Ad-Hoc INDUSTRY

NATURAL RESOURCE MANAGEMENT GROUP

BEST PRACTICE APPROACH FRAMEWORKS IN THE CONTEXT OF NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION:

PFAS, CLIMATE, REMEDIATION/RESTORATION, EMERGENCY RESPONSE/RESTORATION

NEW TOOLS TO AID PRACTITIONERS IN PUBLIC AND PRIVATE SECTORS

December 2024

Developed By and For the Multi-Stakeholder Community

Published in Partnership with the Environmental Law Institute

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TABLE OF CONTENTS

FOREWORD

This document is the culmination of several years of collaborative and cooperative work among a wide set of legal, scientific and economic experts in industry, government, academia and more. The Best Practice Approach Frameworks presented herein provide unique step by step processes as to how one can approach four rather complex topics that are integral to the conduct of natural resource damage assessments under US laws and may also be applicable to practices under EU and other liability regimes.

The Frameworks focus on four salient topics—PFAS, Climate Change, Remediation and Emergency Response. It is hoped that their application in site- and case-specific instances will aid consideration and decision making concerning these topics in the context of natural resource damage liability, assessment, and restoration. As the natural resources practice arena is a dynamic one, the Frameworks will be reviewed periodically for possible expansion or revision, and we welcome comments on them as well.

Finally, none of this could have been achieved without the superb cooperation of our partners in federal and state government, tribal communities and more. We are especially grateful to The George Washington University Law School, the Environmental Law Institute, the George Washington University Environmental and Energy Management Institute in their steadfast support of our Natural Resources Symposia, which provided the forums to discuss, debate and explore these topics.

Barbara Goldsmith

Executive Director, Ad-Hoc Industry
Natural Resource Management Group

December 2024, Washington, DC

1.0 INTRODUCTION

The Ad-Hoc Industry Natural Resource Management Group (Group), in collaboration with representatives from the multi-stakeholder community (industry, federal and state government, academia, professional organizations and others), is pleased to make publicly available—for the first time—four topic-specific Best Practice Approach Frameworks, which are intended to aid practitioners working on natural resource damage assessment (NRDA), liability and restoration matters at specific cases and sites.

The Frameworks are focused on four key issues: (1) per- and polyfluoroalkyl substances (PFAS); (2) Climate Change; (3) Remediation; and (4) Emergency Response and all are aimed at building consistency in practice as to how these issues can be considered in the context of NRDA and restoration at hazardous waste and oil spill sites. Each Best Practice Approach Framework involves a step by step process, establishing a structured method for the evaluation of potential impacts of these leading issues in site-specific instances. The Frameworks, as presented, assume advanced knowledge of the NRDA process as defined in various federal and state statutes and regulations.

The Frameworks are intended for use by different parties at a given site, including potentially responsible parties (PRPs), response agencies, natural resource trustees and others. The Frameworks can identify early decision points in the NRDA process to consider what can often be challenging issues and how they can be managed; encourage alignment among parties as to site-specific objectives and desired endpoints; provide a structure to evaluate incident-specific characteristics; expedite remediation, assessment and restoration; increase efficiency; and promote fairness. Allowing for earlier and more cost-effective case settlements and, ultimately, earlier restoration of natural resources affected by hazardous waste releases or oil spills, is also an inherent goal of the Frameworks.

While there are rapidly changing legislative, regulatory and policy requirements related to the natural resource practice arena, the fundamental underpinnings and principles of the Best Practice Approaches presented here remain constant until and unless there are specific changes in the state of the practice that require an update. Further, the material presented in this document focuses on natural resource issues under US laws, but the considerations and proposed solutions herein may also be applicable to natural resource regimes in the UK, EU and other countries as well.

Chapter 2 of this document summarizes the work done over the past few years to develop the Best Practice Approach Frameworks, including the purpose and intended use of the Frameworks. Each Framework is presented in its entirety in Chapters 3, 4, 5 and 6 respectively: (1) A Best Practice Framework Approach: PFAS and Natural Resource Damage (NRD); (2) A Best Practice Framework Approach: Climate Change and NRD; (3) A Best Practice Framework Approach: Coordinating Remediation and Restoration; and (4) A Best Practice Framework Approach: Coordinating Emergency Response and Restoration. Background and the current context in which the Frameworks would be applied, as well as consensus Guiding Principles and Rules of Engagement pertinent to successful implementation of the Frameworks, is covered in Chapter 7. Chapter 8 provides, for additional context, the agendas of the Natural Resources Symposia convened in 2020, 2022 and 2023. Chapter 9 recognizes the many multi-disciplinary and multi-stakeholder Framework co-authors, reviewers and other contributors and Chapter 10 includes references and resources for the multi-stakeholder practitioner community relevant to the Framework topics. This document concludes with a description of the Group and its key partners in Chapter 11.

2.0 BACKGROUND AND DEVELOPMENT OF THE FRAMEWORKS

This Chapter summarizes the work done by multi-stakeholders, since 2020, to develop, refine and publish Best Practice Approach Frameworks to address four leading practice issues impacting natural resource liability, assessment, restoration and allied issues – PFAS, Climate Change, the interface between remediation and restoration, and the interface between emergency response and restoration.

2.1 Impetus for the Frameworks

The Group convened Part 1 of its 12th Natural Resources Symposium, "*Natural Resources at a Crossroads: How 2020 Has Affected Natural Resources Law and Policy and Highlighted the Importance of Private/Public Collaborations to Advance Shared Objectives*" held virtually on September 17, 2020, in collaboration with the George Washington Law School, the Environmental Law Institute, and the George Washington University Environmental and Energy Management Institute. This Symposium program—the only continuing national and international forum involving industry, government and others—brought together the multi-stakeholder community to examine the natural resource policy and practice arena in the context of 2020 realities and focus on innovative and cutting-edge solutions. The 2020 program identified a set of key "influencers" and drivers for change including "forever chemicals", climate change effects, shifting regulatory and judicial practices, corporate accountability, reporting and more.

It was evident during the Symposium that the ongoing complexities of natural resource management and policy required increased collaboration between the public and private sectors, as well as novel, progressive and flexible approaches. As a result of these engaging and insightful discussions, it was agreed that development of Best Practice Approach Frameworks would be beneficial and could help address some of leading challenges impacting NRD liabilities under US laws (Superfund, Oil Pollution Act [OPA], etc.). To focus efforts, the key challenges to address via the Frameworks included three specific topics: (1) PFAS; (2) climate change; and (3) the interface between remediation and restoration.

2.2 Drafting and Presentation of Initial Framework Drafts

Following the Group's 2020 Natural Resources Symposia, several Group-Internal Multi-Disciplinary Working Groups were created—one each for PFAS, Climate Change and Remediation/Restoration Interface—to conceive, scope and draft the proposed Best Practice Frameworks. These Draft Frameworks were then presented and discussed in September 2022 at the Part 2 of the Group's 12th Natural Resources Symposium, "Natural Resources at a Crossroads: How Recent Events Have Affected Natural Resources Law and Policy and Highlighted the Importance of Public/Private Collaborations to Advance Shared Objectives", on September 15–16, 2022, held in collaboration with The George Washington University Law School, Environmental Law Institute, The George Washington University Environmental and Energy Management Institute.

Following a review of the key drivers for change and the ongoing "influencers" on natural resource practice, the 2022 Symposium was used as a forum to vet the content of the Frameworks, as well as identify how the Frameworks could be used more broadly in actual practice, through a series of topic-specific panels. Panelists represented both public and private sectors and provided detailed insights and feedback on each of the Frameworks. Further, multi-stakeholder Symposium participants—who included a wide range of persons representing private and public sectors, including industrial companies, law firms, consulting firms, federal trustee departments/agencies, state trustee departments/agencies, tribal communities, research organization, non-profit organizations, academia, industry associations and professional organizations—agreed that there was benefit and value in the presented Frameworks; in fact, a fourth topic was also identified for development: Emergency Response/Restoration Interface.

2.3 Refining the Frameworks via Multi-Stakeholder Review and Interactive Workshops

As follow on to the 2022 Symposium and to keep the development of the Best Practice Approach Frameworks moving forward, four topic-specific Multi-Stakeholder Working Groups were established involving industrial company representatives, law firm and consulting firm practitioners, federal trustees, state trustees, tribal trustees, the Environmental Law Institute, The George Washington University Law School and other experts. These Multi-Stakeholder Working Groups provided reviews, comments and possible edits to the Frameworks over the course of 2023. The Multi-Stakeholder Working Groups also identified a final step to make the Frameworks suitable for broad distribution: to convene a series of Workshops focused on applying the Frameworks to site- and case-specific scenarios.

To share the work done by the Multi-Stakeholder Working Groups and confirm next steps for the Frameworks, the Group convened a November 2023 specialty session, "Natural Resources Symposium Redux: Influences, Perspectives, Needs One Year Later", in cooperation with The George Washington University Law School, Environmental Law Institute, The George Washington University's Environmental and Energy Management Institute and others. This program built upon the discussions of the 2022 program and revisited key themes and influences to look specifically at influences and developments during the intervening year, to bring fresh perspectives and identify additional needed actions moving forward for the set of Best Practice Approach Frameworks. Plans for the topic-specific Workshops were shared with participants.

Then, in 2024, four interactive, multi-stakeholder Workshops involving legal, scientific, technical and policy experts from public and private sectors were convened to work through and refine each of the Best Practice Approach Frameworks to identify possible needed refinements or expansions. Each Workshop began with a review of key developments followed by detailed, interactive Work Out Sessions applying the Best Practice Approach Frameworks to hypothetical NRDA and restoration cases or sites. Work Out Leaders, representing various disciplines and entities, led the dialogue and exchange, which ultimately resulted in minor substantive changes to the Framework drafts. The results of the Workshops, as well as the culmination of the multi-stakeholder work supporting the Frameworks, is presented

Many legal, technical, economic and other experts contributed to the development of the Practice Approach Frameworks, notably via contributions by participants in Multi-Stakeholder Working Groups on the topic, attendees at the 2022 and 2023 Natural Resources Symposia and the series of Best Practice Approach Workshops held in March, June and July 2024. In addition, multiple opportunities for review outside the Multi-Stakeholder Working Group's active participants were provided to persons in both public and private sections, including representatives from the US Department of the Interior (DOI), US Department of Commerce/National Oceanic & Atmospheric Administration, US Department of Energy, US Department of Agriculture, US Department of Defense, state and tribal trustee communities, the Environmental Law Institute, national industry trade associations, various law and consulting firm representatives, industrial companies, The George Washington University School of Law and other partnering organizations, some of which are highlighted in Chapter 11.

Table 1: Overview of Key Framework-Related Activities

Year	Activity	Purpose
2020	12th Natural Resources Symposium Part 1 Held	Multi-stakeholder program to examine the natural resource policy and practice arena in the context of 2020 realities and identify possible solutions for current needs
2021–2022	Group-Internal Multi-Disciplinary Working Groups Established on 3 Key Topics: PFAS, Climate Change, Remediation Restoration	Conceive and draft an initial Best Practice Approach Framework for addressing these issues in the context of NRDA and restoration practices
2022	12th Natural Resources Symposium Part 2 Held	Multi-stakeholder forum to present and vet the initial Best Practice Approach Frameworks
2022–2023	4th Group-Internal Multi-Disciplinary Working Group Formed on Emergency Response and Restoration	Best Practice Approach Framework drafted
2023	4 Multi-Stakeholder Working Groups Formed on each Framework Topic: PFAS, Climate Change, Remediation/Restoration; Emergency Response/Restoration	Draft Frameworks circulated for review/comment and next Steps to finalize Frameworks identified
	Natural Resources Symposium Redux Program Convened	Multi-Stakeholder forum to share Multi-Stakeholder Working Group work to date, as well as preview proposed topic-specific Best Practice Approach Workshops
2024	4 Best Practice Approach Framework Workshops Convened	Interactive, multi-stakeholder sessions to "work through" and refine each of the Best Practice Approach Frameworks via case applications to identify possible needed refinements or expansions
	Finalization and Consolidation of Best Practice Approach Frameworks	Final edits and revisions made to each Framework as a result of Workshop discussions and review by Workshop Leads and Work Out Session Leaders

3.0 PRESENTATION OF THE FRAMEWORKS: A BEST PRACTICE APPROACH—PFAS AND NATURAL RESOURCE DAMAGES

This chapter provides a Best Practice Framework for approaching PFAS issues in the context of natural resource damage assessments at a specific case or site, including an introduction, legal and regulatory context on the matter, the step-by-step Framework, cost-benefit considerations, a case application of the Framework and summary remarks.

