan notes that the interagency committee's injury assessment and restoration research is intended to support the NRDA process. However, the NRDA trustees who manage the restoration funds for the *Exxon Valdez* and *Deepwater Horizon* oil spills told us that they have not

⁵⁵According to the interagency committee's research and technology plan, USGS participates in the committee as a nonvoting observer. However, the USGS officials do not regularly attend the quarterly meetings.

⁵⁶In Department of Homeland Security Delegation No. 0170.1, II.80, the Secretary delegated to the Commandant of the Coast Guard the authority to carry out the functions in Executive Order 12777, including § 8(h).

⁵⁷[GAO-12-1022](#).

coordinated or communicated on oil spill research or restoration efforts with the interagency committee; therefore, they would not have been involved with developing the research and technology plan. In addition, some trustee council members told us that they were not even aware that the interagency committee existed.

Under OPA, one of the interagency committee's responsibilities is to coordinate with federal agencies and external entities on an oil pollution research program that includes methods to restore and rehabilitate natural resources damaged by oil spills. As previously discussed, the NRDA trustee councils are charged with assessing natural resource damages for the natural resources under their trusteeship and developing and implementing plans for restoration efforts. The research that the interagency committee members fund includes research on restoration that could be pertinent to the work of the NRDA trustee councils. For example, following the oil spill in 2010, the Deepwater Horizon Trustee Council evaluated baseline conditions for several different representative species, such as sea turtles and Gulf sturgeon, to quantify the extent of injury as part of the restoration planning process that OPA regulations required. Some interagency committee member agencies, such as NOAA and BOEM, fund research on baseline data that could inform the NRDA trustee councils' injury assessment work. In turn, the NRDA trustee councils' work could also inform the interagency committee's coordination of future oil spill research by, for example, identifying gaps in research as identified and prioritized in updates to the research and technology plan. By coordinating with the NRDA trustee councils, the interagency committee could ensure that its research informs and supports the councils' damage assessment and restoration efforts and better leverages members' resources.

Literature Suggests the Effectiveness of Offshore Oil Spill Response Techniques Varies Based on Regional Environmental Differences and Other Factors

According to the literature we reviewed, environmental differences between the Gulf of Mexico and Arctic regions, as well as factors such as the type of oil, influence the potential effectiveness of various oil spill response techniques. In each region, environmental conditions, such as water and air temperature, water movement, and salinity, influence how

effective oil spill response techniques can be. Further, according to the literature we reviewed, these conditions determine which response techniques are appropriate.

Environmental conditions, such as ocean water and air temperature, can influence the effectiveness of natural oil removal through evaporation or biodegradation.⁵⁸ These processes may occur more quickly in warmer climates, such as in the Gulf of Mexico. In the event of an oil spill, communities of microbes can bloom to respond to the new supply of oil. According to a 2011 report from the American Academy of Microbiology, these microbes can biodegrade up to 90 percent of some light crude oil, but the largest and most complex molecules—such as the ones that make up road asphalt—are not significantly biodegradable.⁵⁹ A 2016 study found that higher temperatures lead to increased biodegradation, and increased salinity had a small positive impact on crude oil removal.⁶⁰ However, the American Academy of Microbiology report also states that while microbes can biodegrade oil over time, the process may not be fast enough to prevent ecological damage. Therefore, immediate containment or physical removal of the oil is an important first response.

The effectiveness of oil removal is also influenced by conditions of the water, determined by wind, waves, and currents. According to literature we reviewed, winds and currents can make it more difficult to remove the oil, increasing the likelihood of the oil spill affecting larger areas and additional plant and animal populations. Further, high seas and rough waters can make some response techniques less effective. According to a 2017 study that estimates the effect of environmental conditions on deploying oil spill response techniques in the Arctic Ocean, most

⁵⁸Biodegradation is the disintegration of materials, such as oil, by bacteria or fungi called microbes. It is estimated that about half of the oil in the world's oceans comes from natural seeps in the oil reservoirs and communities of microbes develop to metabolize this oil for their own energy.

⁵⁹American Academy of Microbiology, *Microbes and Oil Spills FAQ* (Washington, D.C.: 2011).