BEST PRACTICE APPROACH

PFAS AND NATURAL RESOURCE DAMAGES

3.1 Introduction

This Best Practice Framework presents how per- and polyfluoroalkyl substances (PFAS) are considered in the context of Natural Resource Damage Assessments. (NRDAs). It assumes advanced knowledge of the natural resource damage assessment (NRDA) process as defined in various federal and state statutes and regulations[1]. The process outlined here consists of six main steps, each of which is detailed below.

The Framework is intended for multistakeholder use and is aimed at building consistency in practice as to how these issues can be considered. While there are rapidly changing legislative, regulatory and policy requirements related to this practice arena, the fundamental underpinnings and principles of the Best Practice Approach presented here remains constant until and unless there are specific changes in the state-of-the art that require an update. We first outline the legal and regulatory context of considering PFAS in the context of NRDA below, followed by presentation of the Framework and some cost-benefit considerations. A case example application of the Framework, as well as the agenda from the Group's March 2024 Best Practice Approach Framework Workshop is also included.

3.2 Legal and Regulatory Context

Overview. PFAS are a group of man-made chemicals, which include perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), GenX and many others, that have been manufactured and used by a variety of industries starting in the 1940s. PFOA and PFOS have been the most extensively studied of these chemicals. It has been shown that these chemicals do not break down easily and can accumulate over time. There is some preliminary evidence that exposure to certain PFAS may lead to adverse human health effects, which may in turn impact human use of natural resources (USEPA).[2]

What does this mean for future natural resource damage cases involving PFAS? The use of PFAS in product manufacturing has become widespread across numerous industrial sectors. To date, there are thousands of different PFAS, and that number continues to grow as industry creates new forms of these chemicals.[3] PFAS are broadly used. Examples include: food packaging (including pizza boxes, candy wrappers, and microwave popcorn); nonstick cookware; carpets, upholstery, and other fabrics; water-resistant clothing; shampoo, dental floss, nail polish, and eye makeup; and paints, varnishes and sealants,

[1] For further background on natural resource damage (NRD) liability and related issues, see www.NRDonline.org, https://darrp.noaa.gov/ and https://www.doi.gov/restoration.

[2] https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas

[3] *Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)*, NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (Apr. 27, 2021), https://www.niehs.nih.gov/health/topics/agents/pfc/index.cfm#footnote2

etc.[4] Among the sectors that manufacture or use PFAS in some fashion are airports, military installations, petroleum refineries, bulk chemical transporters or storage facilities, landfills and wastewater treatment plants, as well as textile, leather, paper, plastic, and wire manufacturers. Whether through manufacturing releases into water or air or through use in certain products such as firefighting foams, human exposure to PFAS has become a significant concern for many stakeholders.

Given the complex nature of PFAS, there are unique issues and challenges when determining potential liability for natural resource damages. For example, the term PFAS includes precursor compounds, which tend to breakdown in the environment to certain terminal compounds, as well as the terminal compounds themselves. Furthermore, there are differences in what constitutes a PFAS compound across different state and regulatory agencies, leading to confusion over how to define them. In addition, only certain PFAS have regulatory thresholds or are of interest to regulators and/or Trustees[5] at this time. Therefore, several key issues should be addressed upfront when conducting a natural resource damage assessment (NRDA) in order to provide clarity for the entire assessment.

Key Laws/Regulations. Today, 95% of the U.S. population is estimated to have at least some measurable concentration of PFAS in their blood.[6] The prevalence and occurrence of these chemicals in drinking-water supplies nationwide, as well as recent discoveries of new areas of contamination or their sources, are driving a flurry of legislative and regulatory developments at the federal and state levels. Many have described PFAS contamination as an unfolding public health crisis.[7] At the same time, companies that use PFAS in product manufacturing or fire suppression and control face a growing risk of liability exposure in the midst of the fast-changing regulatory environment and the fast-emerging litigation boom that could rival the tidal wave of asbestos litigation of previous years. In light of these emerging trends, there is a growing demand for alternative product formulations that avoid the use of various types of PFAS, stepped- up regulatory control over their use in products, and remediation of contaminated drinking-water supplies in communities located near manufacturing facilities emitting PFAS or where PFAS-containing products have been used in fire-fighting foam.

In recent years, state authorities have brought legal actions against PFAS manufacturers and users to require remediation of PFAS and to recover damages for injuries to natural resources due to releases of PFAS. Generally, state PFAS suits arise in three categories, with states usually filing under multiple categories. These categories include: (1) PFAS as "discharges" from facilities alleging injury to surrounding natural resources; (2) product liability and related common law claims associated with manufacturing of aqueous film-forming foam (AFFF) (a type of firefighting foam); and (3) common law claims related to the release of PFAS into the environment associated with a wide array of products.

A great amount of activity related to regulation of PFAS in the past few years has been seen at both the federal and state level. At the federal level, for example, EPA has issued a final rule to regulate six PFAS—perfluorooctanoic acid ("PFOA"), and perfluorooctane sulfonate ("PFOS"), perfluorohexane sulfonic acid ("PFHxS"), perfluorononanoic acid ("PFNA"), hexafluoropropylene oxide dimer acid ("HFPO-DA"), and perfluorobutane sulfonic acid ("PFBS")—in drinking water[8] EPA has also designated PFOA and PFOS as

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[4] *Per- and Polyfluoroalkyl Substances (PFAS) and Your Health*, AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (June 24, 2020), https://www.atsdr.cdc.gov/pfas/health-effects/exposure.html

[5] Natural resource trustees include federal, state and tribal officials designated under federal or state laws to hold natural resources (land, water, biota) in the public's trust.

[6] *PFAS Top 10 Facts*, NATIONAL GROUNDWATER ASSOCIATION, https://www.ngwa.org/docs/default-source/default-document- library/pfas/pfastop-10.pdf?sfvrsn=8c8ef98b_2#:~:text=Studies%20have%20estimated%2095%20percent,measurable%20concentrations%20in% 20their%20blood (last visited Mar. 24, 2021).

[7] *See, e.g.* Tom Perkins, *The "Forever Chemicals" Fueling a Public Health Crisis in Drinking Water*, THE GUARDIAN (Feb. 3, 2020), https://www.theguardian.com/society/2020/feb/03/pfas-forever-chemicals-what-are-they.

[8] See US EPA Rulemaking PFAS National Primary Drinking Water Regulation: https://www.govinfo.gov/content/pkg/FR-2024-04-26/pdf/2024-07773.pdf

"hazardous substances" under CERCLA.[9] Several states have led in regulating several PFAS in groundwater, drinking water, soil, in consumer product and in designating certain PFAS as hazardous substances. Additional influences and state of the practice concerning the PFAS/NRD interface can be found in the presentations and proceedings of the Group's 2020, 2022 and 2023 Natural Resources Symposia (see www.naturalresourcessymposium.com).

3.3 Best Practice Framework

The proposed best practice approach, described here, involves a six-step process, establishing a framework for evaluation of potential impacts of PFAS on natural resource damage liability, assessment, and restoration.

This solution is intended to be used by both potentially responsible parties (PRPs) as well as the regulators and Trustees conducting and/or overseeing the NRD assessment. Because of the need to clarify the key issues early on in an NRD, such as identifying the PFAS of interest and key regulatory thresholds, it is important to have a well-articulated protocol. Furthermore, this protocol may be helpful for regulatory agencies and Trustees, which may have oversight over the establishment of regulatory thresholds.

- As a preliminary "**step zero**," perform an initial evaluation of currently known PFAS information potentially applicable to each step of the framework and potential key uncertainties, with the objective of outlining the potential scope and goals of a reasonable NRDA.
- The **first step** is to "Frame the Problem," which seeks to define PFAS in the current instance.
- The **second step** is to "Understand PFAS Usage," which determines to what extent PFAS were used at the site.
- The **third step** is to "Establish Discharge Pathways," to identify the potential pathways specific for PFAS to the environment.
- The **fourth step**, "Identify Receptors,", assesses the potential for PFAS to have reached both human and environmental receptors.
- The **fifth step**, "Evaluate Service Loss," evaluates the specific services that may have been lost at the site due to PFAS contamination.
- The **sixth step**, "Determine Restoration Alternatives," identifies possible restoration alternatives exists for natural resource restoration of the lost services.

Each step and the questions to be addressed is detailed below.

Note that, while the framework is described as a series of "steps," it is designed to be flexibly applied depending on the specifics of a particular situation. Priorities and the order of the steps may vary widely based on the information available, the interests of any stakeholders, the types of contamination present, and. the media impacted. Therefore, the "steps" of the framework do not necessarily need to be tackled in order, and should be revisited periodically throughout the process.

[9] See USEPA Designation of PFOA and PFOS as CERCLA Hazardous Substances: https://www.epa.gov/superfund/designation-perfluorooctanoic-acid-pfoa-and-perfluorooctanesulfonic-acid-pfos-cercla

Table 2: PFAS/NRD Best Practice Approach Framework

Step Number and Description	Questions to be Answered/Tasks to be Completed
Step 0: Initial Evaluation	What information relevant to each framework step is currently known? • Determine which PFAS are likely to be of primary relevance. • Assess the known and potential natural resource impacts, media/receptors, and what, if any, data is already available. • Consider potential uncertainties around PFAS at issue, including usage, pathways, or receptors. • What are the likely goals and outcomes of a reasonable NRDA? • Identify likely objectives and uses of the NRDA (e.g., support addressing known impacts in specific receptors). • Consider uncertainties, acceptable levels of uncertainty, and the reasonable costs to address uncertainties in furtherance of likely objectives. • Determine likely relevant stakeholders (PRPs, regulators, affected communities, others) and timing for input.
Step 1: Frame the Problem	**What PFAS?** • The term "PFAS" includes thousands of chemicals • Identify how the relevant regulator/Trustee defines "PFAS" and which particular PFAS have regulatory thresholds (e.g., PFOA, PFOS, PFBS). • PFAS can be used in many different applications and products. Determine whether specific uses are of concern to the relevant regulator/Trustee. • Consider the role, influence, and impacts of precursor, degradation, or other substances associated with identified PFAS. • Other non-PFAS contaminants may be present or co-located with PFAS. Identify such contaminants.
Step 2: Understand PFAS Usage	**To what extent were PFAS used at the site?** • Understand how PFAS were historically used or are currently being used at the facility, including duration, application, volumes, and waste streams. • Understand whether any precursor PFAS were used, stored, or produced at the facility – some PFAS transform into others in storage or in the environment. For example, certain fluorotelomer alcohols can transform into PFOA.
Step 3: Establish Discharge Pathways	**What are the potential pathways for PFAS to the environment?** • Understand the potential release mechanisms for PFAS to reach the environment, including pathways that are receiving more scrutiny by certain regulators/Trustees (e.g., air to groundwater pathway). • Understand which specific PFAS may have been released at various stages of the operational process.

Step Number and Description	Questions to be Answered/Tasks to be Completed
Step 4: Identify human and environmental receptors	**What is the potential for PFAS to have reached receptors?** • Identify any receptors, whether human or environmental, that may have been affected by any PFAS released from operations. • Evaluate which specific PFAS may have reached each receptor – not all PFAS behave the same way in the environment, and the fate and transport of any particular PFAS will depend, to some extent, on the chemistry of that specific PFAS and the environmental conditions at issue (geology, hydrology, etc.). • Evaluate whether and to what extent the same specific PFAS already exist in the environment prior to the release (i.e. "baseline" or "background") – given the ubiquitous nature of many PFAS, and their relative lack of degradation, it is important to understand whether certain PFAS already may have reached the same receptor from another specific source or ambient concentrations. • Identify media/receptors with no potential natural resource injury to the extent possible.
Step 5: Evaluate Service Loss	**What services have been lost due to any PFAS contamination?** • Evaluate the potential for the specific PFAS to cause a loss of natural resource services. • Evaluate the extent to which PFAS bioaccumulation can be attributed solely to site or targeted source. • Evaluate the extent, if any, to which that potential natural resource service loss may be attributable to "background" PFAS presence or other non-PFAS contamination. • Determine whether this is evidence of natural resource service resilience since the date of first known exposure.
Step 6: Determine Restoration Alternatives	**What alternatives exist for natural resource restoration?** • Assess what remediation is to be required by the regulator/Trustee. • Evaluate the extent to which remediation can be enhanced to provide further natural resource restoration, or whether there are technical impracticability challenges in doing (i.e., remediation standard is already as low as analytical methodologies allow detection). • Identify feasible and commensurate restoration alternatives. [Note: While the restoration alternatives in the step are focused on remediation, restoration beyond remediation can also be considered within agreed upon timeframes.] • Consider the type and format of a potential mutually agreed-upon resolution or settlement, as well as the appropriate level of certainty and finality that can be achieved through use of contribution protection, NRD credits, and/or limits on reopeners.

3.4 Cost-Benefit Considerations

Following the above best practice approach for preparing for natural resource damages issues related to PFAS will involve some additional costs by various parties, including PRPs, Trustees and others. However, these costs may be outweighed by the benefits of understanding potential liability. A better understanding of potential liability by all involved parties ensures the appropriate level of remediation and natural resource restoration is identified. In particular, establishing baselines for levels of PFAS and for natural resource

services at a site allows for better assessment of any future changes in services related to PFAS. **Separation of baseline services from potential impacts of PFAS ensures proper causation links.**

In addition, a clear understanding of pathways of potential contamination as well as natural resource receptors may allow steps to be taken that could reduce or prevent the loss in natural resource services that may occur. In particular, protection of groundwater resources that are used for drinking water or preemptively mitigating potential groundwater impacts through soil-pathway remediation or provision of substitute supplies would prevent future potential damage before it could occur.

3.5 Case Application of the Best Practice Approach Framework

Hypothetical PFAS Site

PFOS was discharged from a manufacturing facility into a stream. It migrated to a lake that is linked by connecting channels to a number of other lakes and a river. PFAS was discovered in fish tissue samples, and a fish consumption advisory was issued. There were also concerns about drinking water contamination and the ecological effects of elevated levels of PFAS concentrations on the health of fish, birds, and mammals. This case study exposition focuses on the evaluation of human-use service loss associated with fish consumption advisories.

Step 0: Perform Initial Evaluation

a. Relevant PFAS was PFOS.

b. The primary known natural resource being impacted was fish, and the focus was on human-use service loss.

c. There were uncertainties with respect to the scope of natural resources affected and whether other PFAS or other PFAS sources were involved, but it was anticipated that these issues would be assessed in tandem with, and as part of, the PFOS-focused NRDA.

Step 1: Frame the Problem

a. The term PFAS includes thousands of chemicals.

b. Relevant PFAS was PFOS because PFOS was manufactured at the facility where discharges were alleged.

c. PFOS used in manufacturing at the facility. PFOS had been a focus of regulators and natural resource trustees at all levels.

d. PFOS was present in elevated fish tissue samples that led to a fish consumption advisory in downstream waterbodies.

    i. Distinction was important for baseline evaluation due to proliferation of unrelated PFAS of concern.

e. The fish consumption advisories were caused by non-PFAS contaminants (polychlorinated biphenyls [PCBs], dioxins, and mercury).

    i. Distinction was important *for* baseline evaluation due to proliferation of non-PFAS contaminants.

Step 2: Understand PFAS Production, Usage and Discharge

a. Identify the extent of PFAS production and use at the site

    i. PFOS was manufactured at the facility.

    ii. Residual amounts of the manufactured PFOS was discharged into the facility's wastewater.

b. PFOS precursors or other PFAS precursors were not used at the facility.

Step 3: Identify Discharge Pathways

a. Establish the pathways through which the PFAS of interest was discharged to the affected resources or Wastewater stream emptied into an affected lake.

   i. Initial affected lake was tied by a connecting channel to other affected lakes and a river.

   ii. Wastewater discharge migrated to the affected streams, lakes, and river and into groundwater.

Step 4: Identify Human and Ecological Receptors

a. Fish that had elevated levels of PFOS in tissue samples.

b. Other ecological receptors in the food web.

c. Anglers who may catch, keep, and eat the fish.

d. Humans who may be exposed to contamination via surface water, drinking water, or animals in the food web exposed to PFAS

Step 5: Evaluate Service Loss

a. The elevated levels of PFOS in fish tissue samples led to the issuance of a fish consumption advisory.

b. The fish consumption advisory creates a specific link to injury for anglers who fish or would potentially fish in the affected sites.

c. Baseline advisory characterization is important at affected sites.

   i. Some affected sites had advisories that were only for PFOS.

   ii. Other affected sites had advisories for PFOS and other chemicals including PCBs, dioxins, and mercury.

d. Baseline advisory characterization was important at unaffected sites.

   i. Some of the unaffected sites had no advisory.

   ii. Some had advisories for PFOS only-but not the PFOS from the manufacturing site.

   iii. Some had advisories for PFOS, PCBs, dioxins, and mercury.

e. To isolate the effect of the site's release and therefore damages, it was important for the analysis to characterize and account for these differences.

f. For purposes of this case study, the focus is on evaluation of human-use service loss associated with fish consumption advisories (but otherwise, perform similar evaluations for other affected resources).

Step 6: Determine Restoration Alternatives

a. Restoration projects focused on fishing enhancements at fishing sites that did not have a PFOS advisory.

b. The costs of restoration projects necessary to offset the service losses estimated in Step 5 represented the monetary estimate of damages.

3.6 Summary

This above Framework sets forth a best practice approach for considering for assessing natural resource damages related to PFAS contamination in site-specific instances. It is intended to be a resource for the

different parties at a given site, including PRPs, response agencies, natural resource trustees, and others. **Using this Framework can save time and costs and align NRDA objectives, including desired end points, of the parties involved at specific site.** While the material presented in this Framework focuses on natural resource issues under US laws, the considerations and proposed solutions herein may also be applicable to natural resource regimes in the UK, EU and other countries.

3.7 March 2024 Best Practice Approach Framework Workshop Agenda

PFAS/NRD BEST PRACTICE APPROACH FRAMEWORK WORKSHOP

Tuesday, March 12, 2024

AGENDA

10:00 AM

WELCOME AND WORKSHOP OBJECTIVES

Kegan Brown, Partner, Lowenstein Sandler LLP and Thomas Pearce, Associate, Latham & Watkins LLP

10:15 AM

BACKGROUND ON THE FRAMEWORKS AND WHY THEY WERE DEVELOPED

Barbara J. Goldsmith, Executive Director, Ad-Hoc Industry Natural Resource Management Group; President, Barbara J. Goldsmith & Company LLC

10:30 AM

REVIEW OF KEY PFAS/NRD RELATED DEVELOPMENTS SINCE 2022

Speakers:

Legal: ***Thomas Pearce***

Technical: ***Kristin Robrock, Ph.D., P.E., Managing Engineer, Exponent***

Economic: ***Ryan Stifter, Principal, Economic & Complex Analytics, Roux***

Policy: ***Paul Stofa, Chief Advisor, Office of the Deputy Commissioner, Legal and Regulatory Affairs, New Jersey Department of Environmental Protection***

11:15 AM

QUICK REVIEW OF THE FRAMEWORK

Kegan Brown

11:30 AM

INTERACTIVE WORK OUT – OPEN EXCHANGE AND DISCUSSION OF THE FRAMEWORK THROUGH APPLICATION TO HYPOTHETICAL CASE 1

Work Out Leaders:

John Gardella, Shareholder, GMBG3 Law

Tom Gulbransen, Program Manager, Battelle Environment & Infrastructure

Miranda Henning, BCES, Managing Principal, Business Director, Health and Ecology, Integral Consulting

Theodore Tomasi, Ph.D., Managing Principal, Integral Consulting Inc.

12:45 PM

BREAK FOR LUNCH

1:45 PM

INTERACTIVE WORK OUT – OPEN EXCHANGE AND DISCUSSION OF THE FRAMEWORK THROUGH APPLICATION TO HYPOTHETICAL CASE 2

Work Out Leaders:

John Gardella

Tom Gulbransen

Miranda Henning, BCES

Theodore Tomasi, Ph.D.

3:15 PM

SUMMARY/OPEN DISCUSSION

Kegan Brown and Thomas Pearce

3:45 PM

NEXT STEPS

Barbara J. Goldsmith

4:00 PM

ADJOURN

4.0 PRESENTATION OF THE FRAMEWORKS: A BEST PRACTICE APPROACH: CLIMATE CHANGE AND NATURAL RESOURCE DAMAGES

This chapter provides a Best Practice Framework for approaching climate change and extreme weather issues in the context of natural resource damage assessments at a specific case or site, including an introduction, legal and regulatory context on the matter, the step-by-step Framework, cost-benefit considerations, a case application of the Framework and summary remarks

BEST PRACTICE APPROACH

CLIMATE CHANGE AND NATURAL RESOURCE DAMAGES

4.1 Introduction

This Best Practice Framework presents how climate change (CC) is considered in the context of natural resource damage assessments (NRDAs). It assumes advance knowledge of the natural resource damage assessment (NRDA) process as defined in various federal and state statutes and regulations[10]. The process outlined here consists of six main steps, each of which is detailed below.

The Framework is intended for multistakeholder use and is aimed at building consistency in practice as to how these issues can be considered. While there are rapidly changing legislative, regulatory and policy requirements related to this practice arena, the fundamental underpinnings and principles of the Best Practice Approach presented here remains constant until and unless there are specific changes in the state-of-the art that require an update. The steps outlined in this Framework may not always be linear. For example, depending on the circumstances, parties may need to evaluate restoration earlier in the process. Parties should evaluate at the outset of the NRD evaluation if some of the earlier steps in the Framework may be skipped, or postponed, based on the complexity of the site, the extent of the injuries and common knowledge on the prevalence of climate change or extreme weather events. Also, parties should consider if some of the steps in the framework are intertwined or will occur simultaneously.

We first outline the legal and regulatory context when considering climate change in the context of NRDA below, followed by presentation of the Framework and some cost-benefit considerations. A case example application of the Framework, as well as the agenda from the Group's June 2024 Best Practice Approach Framework Workshop is also included.

4.2 Legal and Regulatory Context

Overview. CC issues relating to NRD[11] will undoubtedly evolve over coming years. **The Best Practice Framework presented below is intended to: (a) guide initial evaluations for specific incidents at specific sites as to whether – and to what degree -- CC and extreme weather events (EWE) effects have relevance to NRD; and (b) whether -- and to what degree -- analyses of these factors should be undertaken.**

[10] For further background on natural resource damage (NRD) liability and related issues, see www.NRDonline.org, https://darrp.noaa.gov/ and https://www.doi.gov/restoration.

[11] As designated under the Comprehensive Environmental Response, Compensation, and Liability Act of 1990 (CERCLA) or "Superfund", the Oil Pollution Act (OPA) and other federal and state laws. 42 USC 9601, et seq. and 33 USC 2701, et seq. respectively.

NRDAs are undertaken to determine what actions are needed to restore the services provided by natural resources that have been impacted by releases of hazardous substances or oil. There are two sets of federal regulations, both optional -- one focused on evaluation of NRDs relative to hazardous waste sites and the other relative to oil spills.[12]

The basic questions in considering climate and extreme weather factors in injury assessment and restoration involve: (a) to what extent should non-release factors (described below) be considered or investigated in specific incidents; and (b) what methods should be used to conduct such investigations.

CC affects the natural environment in two basic ways:

- First, changes in climate introduce elements such as sea level rise and increasing ocean and land mass temperatures, on global, regional, and local scales, which, in turn, impart observable and measurable long-term changes to the environment and the habitats and natural resources therein. Moreover, such changes can alter human uses of resources and the relative values of various services these resources provide.
- Second, the increasing frequency and severity of EWE attributable to changes in climate (e.g., tropical cyclones, wildfires, extreme precipitation, flooding, storm surges, etc.) cause large episodic and in some cases permanent disturbances in those habitats and natural resources. While changes in climate can result in permanent shifts in physical and biological resources, EWEs result in regional, and more often local largescale upsets, which may or may not permanently change natural resources.