⁶⁰Priyamvada Sharma and Silke Schiewer, "Assessment of Crude Oil Biodegradation in Arctic Seashore Sediments: Effects of Temperature, Salinity, and Crude Oil Concentration" *Environmental Science and Pollution Research*, vol. 23 (2016).

response techniques are not suitable during Arctic winters, between November and June.⁶¹

Literature we reviewed also shows that other factors influence the effectiveness of response techniques, including oil type, oil thickness, and the location and depth of oil spill events. Light crude oil typically evaporates and biodegrades more quickly than heavy crude oil, which is more viscous. However, if the oil slick is too thin, it becomes difficult to contain and limits response options. Oil spilled in a remote location, such as the place where the *Exxon Valdez* oil spill occurred, may complicate response efforts because equipment and personnel are far away and may not be able to respond within the window of opportunity before the oil spreads.

According to Coast Guard officials, during an oil spill response, various response techniques are used to minimize the negative effects on the water surface, water column, and shorelines, each with different applications, advantages, disadvantages, and risks. The response techniques we reviewed are:

- Mechanical recovery in the marine environment uses a variety of containment booms, barriers, and skimmers, as well as natural and synthetic absorbent materials to capture and store the spilled oil until it can be disposed of properly.
- In-situ burning, meaning in-place burning, is the process of igniting and burning oil slicks in a controlled environment.
- Dispersants are chemicals that can mitigate the immediate damage caused by oil at the surface and help accelerate the natural removal of the spilled oil. Dispersants work similarly to dish soap, breaking up the oil into small droplets that can more easily spread through the water.⁶²

⁶¹Sierra Fletcher, Tim Robertson, Bretwood Higman, and Elise DeCola, *Estimating Impact of Environmental Conditions on Deployment of Marine Oil Spill Response Tactics in the U.S. Arctic Ocean*, proceedings of the Fortieth AMOP Technical Seminar (Ottawa: Environment and Climate Change Canada, 2017) 246-264.

⁶²Separating the oil molecules in oil slicks helps the oil move away from the surface down toward the ocean floor, which can accelerate the ocean's process of weathering or biodegrading the oil.

Mechanical Recovery Safely Removes Spilled Oil but Has Limitations in Certain Conditions

The advantage of mechanical recovery is that it physically removes the oil from the water, minimizing the negative effects of the oil. Mechanical recovery can be used to safely remove oil where other methods might cause health risks or environmental damage, according to a 2013 report published by the National Academies Press.⁶³

However, mechanical recovery has limitations in some conditions. If the oil slick is thin, it is difficult to achieve a significant rate of recovery and requires a lot of equipment to concentrate the slick so it is thick enough to be collected. According to literature we reviewed, mechanical recovery is less effective during inclement weather or high seas because the oil spreads and can emulsify in these conditions and is difficult to contain. Low temperatures and the presence of ice also make it challenging to achieve high recovery rates, and mechanical recovery becomes increasingly ineffective as wave heights increase, according to literature we reviewed.

Furthermore, the process of recovering the oil is labor- and cost-intensive, and recovery can be delayed if the equipment is not readily available. Mechanical recovery is especially challenging to implement quickly when spills occur in remote areas, such as with *Exxon Valdez*, or where the oil is traveling quickly and broadly, such as with *Deepwater Horizon*. For example, according to a 1999 EPA report, skimmers were not readily available during the first 24 hours following the *Exxon Valdez* oil spill, repairs to damaged skimmers were time-consuming, and continued inclement weather slowed down the recovery efforts.⁶⁴ In addition, a disadvantage of mechanical recovery is that temporary storage for large amounts of oil is frequently needed and recovered oil is generally brought back to the shore for disposal, according to Interior officials. Because of the resources required to physically remove the oil, it is difficult to recover

⁶³Committee on the Effects of the *Deepwater Horizon* Mississippi Canyon-252 Oil Spill on Ecosystem Services in the Gulf of Mexico, Ocean Studies Board, Division on Earth and Life Studies, and National Research Council, *An Ecosystem Services Approach to Assessing the Impacts of the Deepwater Horizon Oil Spill in the Gulf of Mexico* (Washington, D.C.: National Academies Press, Dec. 20, 2013).