Both changes in climate and EWEs may result in observable and measurable changes in habitats and natural resources considered under the NRDA process - whether OPA or CERCLA driven. Thus, since it is important to measure injury and scale restoration needed as a result of oil or chemical release(s), as adverse changes from the non-release baseline (i.e., "but for"), likewise it is important to consider how those conditions may be influenced by climate and extreme weather factors. These considerations involve likely shifts in the natural resource baseline against which injury and recovery are measured and scaled, as well as treatment of climate and extreme weather factors as "alternative stressors" which may adversely affect natural resources and be mistaken for natural resource injuries.

Further, the same factors affect not only injury assessment, but also are interwoven in the scaling, design, effectiveness, and resilience of restoration projects that are developed to compensate the public for injuries to natural resources and the services they provide. If the overall resource base is affected through time, particularly at CERCLA sites, the relative value of injuries and restoration also changes, undermining the assumptions on which simplified scaling methods such as Resource Equivalency Analysis (REA) and Habitat Equivalency Analysis (HEA) [13] are based.

While CC and EWE impacts are increasingly becoming a factor in the NRDA process, key questions center on deciding when, and to what extent, analysis of CC and EWE factors in an NRDA is appropriate. Thus, the blend of the application of rigorous science and the practical aspects of coming to fair and equitable NRDA settlements comes into focus as a primary strategic consideration.

Key Laws/Regulations. The profound roles that climate and extreme weather factors may play in an NRDA, both for injury and restoration, imply that decisions must be made as to whether and how to consider climate and extreme weather factors in assessment approaches.

While both OPA and CERCLA regulations include considerations of the natural baseline, in practice, assessments of baseline and information used to determine it are typically not well-specified for either

[12] See 15 CFR 990 and 43 CFR 11, respectively.

[13] HEA and REA are methods used to quantify compensation by equating ecological services or species lost due to contamination with those gained through restoration, without directly estimating economic values for losses or gains.

habitats or individual natural resources. While the proper baseline is the "but for" condition that may be changing over time, NRDAs for some oil or chemical releases have relied on historical data for a habitat or resource which may already be outdated due to the temporal gap between the measurement of historical baseline conditions and the incident date. In the intervening years, both climate and extreme weather factors may have significantly affected a baseline (e.g., fish or bird populations and distributions; chemical toxicity due to aquatic temperature changes; water quality; habitat quality or extent, condition of recreation infrastructure). Given the increasing effects of climate change factors over time, a pre-spill or pre-release estimate of baseline is likely to become increasingly unusable and irrelevant over time, even if the historical data is up to date. Finally, changes in the natural environment after (i.e., OPA) or during (i.e., CERCLA) an incident due to CC and EWE may show that "but for" conditions are non-stationary and that recovery to a pre-spill baseline is never possible. Predicting actual dynamic baselines over the life of the incident and recovery is of augmented importance when CC and EWEs are considered.

In addition to the effect on baselines, climate or extreme weather factors may actually amplify (or mitigate) observed or measured injury. Potential mechanisms include narrowing of temperature tolerances for some species making them more vulnerable to chemical toxicity, reducing the availability of substitutes for recreation which increase the values of trips lost from an event, or completely erasing or making any chemical injury unmeasurable or hypothetical (e.g., if a hurricane completely obliterates a marsh or reef habitat or changes the sediment texture in an intertidal or subtidal resource area).

In a restoration context, climate factors need to be integrated into restoration planning, project design, and resilience planning, due to the same physical and biological factors that affect injury assessments. An added consideration for restoration may be the inclusion of carbon dioxide mitigation, carbon sequestration, and resiliency-friendly elements protective of adjacent non-injured habitat that could be taken into consideration for scaling and restoration credits. When regional baselines are changing, CC and EWE may need to be factored into methods for scaling compensatory restoration.

Influences and state of the practice concerning the Climate Change/NRD interface can be found in the presentations and proceedings of the Group's 2020, 2022 and 2023 Natural Resources Symposia (see www.naturalresourcessymposium.com).

4.3 Best Practice Approach Framework

The Proposed Best Practice Framework involves a six-step process to evaluate potential impacts of climate change on NRD liability, assessment and restoration. Optimally, this multi-step process is undertaken as part of a cooperative assessment wherein scientific and economic experts representing both responsible parties (RP) and trustee entities and interests evaluate the details, the merits, and the practicality of considering CC and EWE factors in the NRDA. The result of the application of this multi-step framework then should be an incident-specific plan to conduct such an evaluation.

- The **first step** is the "Incident Analysis", which would consider the nature and complexity of the release, the potentially affected habitats and services they provide, and their vulnerability to CC and EWE factors.
- The **second step** is a "Determination of Applicable CC Factors" that are relevant to the specific incident (e.g., sea level rise; tropical storm frequency; extreme precipitation, trends in ocean temperature; impacts on recreation infrastructure, etc.).
- The **third step**, "Determination of Investigation Intensity" is an outcome of the first two steps. Based on the nature and specifics of the incident, this step determines if and to what extent CC or EWE factors should be analyzed for their potential influence on baseline and injury. One of three "levels" of inclusion - from no or minimal consideration to rigorous quantitative consideration of climate factors – is determined.
- The **fourth step** "Injury Evaluation" proceeds if the outcome of the third step is to formally

consider CC and EWE factors. In this step the evaluation involves how each material CC or EWE will impact each alleged injury.

- The **fifth step**, "Scaling" evaluates the impacts of CC or EWE on scaling of service losses.
- The **final step**, "Restoration Project Selection", evaluates the impacts of CC or EWE on selection, credit calculations and implementation of proposed restoration projects.

Each step and the questions to be addressed is detailed below.

Table 3: Climate Change/NRD Best Practice Approach Framework

Step Number and Description	Questions to be Answered/Tasks to be Completed
Step 0: Initial Evaluation	**What information relevant to each framework step is currently known?** • Determine which PFAS are likely to be of primary relevance. • Assess the known and potential natural resource impacts, media/receptors, and what, if any, data is already available. • Consider potential uncertainties around PFAS at issue, including usage, pathways, or receptors. **What are the likely goals and outcomes of a reasonable NRDA?** • Identify likely objectives and uses of the NRDA (e.g., support addressing known impacts in specific receptors). • Consider uncertainties, acceptable levels of uncertainty, and the reasonable costs to address uncertainties in furtherance of likely objectives. • Determine likely relevant stakeholders (PRPs, regulators, affected communities, others) and timing for input.
Step 1: Incident Analysis	**What is the nature and complexity of the release; the potentially affected resources, habitats, and services they provide; and the vulnerability of those resources and habitats to CC / EWE factors?** • Determine whether and with what intensity the incident will require investigation and data collection and how information from those investigations may be used. ○ The more complex and severe the incident (or when an incident occurs in a geographical area known to be more sensitive to various climate factors), the more climate factors need to be addressed in consideration of baseline, injury assessment and quantification, and in the development of resilient restoration projects. ○ Alternatively, in those incidents that can quickly assess injury, resolve restoration approaches, and conduct settlement discussions using conventional NRDA approaches, CC and EWE factors are likely to be factually unimportant or of low priority for investigation.

Step Number and Description	Questions to be Answered/Tasks to be Completed
Step 2: Determination of Applicable Potential Climate Change Factors	**What are the climate change factors that may impact the NRDA at this particular site?** • Determine the relevant climate change factors for the given instance (e.g., sea level rise; tropical storm frequency; extreme precipitation; drought trends; ocean temperature trends; land temperature changes; impacts on recreation infrastructure, etc.). • Analyze the potential impact these factors may have in the NRDA: a) the frequency and severity of severe storms, resulting in b) extreme precipitation, and c) physical "forcing factors" that can alter habitats and resources therein; d) prolonged temperature variations from norms; e) ocean or land temperature changes. • Determine whether the applicable impacts will have short term, episodic, or long-term effects on the resource(s) and/or habitats, and/or ecological service values. o Short-term and episodic changes can directly affect NRD injury assessments and should be considered as "alternative stressors" to those resulting from the incident itself (e.g., chemical toxicity factors). o Long term changes are those that impact the applicability of baseline data (e.g., resource populations) and determination of the recovery trajectories in scaling analyses such as HEA and REA. Longer-term climate factors are also especially important in CERCLA-related NRDAs due to the longer term nature of both the contamination inputs, exposures, and recovery periods inherent in CERCLA events. • Rank the CC and EWE factors in suspected order of importance of their relevance and possible influence on the incident: 1) critical factors of clear importance; 2) non-critical factors of lesser importance; 3) factors likely not material to NRDA elements.
Step 3: Determination of Investigation Intensity	**What level of investigation into CC and EWE issues at this site is necessary?** • Determine which party or parties will be the lead for analyzing the impacts of CC and EWE factors on the NRDA. o Although the Responsible Party may have the burden to evaluate the impacts of CC and EWE for baseline and injury assessments. The Trustees may take on a greater role in this evaluation when considering and selecting restoration projects. • Based on the outcome of Steps 1 and 2, determine the level of effort needed to analyze the impact of CC and EWE factors on the NRDA. o *Level 1*: Minimal. Despite possible CC issues and extreme weather disruptions, moving rapidly to a settlement based on other considerations is the best course of action. Potentially, only the restoration project design would include climate resiliency considerations. o *Level 2*: Qualitative. Qualitatively (i.e., using professional judgment based on the literature) consider only a subset of the most critical factors potentially having the greatest impact (e.g., extreme precipitation and land or ocean temperature change) and design literature investigations, analyses, and related low intensity studies to examine those factors. o *Level 3*: Rigorous and quantitative. Climate effects on baseline, injury and restoration would be rigorously and quantitatively researched and investigated (e.g., for complex and large releases with potentially greater injuries to multiple resources occurring in climate/extreme weather vulnerable areas). Each factor would be researched, and probabilistic analysis would be applied within a true casual analysis framework to determine the likelihood of that factor being important.

Step Number and Description	Questions to be Answered/Tasks to be Completed
Step 4: Injury Evaluation	**What impact will each material CC or EWE critical factor (see Step 2) have on each alleged injury?** • Examine each critical factor (i.e., candidate factor), in each specific injury category for causation. • For each critical factor: o Access data on each CC and/or EWE factor. o Access data on the chemical (or behavioral in the case of human use) impacts related to the oil or hazardous chemical release – exposure concentration, duration of exposure, toxicity, etc. o Access information from the literature, or in some cases site-specific information, on the effect of each chemical/behavioral effect and each CC/EWE factor on the resource being considered. o Access information on ecological or life history characteristics of each resource being considered. o Determine the likelihood of each factor playing a role in the injury being assessed. o Perform an analysis of short term vs. long term impacts from CC and EWE and how that duration affects injury and restoration project determinations. o Consider that available data regarding CC and EWE impacts may be limited, particularly in considering baseline conditions and measuring injury. o Consider if additional data collection directly focused on the CC or EWE factors needs to be collected.
Sept 5: Scaling	**What impact will CC or EWE factors have on scaling service losses?** • Evaluate whether the changes in baseline due to CC or EWE will sufficiently alter ecological or human-use service values over time such that scaling methods need to be adjusted to accommodate these changes. • If using HEA and REA, consider adjusting the discount rate to reflect changes in the resource base. If using a valuation approach, consider incorporating changing service values directly into scaling.
Step 6: Restoration Project Selection	**What impact will CC or EWE factors have on restoration project selection, credit calculations and implementation?** • Evaluate whether CC or EWE could affect the success or longevity of a restoration project. o If so, parties may expand the typical nexus between the NRD incident and restoration project, particularly with respect to the location of a project. • Consider the viability and resilience of the restoration projects as a result of CC. • Consider CC or EWE in the context of performance criteria development for a restoration project. • Consider alternative geographic locations for restoration projects that have a higher likelihood of successful implementation and sustainability. • Consider additional costs for adaptive management in response to the effects of CC or EWE during restoration project construction and operation, increased costs for monitoring of projects after implementation and potentially a further upward adjustment in the contingency that is typically included in the costing of restoration projects. • Consider public acceptance of any restoration project.