⁶⁴Environmental Protection Agency, Office of Emergency and Remedial Response, *Understanding Oil Spills and Oil Spill Response*, EPA 540-K-99-007 (December 1999), 39.

a large percentage of the spilled oil through mechanical recovery in large oil spills.

In-Situ Burning Can Efficiently Eliminate Oil but Has Potential Side Effects

According to two studies and an agency document we reviewed, in-situ burning can be a highly effective technique for eliminating spilled oil from the sea surface.⁶⁵ In response to the *Deepwater Horizon* oil spill, roughly 5 to 6 percent of all of the spilled oil was burned, about double the amount of oil removed with skimmers, according to a 2013 National Academies Press report.⁶⁶

The primary advantage of in-situ burning is its efficiency. In ideal conditions, this method can quickly eliminate spilled oil. According to several reports we reviewed, in optimal conditions, in-situ burning can eliminate up to 90 percent of the spilled oil contained for burning with a relatively minimal investment of equipment or manpower.⁶⁷ Literature we reviewed suggests that it is especially suited for response in Arctic conditions, particularly in ice-covered water where logistics and environmental conditions may preclude other options and where the ice can act as a natural barrier to help keep the oil slick thick enough to burn.

However, in-situ burning also has its disadvantages. Burning has a narrow window of opportunity, and if the approval process takes longer than it takes to prepare for the burn, the opportunity for using in-situ

⁶⁵C. C. Guenette and P. Sveum. "In-situ Burning of Uncontained Crude Oil and Emulsion," *Proceedings of the 18th Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, Environment Canada, vol. 2* (1995); A.Y. Walavalkar and A.K. Kulkarni, "Comprehensive Review of Oil Spill Combustion Studies," *Proceedings of the 9th Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, Environment Canada* (1996), 1081–1103.

⁶⁶Committee on the Effects of the *Deepwater Horizon* Mississippi Canyon-252 Oil Spill on Ecosystem Services in the Gulf of Mexico, *An Ecosystem Services Approach to Assessing the Impacts of the Deepwater Horizon Oil Spill in the Gulf of Mexico*.

⁶⁷Janne Fritt-Rasmussen, Susse Wegeberg, and Kim Gustavson, "Review on Burn Residues from In Situ Burning of Oil Spills in Relation to Arctic Waters," *Water Air Soil Pollution*, vol. 226 (2015); Committee on Responding to Oil Spills in the U.S. Arctic Marine Environment, Ocean Studies Board, Polar Research Board, Division on Earth and Life Studies, Marine Board, Transportation Research Board, and National Research Council, *Responding to Oil Spills in U.S. Arctic Marine Environment* (Washington, D.C.: National Academies Press, 2014), 6, 88; and Arctic Oil Spill Response Technology Joint Industry Programme, *Synthesis Report*, D. Dickens-DF Dickens Associates, LLC (May 3, 2017) 39.

burning may be lost, according to a NOAA document. Similar to mechanical recovery, burning can only be used if the oil slick is a certain thickness and when waves, wind, and currents are not too strong. In-situ burning becomes increasingly difficult in strong winds or with waves over 3 feet tall. A second disadvantage is that the burn residue caused by in-situ burning may have negative effects on ocean life, though studies we reviewed differed on this matter. According to a 2014 National Academies Press report about oil spills in the U.S. Arctic environment, a series of studies in the 1990s found that burn residues have little to no impact on oceanic organisms.⁶⁸ However, a 2015 review on burn residues from in-situ burning in Arctic waters concluded that not enough research has been done on the side effects of burn residue from in-situ burning.⁶⁹ According to NOAA officials, another disadvantage of in-situ burning is that the soot from inefficient combustion can result in unsightly and unhealthy particulates that may affect any downwind populations before the smoke dissipates.

Use of Dispersants Is Versatile but Its Effectiveness Depends on Several Factors

According to Coast Guard officials, chemical dispersants are typically used in conjunction with mechanical means and are considered when offshore mechanical methods are recognized as inadequate because of the spill volume, the geographical extent of the slicks, or specific on-scene environmental conditions.

According to the literature we reviewed, an advantage of dispersants is their versatility. Dispersants are not as limited by environmental conditions as other response techniques, and they can be applied on surface or underwater environments. Further, dispersants can be applied through a variety of mechanisms. For example, they can be applied on oil slicks at the water's surface by boats, planes, or helicopters. Dispersants can also be used below the surface, through subsea injection at the site of the spill, as was applied in response to the *Deepwater Horizon* oil spill.

⁶⁸Committee on Responding to Oil Spills in the U.S. Arctic Marine Environment, Ocean Studies Board, Polar Research Board, Division on Earth and Life Studies, Marine Board; Transportation Research Board, and National Research Council, *Responding to Oil Spills in U.S. Arctic Marine Environment*.

⁶⁹Fritt-Rasmussen, Wegeberg, and Gustavson, "Review on Burn Residues from In Situ Burning of Oil Spills in Relation to Arctic Waters."

However, the literature suggests that the effectiveness of dispersants depends on many factors, such as the type of oil, type of dispersant used, and sea and weather conditions. According to Coast Guard officials, the decision to use dispersants is made after careful consideration of the location of the spill, type of oil spilled, seasonal resources at risk, and the environmental conditions at the time, as these factors influence the effectiveness and practicality of using dispersants, as well as the advisability of the tactic in the face of other options and risks. These officials also noted that dispersants are rarely used in the United States, but in certain situations, where mechanical means such as booming and skimming may not be effective, dispersants may be considered.

In addition to the uncertainty of their effectiveness, the potential environmental risks associated with dispersants are also uncertain. One 2014 study states that while dispersants were thought to undergo rapid degradation in the water column, there was evidence that the dispersants remained on Gulf of Mexico beaches almost 4 years after the *Deepwater Horizon* oil spill.⁷⁰ During the *Deepwater Horizon* oil spill, responders applied over 1.8 million gallons of chemical dispersants to the spilled oil—an unprecedented volume in the United States. It was the first major oil spill to use dispersants on such a large scale,⁷¹ and approximately 42 percent of these dispersants were applied sub-sea in the first operational sub-sea application of this technique.⁷² According to Coast Guard officials, the toxicity and long-term effects of large-scale application of dispersants on the ecology of marine life are unknown. According to literature we reviewed, there is evidence that chemically dispersed oil and some dispersant compounds may be toxic to some marine life, especially those in early life stages. Coast Guard officials also said that continued monitoring and further review of scientific research should improve the understanding of the impact of dispersants on mitigating the effects of oil spills as well as their overall environmental impact.

⁷⁰Helen K. White, Shelby L. Lyons, Sarah J. Harrison, David M. Findley, Yina Liu, and Elizabeth B. Kujawinski, “Long-Term Persistence of Dispersants following the *Deepwater Horizon* Oil Spill,” *Environmental Science & Technology Letters* (2014) 295-299.

⁷¹In response to the *Ixtoc* spill, which occurred from 1979 through 1980 off the coast of Mexico, responders applied 2.7 million gallons of dispersants to the surface of the water.

⁷²United States Coast Guard, On Scene Coordinator Report *Deepwater Horizon* Oil Spill, (September 2011).

Conclusions

Following initial response and cleanup efforts, restoration activities related to a significant offshore oil spill, such as those from *Exxon Valdez* or *Deepwater Horizon*, can endure for decades. Federal agencies of the interagency committee conduct and fund research projects related to preventing, preparing for, responding to, and restoring the environment after oil spills. The interagency committee has improved the coordination of federal oil spill research efforts since the *Deepwater Horizon* oil spill in 2010. However, the interagency committee has not systematically reviewed its membership to determine which offices within current member agencies are the most relevant to its mission and whether adding other federal agencies as members would be beneficial. By systematically reviewing its membership to determine whether any additional agencies should be involved in coordinating oil spill research and that the most appropriate offices within member agencies are represented, the interagency committee could improve its ability to coordinate research among federal agencies.