4.4 Cost-Benefit Considerations

The level of effort devoted to evaluation of CC and EWE factors on NRDA components - baseline, injury, restoration - will be determined by the level of Investigation Intensity (Step 3 above) considered appropriate in each specific case. **This framework and implied process represents a balance between the goal of accurate delineation of climate-related effects and the need for cost-effective and timely resolution of NRD claims.** For example, in a CERCLA claim where historic impacts of a release may span back many decades, it may be desirable to understand how climate-related factors have altered the baseline over that time span, but limitations on availability of suitable data to demonstrate how resources have responded to those factors may make such an investigation impractical. Alternatively, for an oil spill that occurs during an intense phase of an El Niño event, focused collection of data on the impact of the event on biological communities may prove cost-effective in more accurately defining baseline and reducing the magnitude of injury claims.

For restoration scaling, effort spent on forecasting the impacts of future climate-driven changes and EWEs on potential restoration projects may be important for accurately evaluating the relative benefits of different projects. For example, enhanced resiliency to the impacts of sea-level rise may make a seemingly less cost-efficient project more valuable by making projected future benefits more likely to accrue. Demonstrating this could have practical implications for assigning restoration credits to various candidate projects and ultimately to the selection and scaling of the most cost-efficient option.

4.5 Case Applications of the Best Practice Approach Framework

Hypothetical Case #1: Heron Bay Oil Spill

On July 1, an undersea crude oil pipeline in the Gulf of Mexico, off the coast of Louisiana, ruptures. Faulty sensors and the failure of a valve results in a substantial release, estimated to exceed 100,000 barrels of oil. A substantial portion of the release reaches the coastline in Louisiana, impacting coastal marshes. Patches of oil and tarballs travel east, along the coastline, and force closures of beaches in Mississippi and Alabama over the July 4th holiday. The rupture of the pipeline also occurs during a year when NOAA has issued Unusual Mortality Event ("UME") warnings for marine mammals in the Gulf.

Recoverable oil is removed from the water within two weeks of the release and shoreline cleanup on the area beaches is completed within three weeks, allowing impacted beaches to reopen by the end of July. Oil stranded in the coastal marshes proves more difficult to remove and response crews are still at work when a Category 5 hurricane impacts the area in early August. The rain, wind, and storm surge associated with this massive hurricane disperse the remaining oil from the release, but also severely impact the coastal marsh habitat, which is increasingly compromised by sea level rise. The hurricane also does extensive damage to the local beach communities and tourism infrastructure, severely reducing recreation in the area. Beach visitation does not return to normal levels until three years post-incident.

Incident responders and the public recover 48 gulf dolphin carcasses in the month after the release. Responding agencies estimate actual losses of dolphins to be 3x this number due to carcasses sinking at sea prior to recovery. Several of the dolphins recovered from the shoreline near the point of the release are partially covered in oil, but it is unclear whether the dolphins encountered the oil while still living or whether the carcasses collected oil after landing on oil impacted shorelines. The state of decomposition of some of the carcasses indicates that their death occurred before the releases. This species of dolphin, listed as an endangered species, is well studied by local researchers who have documented a sharp decline in population over the last three years. Researchers have published papers attributing the decline to an increase in ocean temperature resulting in a loss of prey.

The Louisiana heron, a common species inhabiting the coastal marshes near the release point appears to be the bird species most impacted by the release. Several dozen oiled herons are collected near the release, but experienced responders remark that it could have been much worse, as the heron fledglings had recently

left their nests. The hurricane appears to do extensive damage to heron habitat, but counts of nesting pairs the year following the incident appear close to normal, although data on herons in this area is limited.

Amongst the restoration projects favored by local communities is a restoration of critical coastal marsh habitat damaged by the hurricane. Some commenters on the proposed coastal marsh restoration, however, express concern about the viability of this project, arguing that sea level rise is likely to inundate the marshes within 10 years.

Step 1: Incident Analysis – The incident is a large oil release into a complex environment that is influenced by climate and EWE, including ocean temperature fluctuations, sea level rise, and hurricanes.

Step 2: Determination of Applicable Potential Climate Change Factors

Critical Factors of Clear Importance

a. Category 5 Hurricane, impacting determination of resource injury and recovery of human use including physical removal of marsh habitat which must be differentiated from injury caused by oil (smothering or toxicity), redistribution of incident oil from physical removal of marshes and flooding associated with the hurricane;

b. Rise in ocean temperature, impacting determination of injury to dolphins and distribution and nesting of birds;

c. Sea level rise, may impact viability of coastal marsh restoration projects.

Non-Critical Factors of Lesser Importance

a. Hurricane impacts on the Louisiana Heron.

Step 3: Determination of Investigation Intensity

Level 3, Rigorous and Quantitative

a. Hurricane impacts on human use and the redistribution and removal of oil;

b. Rise in ocean temperature impacts on the dolphin injury.

Level 1, Minimal

a. Hurricane impacts on the heron population;

b. Sea-level rise impacts on marsh restorations projects.

Step 4: Injury Evaluation

a. Damage to the tourism infrastructure caused by the hurricane will likely impact the recovery of human use resources for years to come, complicating the NRD evaluation. Data on the recovery of human use following similar hurricane events should be considered.

b. Published literature on the decline in the dolphin population as well as data collected during the response indicating not all dolphin carcasses are spill related would be examined.

Step 5: Scaling

a. Human loss uses must consider lost trips from hurricane damage as a baseline. Data from other hurricane events unrelated to oil spills for losses in trips, boating and other recreation including recovery time should be considered in scaling human use related to the spill.

b. Hurricane impacts may dramatically alter the baseline bird populations.

c. Ocean temperature increases also causes scaling issues for dolphin losses springing from injury/causation determination.

d. Restoration projects for human use could have higher credit values for projects also helping recovery from hurricane damage.

Step 6: Restoration Project Selection

a. Selection of coastal marsh restoration projects will be impacted by sea level rise. Consideration should be given to alternate locations or habitats that will be less impacted by sea level rise.

b. Resiliency to hurricane impacts must also be considered when selecting restoration projects.

Hypothetical Case #2: Colorado Solvent Services

Colorado Solvent Services (CSS) operated a waste solvent recycling facility from 1975-2020. CSS accepted used solvents from a variety of industries and stored the solvents in several large underground storage tanks prior to processing. CSS is located near the Trout River, separated from the river by a seasonal wetland, beloved by the local bird-watching community and providing habitat for several critical species of bird and amphibians.

Business for CSS was good, so good that it failed to notice that two of its underground storage tanks had developed leaks in the early 1990's. By the time CSS discovered the leaks in 2019, investigators estimate 45,000 to 50,000 gallons of solvents had entered the shallow groundwater table. Initial investigations find that a solvent and heavy metal contaminated ground water plume underlies the adjacent seasonal wetland and appears to have entered the Trout River, contaminating sediment for about 1 mile of the river.

The Trout River basin is in a long-term drought and an increasing percentage of precipitation that the area receives comes in the form of brief, high-intensity rain storms. The flow in Trout River, once a highly productive fishery, drawing anglers from across the state, has significantly reduced during the drought years. There is anecdotal evidence that angler and other recreational visitation at Trout River has declined, but the most recent survey of recreation in the area was performed in the late 1990's well before the drought. The drought's impacts on the seasonal wetland are well-documented by local bird-watchers in a database maintained by the local university. The season that the wetland provides habitat for birds has decreased by 30% resulting in 50% decline in the number of birds that use the wetland.

The remediation plan for CSS calls for excavation and removal of impacted soil from several square miles of the seasonal wetland as well as dredging of Trout River. Until the remediation of Trout River is complete, Colorado Fish and Game has closed a five mile stretch of river to fishing. A groundwater extraction and treatment system is expected to operate for five years and will likely drawdown the groundwater table in the seasonal wetland, further reducing the number of days the area can support wetland habitat.

Restoration projects proposed by local stakeholders include seasonal wetland restoration and restoration of riparian habitat along Trout Creek to improve trout habitat. Some local scientists question whether the drought-lowered groundwater elevation can support wetlands. In addition, lowered stream flows with flash-floods following the high intensity rain events may hamper riparian habitat restoration.

Step 1: Incident Analysis – The incident is a long-term release of solvents impacting groundwater and a 5 mile-stretch of a trout stream. Drought and increase in brief high-intensity rain events has impacted the natural resources and human use.

Step 2: Determination of Applicable Potential Climate Change Factors

Critical Factors of Clear Importance

a. Long-term drought has lowered the water table, reducing the wetlands value as bird habitat.

b. Increased frequency of high-intensity rainfall events may wash away or redistribute contaminants. Remediation must be resilient to prevent redistribution of contaminants.

Non-Critical Factors of Lesser Importance

a. The drought's impacts on human use of the trout stream are less certain.

Step 3: Determination of Investigation Intensity

Level 3, Rigorous and Quantitative

a. Bird population data on the impacts of drought is available for use to determine baseline for this resource, however, consideration should be given to whether the damages to the wetland warrant significant analysis of this issue.

Level 2, Qualitative

a. The impacts of drought and high-intensity rain events on the trout stream habitat may warrant a qualitative review.

Level 1, Minimal

a. Long-term drought impacts on the restoration of the wetlands and trout stream may be considered.

Step 4: Injury Evaluation

a. Available data appears to demonstrate that the drought has impacted the value of the wetland resource for bird habitat, although the drought has occurred during the same period as the release.

b. Data available for recreational use of the stream does not appear to demonstrate that the drought has impacted this resource.

Step 5: Scaling

a. Should ignore the potential impacts of high intensity precipitation events for scaling.

Step 6: Restoration Project Selection

a. The drought may make restoration of the wetlands impacted by release impossible or impractical. An alternate location for wetland restoration may need to be considered.

b. Drought and high-intensity rain fall events will also impact the design of the trout stream restoration. Restoration must be resilient.

4.6 Summary

This above Framework sets forth a best practice approach for incorporating CC considerations in the context of NRDAs at hazardous waste sites and oil spill sites. It is intended to be used by the different parties at a given site, including PRPs, response agencies, natural resource trustees, and others. **Using this Framework can save time and costs and align NRDA objectives, including desired end points, of the parties involved at specific sites.** While the material presented in this Framework focuses on natural resource issues under US laws, the considerations and proposed solutions herein may also be applicable to natural resource regimes in the UK, EU and other countries.

4.7 June 2024 Best Practice Approach Framework Workshop Agenda

CLIMATE CHANGE/NRD BEST PRACTICE APPROACH FRAMEWORK WORKSHOP

Wednesday, June 26, 2024

AGENDA

10:00 AM

WELCOMING REMARKS ON BEHALF OF LATHAM & WATKINS

Thomas Pearce, Associate, Latham & Watkins LLP

10:05 AM

OPENING REMARKS OF THE WORKSHOP'S LEAD CONVENER

Steven Goldberg, Partner, Downey Brand LLP

10:15 AM

BACKGROUND ON THE FRAMEWORKS AND WHY THEY WERE DEVELOPED

Barbara J. Goldsmith, Executive Director, Ad-Hoc Industry Natural Resource Management Group; President, Barbara J. Goldsmith & Company LLC

10:30 AM

REVIEW OF KEY CLIMATE/NRD RELATED DEVELOPMENTS SINCE 2022

Speakers:

Policy: ***John Pendergrass, Senior Advisor, Research and Policy, The Environmental Law Institute***

Legal: ***Patrick Veasy, Partner, Downey Brand LLP***

Technical: ***Richard Wenning, Montrose Environmental Inc.***

Economic: ***Theodore Tomasi, Ph.D., Managing Principal, Integral Consulting Inc.***

11:15 AM

QUICK REVIEW OF THE FRAMEWORK

Steven Goldberg

11:30 AM

INTERACTIVE WORK OUT – OPEN EXCHANGE AND DISCUSSION OF THE FRAMEWORK THROUGH APPLICATION TO HYPOTHETICAL CASE 1

Work Out Facilitators:

Steven Goldberg

Patrick Veasy

Monica Browner, Associate, Downey Brand LLP

Work Out Leaders:

Michael J. Anderson, Ph.D., Environmental Program Manager, California Department of Fish and Wildlife, Oil Spill Prevention and Response

Paul Boehm, Ph.D., Principal Scientist, Exponent, Inc.