In addition, the interagency committee does not coordinate with the NRDA trustee councils that manage the large restoration funds and monitor the restoration of damaged resources after a specific spill, such as the *Exxon Valdez* and *Deepwater Horizon* oil spills. Coordinating with the NRDA trustee councils could help ensure that the interagency committee's oil spill research program is effectively supporting the damage assessment and restoration efforts of the councils, and better knowledge sharing between groups and leveraging its members' oil spill research resources.

Recommendations for Executive Action

We are making the following two recommendations to the Commandant of the U.S. Coast Guard at the Department of Homeland Security:

The Commandant of the U.S. Coast Guard should direct the chair of the Interagency Coordinating Committee on Oil Pollution Research, in coordination with member agencies, to systematically review its membership to determine whether any additional agencies should be involved in coordinating oil spill research and that the most appropriate offices within member agencies are represented. (Recommendation 1)

The Commandant of the U.S. Coast Guard should direct the chair of the Interagency Coordinating Committee on Oil Pollution Research, in coordination with member agencies, to coordinate with the relevant Natural Resource Damage Assessment trustee councils to help ensure that the interagency committee's research informs and supports the councils' damage assessment and restoration efforts. (Recommendation 2)

Agency Comments

We provided our draft report to the Department of Agriculture, Department of Commerce, Department of Defense, Department of Energy, Department of Homeland Security, Department of the Interior, Department of Transportation, Environmental Protection Agency, National Aeronautics and Space Administration, and U.S. Arctic Research Commission for review and comment. In comments reprinted in appendix II, the Department of Homeland Security concurred with our recommendations. In addition, the departments of Commerce, Homeland Security, Interior, and EPA provided technical comments, which we incorporated as appropriate.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of the report to the appropriate congressional committees; the Secretaries of Agriculture, Commerce, Defense, Energy, Homeland Security, the Interior, and Transportation; the Administrators of EPA and NASA; the Executive Director of the U.S. Arctic Research Commission; and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff members have any questions about this report, please contact me at (202) 512-3841 or ruscof@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.

Sincerely yours,

A handwritten signature in black ink that reads "Frank Rusco". The signature is written in a cursive style with a long, sweeping horizontal line extending to the right from the end of the name.

Frank Rusco
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

This report examines (1) how the Natural Resource Damage Assessment (NRDA) trustee councils have used the restoration trust funds for the *Exxon Valdez* and *Deepwater Horizon* oil spills and the status of the restoration efforts; (2) the status of the Interagency Coordinating Committee on Oil Pollution Research's (interagency committee) oil spill research efforts and how coordination of such efforts has changed since we last reported on it in March 2011; and (3) what literature suggests about the effectiveness of various oil spill response techniques in the Arctic and the Gulf of Mexico.

To examine how the NRDA trustee councils used the restoration funds from the *Exxon Valdez* oil spill (from October 1992 to January 2018) and the *Deepwater Horizon* oil spill (from April 2012 to December 2017) for restoration and the status of the restoration efforts, we obtained data from each trustee council on the amount of funds (1) ordered by the settlement for each restoration type; (2) authorized by the trustees for, but not yet spent on, restoration activities (authorizations); (3) spent on restoration activities (expenditures); and (4) not yet authorized for restoration activities (remaining balance) through calendar year 2017 for *Deepwater Horizon* and through January 31, 2018, for *Exxon Valdez*.¹ To assess the reliability of the financial data, we reviewed related budget documentation; interviewed knowledgeable council staff about how fund balances are recorded and reported; reviewed the totals for obvious errors and inconsistencies; and reviewed internal control documents, such as a database manual and standard operating procedures. We determined that the data were sufficiently reliable for the purposes of our report.²

¹Our review focuses on the role of the NRDA trustee councils; therefore, we excluded the criminal fine and restitution payment for *Exxon Valdez* and the RESTORE Act funding and the criminal payments paid to the National Fish and Wildlife Foundation and other entities for *Deepwater Horizon* from the scope of this review.

²The Exxon Valdez Trustee Council has submitted all of its annual financial statements to a third-party audit. Each Deepwater Horizon Trustee Council trustee is responsible for procuring financial audits no less than once every 3 years, with the first audit occurring in 2017, according to the trustee council's standard operating procedures.

We examined the approved restoration plans (1994 restoration plan and 2014 restoration plan update for the *Exxon Valdez* oil spill, and the 2016 programmatic damage assessment and restoration plan for the *Deepwater Horizon* oil spill) and, when available, annual reports on restoration activities (1994 through 2018 annual reports for the Exxon Valdez Oil Spill Trustee Council (Exxon Valdez Trustee Council) and 2016 and 2017 annual financial reports for the Deepwater Horizon Natural Resource Damage Assessment Trustee Council (Deepwater Horizon Trustee Council)). We also reviewed project reports and scientific studies that the trustee councils funded to gain a better understanding of the status of restoration of injured natural resources, restoration priorities, activities, and progress made by the trustee councils.³ We reviewed laws and regulations that provide the legal authority for federal agencies to intervene and respond after an oil spill, such as the Oil Pollution Act of 1990 (OPA), the Clean Water Act, and NRDA regulations. We met with officials from the Exxon Valdez Trustee Council to discuss the distribution of settlement money for restoration purposes after the *Exxon Valdez* oil spill, and with officials from the Deepwater Horizon Trustee Council, Gulf Coast Ecosystem Restoration Council (RESTORE Council), and the National Fish and Wildlife Foundation to discuss the distribution of settlement money for restoration purposes after the *Deepwater Horizon* oil spill. Additionally, in May 2018, we traveled to multiple locations in the former spill area in Alaska to observe the extent of restoration efforts and ongoing issues. Along with researchers sent by the Exxon Valdez Trustee Council, we excavated three pits that revealed lingering oil about 6 inches below the surface of the beach on Eleanor Island in Prince William Sound. These researchers told us that oil previously uncovered at this location had been linked to the *Exxon Valdez* oil spill. In addition to fieldwork in Alaska, in November 2017 and February 2018, we attended public meetings in Alabama and Louisiana to learn about restoration plans for the Gulf States.

To examine the status of the interagency committee's federal oil spill research efforts and how coordination of such efforts has changed since we last reported on it in March 2011, we requested funding data and project information on oil spill research from all 15 member agencies of

³Under OPA, damages for injuries to natural resources and services resulting from an oil spill incident must be based on a restoration plan developed after adequate public notice, opportunity for a hearing, and consideration of all public comment.

the interagency committee.⁴ We received data from the 9 member agencies that reported funding oil spill research projects from fiscal years 2011 through 2017.⁵ These 9 agencies provided data on agency expenditures on oil spill research and the research category of any projects funded.⁶ We assessed the reliability of the data by reviewing related documentation, interviewing knowledgeable agency officials, and reviewing agency internal controls for each of the 9 member agencies that provided us data about the steps they take to maintain this information. We determined that in most cases the data were sufficiently reliable for the purposes of our report. However, we chose not to provide the National Oceanic and Atmospheric Administration's (NOAA) agency expenditures for oil spill research because NOAA officials were unable to provide reliable data on the actual amount the agency spent on such research during the time period we requested. In addition, some agency officials we interviewed raised the concern that their agencies do not track oil spill research funding and therefore the information they provided on expenditures for such research may not include all relevant efforts that could inform oil spill prevention, preparedness, response, and restoration.

We also interviewed officials from the 15 member agencies to learn about each agency's oil spill research efforts and participation in and coordination through the interagency committee, and compared their coordination practices to one of our federal leading practices for collaboration for interagency groups to evaluate the interagency

⁴As of November 2018, the 15 member agencies of the interagency committee are the U.S. Coast Guard (Coast Guard), National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA), Bureau of Safety and Environmental Enforcement (BSEE), Bureau of Ocean Energy Management, U.S. Army Corps of Engineers, Pipeline and Hazardous Materials Safety Administration, U.S. Fish and Wildlife Service, U.S. Navy, National Aeronautics and Space Administration (NASA), Department of Energy, U.S. Fire Administration, Maritime Administration, National Institute of Standards and Technology, and U.S. Arctic Research Commission.