Gary Fremerman, Senior Counsel, US Department of Agriculture

Jean Martin, J.D., Senior Counsel, BP Legal

Ryan Stifter, Principal, Economic & Complex Analytics, Roux

12:45 PM

BREAK FOR LUNCH

1:45 PM

INTERACTIVE WORK OUT – OPEN EXCHANGE AND DISCUSSION OF THE FRAMEWORK THROUGH APPLICATION TO HYPOTHETICAL CASE 2

Work Out Facilitators:

Steven Goldberg

Patrick Veasy

Monica Browner

Work Out Leaders:

Michael J. Anderson, Ph.D.

Paul Boehm, Ph.D.

Gary Fremerman

Jean Martin, J.D.

Ryan Stifter

3:15 PM

SUMMARY/OPEN DISCUSSION

Steven Goldberg and Monica Browner

3:45 PM

NEXT STEPS

Barbara J. Goldsmith

4:00 PM

ADJOURN

5.0 PRESENTATION OF THE FRAMEWORKS: A BEST PRACTICE APPROACH: COORDINATING REMEDIATION AND RESTORATION

This chapter provides a Best Practice Framework for coordinating remediation and restoration issues and practices a specific case or site, including an introduction, legal and regulatory context on the matter, the step-by-step Framework, cost-benefit considerations, case applications of the Framework and summary remarks.

BEST PRACTICE APPROACH

COORDINATING REMEDIATION AND RESTORATION

5.1 Introduction

This Best Practice Framework presents a process to encourage consistency across stakeholder groups and at sites nationwide in addressing coordination of remediation and natural resource restoration. It assumes advance knowledge of the natural resource damage assessment (NRDA) process as defined in various federal and state statutes and regulations[14]. The process outlined here consists of several steps, each of which is detailed below.

The Framework is intended for multistakeholder use and is aimed at building consistency in practice as to how these issues can be considered. While there are rapidly changing legislative, regulatory and policy requirements related to this practice arena, the fundamental underpinnings and principles of the Best Practice Approach presented here remains constant until and unless there are specific changes in the state-of-the art that require an update.

We first outline the legal and regulatory context of the remediation/restoration paradigm below, followed by presentation of the Framework and some cost-benefit considerations. A case example application of the Framework, as well as the agenda from the Group's July 2024 Best Practice Approach Framework Workshop is also included.

5.2 Legal and Regulatory Context

Key Laws. Natural resource damages are typically regarded as residual after cleanup and, as such, the statutes, regulations, and guidance largely separate the two processes governing the relationship between cleanup/restoration and NRDA and compensatory restoration. Despite this, experience has shown that joint consideration of the two processes can save time and money, including opportunities for coordination of data collection and analysis, and accelerate the restoration of injured natural resources, enabling their use(s) to be returned more quickly to the affected communities.

[14] For further background on natural resource damage (NRD) liability and related issues, see www.NRDonline.org, https://darrp.noaa.gov/ and https://www.doi.gov/restoration.

Under the federal law, the Comprehensive Environmental Response, Compensation, and Liability Act of 1990 (CERCLA) or Superfund, Potentially Responsible Parties (PRPs) are accountable for reducing exposure of humans and the environment to hazardous substances through remediation (e.g., excavation and removal, capping) or other mechanisms (e.g., monitored natural recovery (MNR)). The US Environmental Protection Agency (USEPA) manages these remedial requirements while another CERCLA provision, separate from remediation, allows natural resource trustees[15] to make a claim against PRPs for natural resource damages.

Since passage of CERCLA in 1980, thousands of sites have been remediated and over 1,000 legal claims for natural resource damages have been settled – totaling over $17 billion. A large proportion of these cases took many years to settle and there are cases currently that have been going on for decades; however, many of these settlements could have proceeded more effectively and expeditiously had remediation and restoration been coordinated from the start.

Some PRPs have coordinated their remedial work with restoration at CERCLA sites, which has allowed them to reduce mobilization and construction costs, while garnering improvements to natural resources sooner than might have been achieved otherwise. Some PRPs may argue against coordination since it might give a real or implied acknowledgement of liability for harming natural resources or may result in improvements much greater than what are needed to offset the potential claim.

While the material presented in this Framework focuses on the advantages of remediation and restoration coordination at hazardous waste sites under CERCLA, the considerations and proposed solutions herein may be equally applicable to state hazardous wastes sites, as well as emergency response and restoration activities in the context of oil spills[16].

Key Responsibilities/Current Practice. CERCLA created two complementary regimes for cleaning up contaminated sites and restoring injured natural resources. The cleanup component of CERCLA consists of statutory provisions that specify the process for investigating sites and, thereafter, evaluating the feasibility of alternative cleanup options (42 U.S.C. § 9604(a)), while the NRDA component consists of procedures for investigating the impact of contaminants on natural resources and their uses and the methods available for restoring, or obtaining compensation for damages to impacted resources (42 U.S.C. § 9607(f)).

The two regimes typically proceed on different tracks and different timelines. The nature and extent of cleanup activities required by USEPA can affect the magnitude of restoration activities that the natural resource trustees will require. While USEPA is assigned primary federal responsibility for undertaking investigation and cleanup measures, it also has an obligation to promptly "notify the appropriate Federal and State natural resource trustees of potential damages resulting from release under investigation … and to coordinate the assessments, investigations and planning … with such Federal and State trustees" (42 U.S.C. § 9604(b)(2)).[17] The remedial investigation/feasibility study (RI/FS) and remedial selection process under CERCLA requires the consideration of whether natural resources "… are or may be injured by the release…"[18] as part of the evaluation of remedial alternatives, thereby providing an opportunity to evaluate net environmental benefits of remedial alternatives, including potential enhancements of ecological and human use services, prior to implementing the site remedy. In theory, under CERCLA, the net environmental benefits analysis (NEBA) is part of the feasibility study (FS) process reviewed by both USEPA/state agencies and trustees (e.g., Biological Technical Assistance Group, BTAG). However, in

[15] Natural resource trustees include federal, state, and tribal officials designated under federal or state laws to hold natural resources (land, water, biota) in the public's trust.

[16] Emergency response, assessment and restoration actions are often governed under the federal law, the Oil Pollution Act 33 U.S.C. §2701 et seq. (1990), and similar state statues.

[17] Interior, U. S., Natural Resource Damage Assessment and Restoration Federal Advisory Committee; Bureau of Reclamation, 376 Technical Service Center: Denver, Colorado, May 2007, 2007; p 73..

[18] 40 CFR §300.430 (b)(7)

practice, the RI and FS process is more often than not compartmentalized, with scientists doing the RI and handing off the FS to remedial engineers. Communication between USEPA and natural resource trustees concerning opportunities to coordinate remediation and restoration often lag behind communication regarding remedial response.

Integrating the CERCLA cleanup process more closely, and earlier, with the NRDA and restoration process can shorten the timeline for implementing restoration measures, lead to more cost-effective cleanup plans and create a better ecosystem from what was injured. Certain case-specific or site-specific factors will often de facto favor or disfavor drawing the two processes closer together. For example, Table 4 notes a few of the situational factors that might favor or disfavor remediation/restoration coordination. Reducing the cost and time required for site investigations, remediation, and potential restoration efforts, among other benefits, could provide an important incentive for PRPs to coordinate remediation and restoration at hazardous waste sites.[19] Other stakeholders, notably local government, and the communities in which the resources reside, also can benefit from these efficiencies. Under the typical CERCLA cleanup process, several years or more can pass before the NRDA begins. In that time, the magnitude of the resource damages and scope of required restoration measures may continue to increase. **It is possible, and often desirable, to increase the pace of cleanups and reduce the damage to affected resources by bringing the NRDA process into the very first steps of a CERCLA site investigation.**[20]

In cases where there appears to be obvious efficiencies and cost savings from coordinating remediation and restoration planning, there are still sometimes legal and regulatory barriers to this sort of coordination. For example, starting the NRDA during the investigative process is complicated because USEPA has primary authority to manage onsite cleanups at CERCLA sites.[21] There is no legal requirement that resource trustees work jointly and continuously with USEPA. Occasionally, there are disincentives to the early coordination of remediation and restoration planning. For example, it is not always apparent whether trustees ever will weigh in with formal demands for restoring resources. PRPs also may face financial penalties if they fail to meet agreed-upon cleanup timelines. The additional time required to coordinate trustee investigations with USEPA may increase the risk that penalties will be imposed. But, at sites where there is no reason to doubt the existence of injured natural resources, there are often compelling reasons for coordinating remediation with natural resource damage restoration.

In the early stages of a site investigation, coordinating field sampling for documenting the nature and extent of contamination and collecting data for assessment of injury to natural resources may yield significant cost savings. Adding some additional samples and lines of evidence to the RI field program to address trustees' concerns can be done earlier and often easily. However, it is important that the rationale for including additional sampling and lines of evidence and how those sampling data will be used is clearly identified and all data collected, whether for site characterization or injury assessment, follow rigorous data quality standards (e.g., Data Quality Objectives, Quality Assurance Project Plan). Having an eye towards both cleanup and potential restoration during the RI could provide information essential for assessing whether the site itself or nearby habitats are suitable for restoration.[22] More importantly, some aspects of cleanup

[19] Goldsmith, B. J., Beyond the Headlines: Best Practices to Restore Natural Resources Injured by Long Term Hazardous Waste Releases, Oil Spills and Transport and Other Accidents. *Bloomberg Daily Environmental Report* 2014, August 18, 2014, 12.

[20] Stahl Jr, R. G.; Bingman, T. S.; Grimsted, B. A.; Waldron, C. S., How Might We Pick Up the Pace of Remediating Contaminated Sites in the United States? *Integrated Environmental Assessment and Management* 2019, 15, (6), 1029-1031.

[21] Gouguet, R. G.; Charters, D. W.; Champagne, L. F.; Davis, M.; Desvouges, W.; Durda, J. L.; Hyatt, W. H.; Jacobson, R.; Kapustka, L.; Longoria, R. M., Effective coordination and cooperation between environmental risk assessments and natural resource damage assessments: A new synthesis. *Integrated Environmental Assessment and Management* 2009, 5, (4), 523-534.

[22] Stahl, R. G., Jr.; Gouguet, Ron; DeSantis, Amanda; Liu, Jenny; Ammann, Michael, Prospective environmental restoration / restoration up front: A concept for an incentive-based program to increase

(excavation, capping, backfilling, planting covers on landfills, etc.) could be better understood early in the remedial process and combined with on-site restoration. That could yield a faster and more cost-effective restoration of injured natural resources, and potentially smaller natural resource damage claims, because the resources then can be brought back sooner to baseline (but for the release) conditions.

5.3 Best Practice Approach Framework

The proposed solution described here is a process that integrates NRDA and compensatory restoration through all phases of site characterization, remedial design (RD), and implementation of remedial actions (RA) for contaminated sites. The approach allows for early identification of the likelihood of a natural resource damage claim, opportunity for early engagement with trustee agencies, collection of data for assessing injury and service losses prior to destructive remedial actions, and opportunities for enhanced primary restoration and on-site compensatory restoration. The ultimate goal of the Framework is to create a better ecosystem in terms of ecological and/or human use services than existed prior to implementation of the RAs. This may include land use alteration, such as (1) elimination of invasive, non-native plant species and replacement with native species (2) restoring one or more common types of service loss (ecological or human use) with a more desirable type of service for the affected ecosystem. Although the approach is modeled after the Superfund process of RI/FS, RD, and RA, it is also applicable to other federal, state, and tribal programs.

Benefits of the approach can be many. Early identification of a likely damage claim and engagement with trustees can identify data needs for an injury assessment, which can be integrated with and collected concurrently with data for human health and ecological risk assessments during the RI or similar site investigation phase. As previously identified, it is important that the rationales for all lines of evidence are clearly identified, and all data collected adhere to rigorous data quality standards. Evaluation of remedial alternatives during the FS can eliminate over engineered or potentially destructive alternatives and identify opportunities for enhanced primary restoration (i.e., uplift of services) and/or compensatory restoration. The approach has several opportunities for data collection for injury assessment and restoration planning during the RD. One potentially significant benefit is the economy of scale recognized in providing on-site compensatory restoration concurrent with implementation of an RA. This minimizes, or eliminates, the need for off-site compensation, which can include significant additional time and costs for planning and construction of restoration projects.