⁵The nine member agencies that reported funding oil spill research from fiscal years 2011 through 2017 are the Coast Guard, NOAA, the Department of Energy, the Bureau of Ocean Energy Management, BSEE, the Pipeline and Hazardous Materials Safety Administration, EPA, NASA, and the U.S. Arctic Research Commission. The other six member agencies reported that they did not fund or conduct oil spill research from fiscal years 2011 through 2017.

⁶For this report we use "funded" to describe money spent on oil spill research projects. We asked member agencies to include the total number of research projects funded from fiscal years 2011 through 2017.

committee's efforts to coordinate such research.⁷ We chose to focus on the collaboration practice pertaining to participants because it appeared to be the most challenging for the interagency committee based on the findings of our previous March 2011 report, the actions taken by the interagency committee to address our recommendations from that report, and our own findings from our research for this report.⁸ In addition, we reviewed the 2013 interagency committee charter, the committee's most recent biennial reports to Congress covering fiscal years 2008 through 2017, and the committee's third multiyear research and technology plan for fiscal years 2015 through 2021; attended two committee meetings; and reviewed minutes of eight past meetings. We also reviewed OPA's provisions that established and govern the interagency committee's coordination efforts and membership, as well as various related executive documents.

To examine what literature suggests about the effectiveness of various oil spill response techniques in the Arctic and the Gulf of Mexico, we conducted a literature search for studies and articles that analyzed and summarized the effectiveness of various oil spill response techniques in those regions. We identified existing literature from 1989 (the year of the *Exxon Valdez* oil spill) to March 2018 by searching various databases, such as Scopus and ProQuest. We chose to focus on three primary response techniques—mechanical recovery, in-situ burning, and the use of dispersants—used to clean up after offshore oil spills according to knowledgeable stakeholders and the literature we reviewed. The database search produced over 800 results. Our subject matter expert helped the team narrow this list to 50 results, of which we relied on 16 studies and articles that we determined were most relevant to our research objective of determining the effectiveness of various oil spill response techniques in the Arctic and the Gulf of Mexico. Some literature was not included if it was too specific for the scope of our review. Literature published recently, generally within the past 10 years, was considered more relevant. We supplemented the list of studies from these databases with literature from the Congressional Research Service, the

⁷GAO, *Managing for Results: Key Considerations for Implementing Interagency Collaborative Mechanisms*, [GAO-12-1022](#) (Washington, D.C.: Sept. 27, 2012), and *Results-Oriented Government: Practices That Can Help Enhance and Sustain Collaboration among Federal Agencies*, [GAO-06-15](#) (Washington, D.C.: Oct. 21, 2005).

⁸GAO, *Federal Oil and Gas: Interagency Committee Needs to Better Coordinate Research on Oil Pollution Prevention and Response*, [GAO-11-319](#) (Washington, D.C.: Mar. 25, 2011).

National Academies Press, the Environmental Protection Agency (EPA), NOAA, the American Academy of Microbiology, the Arctic Oil Spill Response Joint Industry Programme, and our previous report on oil dispersants. In total, we relied upon 22 literature results to inform the findings of our objective. For a complete list of the literature, see the bibliography. We shared our summary of the literature search findings with agency officials representing some of the interagency committee member agencies. The following agencies responded with comments and we included their perspectives where relevant: the Department of the Interior, EPA, NOAA, and the U.S. Coast Guard. We did not independently evaluate the effectiveness of these response techniques.

We conducted this performance audit from July 2017 to January 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Comments from the Department of Homeland Security



November 27, 2018

Frank Rusco
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Re: Management Response to Draft Report: GAO-19-31, "OFFSHORE OIL
SPILLS: Restoration and Federal Research Efforts Continue, but Opportunities
to Improve Coordination Remain"

Dear Mr. Rusco:

Thank you for the opportunity to comment on this draft report. The U.S. Department of Homeland Security (DHS) appreciates the U.S. Government Accountability Office's (GAO) work in planning and conducting its review and issuing this report.

The Department is pleased to note GAO's acknowledgment that the Interagency Committee on Oil Pollution Research Committee (the Committee), has strengthened communication and coordination among member agencies and nonfederal stakeholders since GAO's 2011 review. As the Committee chair, the U.S. Coast Guard remains committed to further improving collaboration on research efforts related to the prevention of, preparedness for, response to, and restoration after oil spills.

The draft report contained two recommendations with which the Department concurs. Attached find our detailed response to each recommendation. Technical comments were previously provided under separate cover.

Again, thank you for the opportunity to review and comment on this draft report. Please feel free to contact me if you have any questions. We look forward to working with you again in the future.

Sincerely,

A handwritten signature in black ink, appearing to read "Jim H. Crumpacker", is written over a horizontal line.

JIM H. CRUMPACKER, CIA, CFE
Director
Departmental GAO-OIG Liaison Office

Attachment

**Attachment: Management Response to Recommendations
Contained in GAO-19-31**

GAO recommended that the Commandant of the U.S. Coast Guard:

Recommendation 1: Direct the chair of the Interagency Committee on Oil Pollution Research, in coordination with member agencies, to review its membership to determine whether any additional agencies may be appropriate for coordinating oil spill research and that the most appropriate offices within member agencies are represented.

Response: Concur. As chair of the Committee, the Coast Guard will lead a systematic review of Committee membership. The review will be introduced at the next Committee meeting on December 12, 2018. Based on the review, the Committee will consider and implement adjustments to its membership, as appropriate. Estimated Completion Date (ECD): December 31, 2019.

Recommendation 2: Direct the chair of the Interagency Committee on Oil Pollution Research, in coordination with member agencies, to coordinate with the Natural Resource Damage Assessment [NRDA] trustee councils to help ensure that the interagency committee's research informs and supports the councils' injury assessment and restoration efforts.

Response: Concur. The Committee will coordinate with the NRDA trustee councils to ensure (1) that Committee and councils' members research informs their respective efforts, as appropriate, and (2) develop an action plan for continued engagement. Of note, while Committee research may support the councils' efforts, the Committee will not limit the scope of their Injury and Assessment and Restoration work to areas that only support councils' efforts. ECD: August 31, 2019.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Frank Rusco, (202) 512-3841 or ruscof@gao.gov

Staff Acknowledgments

In addition to the contact named above, Christine Kehr (Assistant Director), Amy Ward-Meier (Analyst-in-Charge), Colleen Candrl, Nirmal Chaudhary, Juan Garay, Cindy Gilbert, Matt Hunter, Jessica Lewis, Joe Maher, Greg Marchand, Kimberly (Kim) McGatlin, Cynthia Norris, Travis Schwartz, Sheryl Stein, Sara Sullivan, Vasiliki (Kiki) Theodoropoulos, Matthew Valenta, Sarah Veale, and Dan Will made key contributions to this report.

Appendix IV: Accessible Data

Data Tables

Accessible Data for Figure 2: Exxon Valdez Oil Spill Trustee Council Use of Restoration Trust Fund from October 1992 to January 2018

Category	Dollars in millions
Habitat Protection	445
Research, Monitoring & General Restoration	234
Reimbursements for Damage Assessments & Response	216
Research Investment Sub-Account	105
Habitat Investment Sub-Account	105
Administration, Science Management & Public Information	89

Accessible Data for Figure 4: Deepwater Horizon Natural Resource Damage Assessment Trustee Council Use of Restoration Trust Fund by Restoration Goal, from April 2012 to December 31, 2017

Total authorized 1.1 billion

Category	Dollars in millions
Habitat Protection	460
Enhancing recreational use	349
Restoring coastal and marine wildlife	218
Administrative oversight and monitoring	27
Restoring water quality	4

Agency Comment Letter

Accessible Text for Appendix II Comments from the Department of Homeland Security

Page 1

November 27, 2018

Frank Rusco

Director, Natural Resources and Environment

U.S. Government Accountability Office

441 G Street, NW

Washington, DC 20548

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recommendation. Technical comments were previously provided under separate cover.

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JIM H. CRUMPACKER, CIA, CFE

Director

Departmental GAO-OIG Liaison Office

Attachment

Page 2

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We reviewed literature to examine what it suggests about the effectiveness of various oil spill response techniques in the Arctic and the Gulf of Mexico. This bibliography contains citations for the studies and articles that contributed to these findings.

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