Using the Superfund process as a model, the Best Practice Framework, shown in the Table 5, outlines how restoration, both primary and compensatory, can be considered throughout site investigation and remedial design and implemented concurrent with remediation actions. The approach was developed for use by companies, practitioners, trustees, and regulators to facilitate development and implementation of work plans that efficiently integrate requirements for investigation and remediation with data for assessing injury and determining compensation, where appropriate.

Table 5 illustrates opportunities for more effective coordination of remediation and NRDA and restoration through each phase of the site investigation and remediation process. Actions include those that can be undertaken by USEPA, PRPs and trustees, and are also intended to highlight junctures in the processes where there are potential opportunities for settlement. **The changes from current practice illustrated here include: engaging ecologists, toxicologists, economists, and natural resource damage practitioners earlier in the site investigation/remedial process; identifying potential restoration projects before remediation is complete; and, simultaneous collection of data for site characterization, RD, NRDA purposes, and others — all of which can render the processes more efficient and cost-effective for all parties involved.** While most of the information provided here relates to on-site coordination of remediation and restoration, off-site restoration options can also be explored. In

restoration planning and implementation in the United States. *Integrated Environmental Assessment and Management* 2008, 4, (1), 6-14.

addition, because the remediation process can typically last 5+ years, practitioners should also be aware of possible opportunities to collect data for injury assessment prior to completion of remediation.

Table 4: Factors Favoring Coordination Versus Separation Remedy and Restoration Actions

Factors Weighing in Favor of the Coordination of Remedy and Restoration Planning	Factors Weighing in Favor of Separating Remedy and Restoration Planning
PRP liability is clear or likely.	PRPs have good faith defenses to liability.
Release has caused obvious damage to natural resources.	Release does not appear to have caused significant damage to natural resources.
Damage is significant enough to warrant the time and cost of conducting an NRD assessment.	Damage is slight, transitory, or unrelated to substances associated with some or all the PRPs.
Coordination of sampling and data collection can save time and money because remedy and restoration data will be collected from the same or similar areas, at the same or similar times. This is typical in water contamination cases in rivers, lakes, harbors, and coastal areas.	There is little or no similarity in sampling locations or schedules. Remedy investigation proceeds in one area, while NRD assessment proceeds in a different area at a different time, as in the case of migratory species that pass through a spill site on their way to distant nesting or foraging grounds.
Potential remedy alternatives likely to be evaluated include work that can create or improve wildlife habitat, such as: (i) revegetation of impacted land, (ii) reconstruction of impacted streams or shorelines, or (iii) improvements to surface water quality. A coordinated restoration project in the same area around the same time could reduce construction costs, restore resources more quickly, and shorten the period of interim loss, allowing NRD claims to be resolved for less.	Restoration is needed in a different location unrelated to the remedy. This is typical for migratory species damage claims, where the contamination and remedy occur in one region of the US, while the restoration project occurs at breeding grounds in a different region or country.

Table 5: Opportunities for Improved Coordination Between Remediation and Restoration within the CERCLA Process

Investigation/ Remediation Phase	Natural Resource Damage Assessment & Restoration Evaluation		Settlement Opportunity	Comments
USEPA Action	**Companies Action**	**Trustees Action**	**Companies/ Trustees Action**	
Remedial Investigation				
Screening Level Risk Assessments (Ecological and Human Health)	Potential NRD Liability Assessment	Pre-Assessment	Moderate See Notes	• Ecologists, Toxicologists, Economists, and NRD specialists should be engaged as early as possible
				• Sufficient data should be collected to determine if NRD is likely • If NRD not probable, Companies may be finished with NRD with minimal investment • Settlement opportunity is low due to conservatism of screening level risk assessments and insufficient data for complete injury assessment.
	Memorandum of Agreement (MOA) (if considered desirable by Companies and Trustees)			• If NRD likely, parties can negotiate MOA for further assessment, establish ground rules and minimize delays in Companies/Trustees discussions
Baseline Investigation Work Plan[23]	Sampling and Analysis Plan (SAP), Data Quality Objectives (DQOs), and Quality Assurance Project Plan (QAPP) for Baseline Risk Assessments (Ecological and/or Human Health)	Assessment Plan[24]	Moderate to High Dependent on lines of evidence and results of data collected for the RI	• NRD is probable - Data to support injury assessment can be incorporated into the Final RI • Final RI typically requires additional data - with or without remediation/restoration - Major decision point for Companies - minimum to complete RI or comprehensive program to conduct injury assessment
Baseline Risk Assessments (Ecological and/or Human Health Risk)	Risk Assessment and/or Injury Assessment			• Baseline Risk Assessment(s) complete - Additional data from this point forward will be for injury assessment, preferably prior to remediation

[23] Work Plans, Sampling and Analysis Plans, Data Quality Objectives, and Quality Assurance Project Plans are prepared in compliance with guidance and protocols of regulatory agencies responsible for site investigations.
[24] Assessment Plans are a requirement of the trustee NRDA process.

Investigation/ Remediation Phase	Natural Resource Damage Assessment & Restoration Evaluation		Settlement Opportunity	Comments
USEPA Action	**Companies Action**	**Trustees Action**	**Companies/ Trustees Action**	
Feasibility Study				
Feasibility Study Investigation	Additional Data for Injury Assessment		Moderate to High Dependent on lines of evidence and results of data collected for FS Investigation	• Opportunity to collect additional data for injury assessment
Alternatives Evaluation	Net Environmental Benefits Analysis (NEBA)			• Ecologists, Toxicologist, Economists, and NRD specialists should be part of FS team
	Restoration Opportunity/Constraints[25]			
Record of Decision				
Select Remedial Measures	Go/No Go Decision in Restoration/Remediation (and this is just USEPA)			• Decision point for determination of Restoration/ Remediation to move forward
Remedial Design				
Pre-Design Investigation (PDI)	Data for Injury Assessment		High	• Opportunity to collect additional data for injury assessment
	Co-Operative Injury Assessment	Injury Assessment		• Results of PDI can be used for injury assessment, ideally conducted cooperatively
Remedial Design Investigation	Data for Restoration	Post-Assessment		• Data for design of restoration (e.g., hydrology, substrate, etc.)
30% Remedial Design	Conceptual Restoration Plans			• Incorporate restoration features in design documents
				• Progressively more detail as design progresses
60% Remedial Design	Development of Detailed Restoration Plans			• Progressively more detail as design progresses
90% Remedial Design				
Final Remedial Design				

[25] Includes consideration of opportunities to coordinate restoration with (1) Non-Critical Removal Actions (NTCRAs) and (2) during implementation of remedial demonstration/pilot projects.

Investigation/ Remediation Phase	Natural Resource Damage Assessment & Restoration Evaluation		Settlement Opportunity	Comments
USEPA Action	Companies Action	Trustees Action	Companies/ Trustees Action	
Remediation				
	Implement Remedial/Restoration Measures		Likely Required	• At this point, data for injury assessment will be difficult to collect, or coordinate with remediation work. Remediation (except for natural monitored recovery) will have disturbed/significantly altered natural resources. Injury assessment would have to rely on secondary sources of data/information (if available) rather that direct sampling (e.g., sediment for toxicity tests, samples for tissue analysis, benthic community characterization). - Damages and settlement costs likely higher

5.4 Cost-Benefit Considerations

Whether remediation and restoration are considered together can affect how much restoration must be undertaken. The earlier remediation is undertaken and completed, the lower the interim losses will be, the faster benefits will begin to accrue, and the lower the amount of restoration required to offset interim losses.

In principle, PRPs and trustees are supportive of implementing restoration as early as possible, but a number of challenges can keep restoration from occurring prior to the completion of remediation. For example, if restoration is completed prior to completing remediation:

- Will the restoration create an attractive nuisance (i.e., will exposure be higher than it would otherwise be but for the restoration project)?
- Will the restoration be undone by the implementation of the remedy (e.g., if new habitat is created within a study area, could that new habitat be removed and/or modified by the remedy)?
- How will PRPs be credited for restoration that is implemented prior to the remedy, especially if damages have not yet been estimated, and regardless of what happens to the restoration project following the remedy? [26]
- Evaluating the benefits and costs of restoration versus remediation requires each of the following:
- Understanding the tradeoffs between implementing restoration prior to remedy implementation versus post implementation; and
- Understanding the relationship between the PRP and trustee's positions, how the damage assessment process may be improved by changing the timing of restoration implementation, and how the remedial process may be affected.

[26] A Framework detailing how PRPs can receive appropriate credit for restoration completed during the remedial phase can be developed.

Consider an extreme example where a PRP views no service change from a particular release and, therefore, no natural resource damages. In order for the PRP to support its position, it needs to undertake specific studies to document that the effect of the release has no service change. This increases the PRP's study costs and potential for litigation to support its position. However, if instead of trying to support an extreme position of no service loss, the PRP is able to accept a reasonable level of service loss and implement restoration projects prior to the remedy's completion, the PRP will be able to lower its overall restoration costs because benefits begin to accrue earlier. Moreover, the PRP may be able to reduce its overall costs by not having to defend a "no service-loss" position.

5.5 Case Application of the Best Practice Approach Framework

Passaic River (Diamond Alkali Superfund Site) Cooperative Assessment

Production of pesticides and other chemical products began at 80 Lister Avenue in the 1940s. The Diamond Alkali Company owned and operated the facility in the 1950s and 1960s, manufacturing agricultural chemicals, including the herbicides used in the defoliant known as "Agent Orange." A by-product of these manufacturing processes was the chemical 2,3,7,8-tetrachlorodibenzo-para-dioxin, (2,3,7,8-TCDD and hereinafter referred to as "TCDD"). In 1983, environmental sampling by the State of New Jersey and the US Environmental Protection Agency (USEPA) at and near 80 Lister Avenue and in the adjacent river revealed high levels of TCDD. In 1984 the site was listed on the Superfund National Priorities List (NPL). TCDD, pesticides and other hazardous substances were found in the soil and groundwater at 80-120 Lister Avenue. TCDD, polychlorinated biphenyls (PCBs), metals, polycyclic aromatic hydrocarbons (PAHs) and pesticides were also found in sediment of the lower Passaic River. The Diamond Alkali Superfund Site of the former Diamond Alkali facility at 80-120 Lister Avenue in Newark, New Jersey, the Lower Passaic River Study Area (LPRSA), the Newark Bay Study Area and the areal extent of contamination. USEPA divides the area into four operable units.

- OU1, the former site of the Lister Avenue Plant;
- OU2, the lower 8.3 miles of the Passaic River (the "Lower 8.3 Miles");
- OU3, Newark Bay and portions of the Hackensack River, Arthur Kill, and Kill van Kull; and
- OU4, the 17-mile LPRSA.

In 2009 a group of 11 potentially responsible parties participated in a cooperative natural resource damage assessment for the Passaic River with the Federal Trustees. The cooperative agreement was established for a period of one year with the potential to renew. The PRPs agreed to extend the cooperative agreement if, during the first year, one human-use and one ecological restoration project were identified, costs scoped, NRDAR crediting process described, and a construction plan was developed.

Step 1: Screening Level Risk Assessment (Remediation)/Pre-assessment Screen (NRD)

The Diamond Alkali Superfund Site was listed on the NPL early in the development of the NRD process where integration of remediation and restoration was not common practice. Therefore, coordination of remediation and restoration was not achieved for Steps 1 and 2.

Step 2: Work Plan Development (Remediation)/Assessment Plan (NRD) See comment under Step 1.

Step 3: Baseline Ecological Risk Assessment (Remediation)/Injury Assessment and Early Restoration Scoping (NRD)

PRP representatives identified potential human use and ecological project ideas that were put forth as alternatives to the Federal trustees.

Primary proposed project – Removal of Dundee Dam:

a. Ecological benefits:

i. River connectivity
ii. Increase flow
iii. Restore shad and trout habitat

b. Human use benefits:
i. Development of a high-value fly fishery in densely population area

Additional Human Use Projects proposed:

a. Improvement of a boat launch and pier
b. Waterfront trail construction
c. Anticipated benefits – Improved riverfront access and connectivity between parks without increasing human-health risk

Additional Ecological Project proposed:

a. Acquiring and conserving riverfront property with potential for restoration following remediation

Attempt to coordinate remediation and restoration was unsuccessful

a. Cooperative assessment was terminated as the milestones identified were not met
b. Dundee Dam removal was rejected due to the possibility of increased contamination risk from sediment and fish movement
c. Agency representatives participating in the cooperative process raised concerns that any project interfacing with the river might increase human-health risk.
d. Boat launch improvements required the participation of State Trustees
e. Unable to agree on crediting for acquiring and conserving land

Step 4: Feasibility Study and Alternatives Evaluation (Remediation)/Further Early Restoration Scoping (NRD)

This attempt to integrate remediation and restoration at this site was unsuccessful.

Step 5: Record of Decision (Remediation)/Restoration Selection (NRD)

This attempt to integrate remediation and restoration at this site was unsuccessful.

Step 6: Remedial Design (Remediation)/Finalize Injury Assessment and Restoration Project Selection (NRD)

This attempt to integrate remediation and restoration at this site was unsuccessful.

5.6 Summary

The Framework described here sets forth a Best Practice Framework for coordinating remediation and restoration in site-specific instances. It is intended to be used by the different parties at a given site, including PRPs, response agencies, natural resource trustees, and others. **Using this Framework can save time and costs and align NRDA objectives, including desired end points, of the parties involved at specific sites.**

While the material presented in this Framework focuses on natural resource issues under US laws, the considerations and proposed solutions herein may also be applicable to natural resource regimes in the UK, EU and other countries.

5.7 July 2024 Best Practice Approach Framework Workshop Agenda

REMEDIATION/RESTORATION BEST PRACTICE APPROACH FRAMEWORK WORKSHOP

Tuesday, July 23, 2024

AGENDA

10:00 AM

WELCOMING REMARKS ON BEHALF OF ARNOLD & PORTER KAYE SCHOLER LLP

Jeffrey Talbert, J.D., Partner, Arnold & Porter Kaye Scholer LLP

10:05 AM

OPENING REMARKS OF THE WORKSHOP'S LEAD CONVENER

Steven Jones, Senior Ecologist, GHD (Retired)

10:15 AM

BACKGROUND ON THE FRAMEWORKS AND WHY THEY WERE DEVELOPED

Barbara J. Goldsmith, Executive Director, Ad-Hoc Industry Natural Resource Management Group; President, Barbara J. Goldsmith & Company LLC

10:30 AM

REVIEW OF KEY REMEDIATION/RESTORATION RELATED DEVELOPMENTS SINCE 2022

Speakers:

Adam Ayers, Principal Scientist, Arcadis

Matthew Bingham, Principal Economist and Founding Partner, Veritas Economic Consulting

Jeffrey Talbert, J.D.

11:15 AM

QUICK REVIEW OF THE FRAMEWORK

Steven Jones

11:30 AM

INTERACTIVE WORK OUT – OPEN EXCHANGE AND DISCUSSION OF THE FRAMEWORK THROUGH APPLICATION TO HYPOTHETICAL CASE 1

Work Out Facilitators:

Steven Jones

William Schew, Ph.D., Senior Environmental Risk Assessor, GHD

Work Out Leaders:

David Charters, Environmental Scientist, US Environmental Protection Agency

Josh Heltzer, Senior Associate, First Environment

Mike Johns, Ph.D., Partner Emeritus, Windward Environmental

Benjamin Lippard, Partner, Vinson & Elkins

Steven Miller, Deputy Assistant General Counsel, United States Department of Energy

Rebecca Stevens, Restoration Coordinator/Program Manager, Hazardous Waste Management Program, Coeur d'Alene Tribe

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12:45 PM

BREAK FOR LUNCH

1:45 PM

INTERACTIVE WORK OUT – OPEN EXCHANGE AND DISCUSSION OF THE FRAMEWORK THROUGH APPLICATION TO HYPOTHETICAL CASE 2

Work Out Facilitators:

Steven Jones

William Schew, Ph.D.

Work Out Leaders:

David Charters

Josh Heltzer

Mike Johns

Benjamin Lippard

Steven Miller

Rebecca Stevens

3:15 PM

SUMMARY/OPEN DISCUSSION

Steven Jones

William Schew, Ph.D.

3:45 PM

NEXT STEPS

Barbara J. Goldsmith

4:00 PM

ADJOURN

6.0 PRESENTATION OF THE FRAMEWORKS: A BEST PRACTICE APPROACH: COORDINATING EMERGENCY RESPONSE AND RESTORATION

This chapter provides a Best Practice Framework for coordinating emergency response and restoration issues and practices a specific case or site, including an introduction, legal and regulatory context on the matter, the step-by-step Framework, cost-benefit considerations, a case application of the Framework and summary remarks

BEST PRACTICE APPROACH

COORDINATING EMERGENCY RESPONSE AND RESTORATION

6.1 Introduction

This Best Practice Framework presents a process for coordinating emergency response and natural resource damage considerations at an oil spill. It assumes advance knowledge of the natural resource damage assessment (NRDA) process as defined in various federal and state statutes and regulations [27]. The process outlined here consists of four main steps, each of which is detailed below.

The Framework is intended for multistakeholder use as a way to evaluate the merits of coordination rather than undertaking emergency response and restoration of natural resources as sequential processes. De facto, the Framework is also aimed at building consistency in practice as to how these issues can be considered prior to, during and after an oil spill occurs.

While the issues at hand in site-specific situations will define the extent to which these processes should be coordinated, the consideration of natural resource damages from the outset of an oil spill is generally viewed to be favorable even if it subsequently results in a decision to bifurcate the two processes. Coordination typically can result in time and money savings and also expedite restoration of injured resources as appropriate.

We first outline the legal and regulatory underpinnings of the emergency response/restoration paradigm below, followed by presentation of the Framework, and some cost-benefit considerations. Additional resources pertinent to the Framework and related issues are also provided. A case example application of the Framework, as well as the agenda from the Group's July 2024 Best Practice Approach Framework Workshop is also included.

6.2 Legal and Regulatory Context

Key Laws/Responsibilities. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Oil Pollution Act (OPA) treat emergency response for releases of hazardous substances (CERCLA) and oil spills (OPA) and assessment of natural resource damages as separate processes. Oil spill response actions are led by the US Environmental Protection Agency (USEPA) for inland waters and the US Coast Guard (USCG) for spills in coastal waters and deepwater ports. Their role is to determine the response actions needed.

The US DOI, NOAA and other federal and state "natural resource trustees" typically undertake a natural resource damage assessment (NRDA) to determine whether the release or spill in question has caused injury

[27] For further background on natural resource damage (NRD) liability and related issues, see www.NRDonline.org, https://darrp.noaa.gov/ and https://www.doi.gov/restoration.

to natural resources and to identify subsequent needs to address such injuries, typically defined in terms of reductions in the services provided by the affected resources.

Emergency response, NRDA, and restoration activities related to oil spills are governed under the Oil Pollution Act (OPA), 33 U.S.C. § 2701 et seq. (1990).[28] Congress enacted OPA in response to the 1989 Exxon Valdez oil spill. Similar to CERCLA, which was enacted a decade earlier, the statutory provisions of OPA include response-related (i.e., cleanup) components and restoration-related (i.e., NRDA) components. However, unlike CERCLA, OPA and its implementing regulations more expressly contemplate coordination between response and restoration. **While some emergency response actions can have negative restoration impacts,[29] on the whole, coordinating emergency response actions and restoration actions has the potential to greatly benefit the objectives of both programs.**

Under OPA, the US Environmental Protection Agency (USEPA) and the US Coast Guard (USCG) are responsible for investigating and responding to contamination from oil spills to waterbodies. The USCG is primarily responsible for contamination involving coastal waters, the Great Lakes, and deepwater ports. EPA is primarily responsible for responding to oil spills in inland waters. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, provides the organizational structure and procedures for preparing for and responding to such discharges of oil.

NOAA OPA Regulations. NOAA's OPA regulations, 15 CFR Part 990, provide further structure and guidance for conducting NRDA and restoration activities under OPA. **The OPA regulations expressly contemplate coordination between the NRD Trustees and the various response agencies.** Trustees must coordinate any NRDA activities conducted at the same time as response operations with response agencies, consistent with the NCP and any pre-incident plans developed by the Trustees and the response agencies. See 15 CFR § 990.14(b). In addition, the regulations require Trustees to coordinate with the On-Scene Coordinator (OSC) designated by EPA or the USCG before implementing any emergency restoration actions, and must ensure that such actions do not interfere with on-going response actions. See 15 CFR § 990.26(b).

The OPA regulations establish three phases of a natural resource damage assessment: (1) the Preassessment Phase (which includes ephemeral data collection activities); (2) the Restoration Planning Phase (which includes injury assessment, restoration project selection, and public review and comment); and (3) the Restoration Implementation Phase (where the Trustees implement the chosen restoration project[s]). See 15 CFR § 990.12. Cooperation between emergency response, assessment and restoration is most commonly seen during the Preassessment Phase, when the Trustees are trying to gather the key data on potential injuries to natural resources that are intrinsic to the NRDA process. Coordination of response and assessment activities can potentially transition into coordination between emergency response and emergency restoration – allowing parallel tracks of activity to proceed together.

Coordination between emergency response and assessment during the Preassessment Phase can lead to cost and time savings through increased sharing of information and avoid duplication of data-gathering efforts, such cooperation can also benefit the Restoration Planning and Restoration Implementation phases. For example, coordinating emergency response and assessment can allow for shared use of equipment, combined permitting, and other benefits that can materially increase the overall cost-effectiveness of the process. Furthermore, coordinating actual restoration activities with response activities, either standard restoration actions or emergency restoration actions under § 990.26(1), can speed the overall restoration

[28] While the material presented in this Framework focuses on the advantages of coordinating emergency response and restoration activities for oil spills under OPA, the considerations and proposed solutions herein may be equally applicable at hazardous waste sites under CERCLA and analogous state statutes.

[29] For example, dredging or removal of contaminated large woody debris from a stream channel that effectively resolves contamination issues, but also negatively reduces habitat complexity.

process by getting restoration projects on the ground quicker, leading to a faster recovery of natural systems to the pre-incident baseline.

The feasibility of coordination of response, assessment and/or emergency restoration will need to be evaluated on a case-by-case basis and agreement between parties as to how this process can proceed given the specific facts of a case or site, including possible use of "early restoration" credits [30].

Additional Guidance. In addition to the structure for coordinating emergency response and NRDA processes under the OPA regulations, several other guidance documents and information outlining the relationship between the two processes have been issued. Significant work was done following the Deepwater Horizon Incident by the Department of Commerce/National Oceanic and Atmospheric Administration (NOAA) to develop its Environmental Response Management Application (ERMA) tool to provide key environmental response information to responders and decision makers, as well as support the NRDA process, for all regions across the US[31]. The US DOI's Office of Restoration and Damage Assessment provides information on its website as to how NRDAR and response actions work together [32]. In addition, the National Response Team (NRT) has prepared its Federal Natural Resource Trustees and Incident Command System/Unified Command (ICS/UC) NRT-RTT Factsheet to describe which units of an ICS/UC and federal trustees might work together during an emergency response; resources available via the trustees; and potential opportunities for coordination [33]. The NRT also convenes periodic Spill of National Significance (SONS) drills across the country to provide a "proving group" for lessons learned and analysis of new technologies and response methods. Moving forward, the NRT and others may wish to incorporate additional NRDA and coordinated response, assessment and restoration exercises within the context of these drills.

6.3 Best Practice Framework

The best practice approach described here involves a 4-step process, establishing a framework to evaluate coordination of emergency response, assessment and restoration.

The Framework identifies where consideration of natural resource damage issues is most needed in the emergency response process. Potential strategies to increase efficiency through coordination of emergency response and the NRDA and restoration processes are identified.

- The **first step** occurs "Before an Incident".
- The **second step** occurs "During Emergency Response".
- The **third step** occurs "Following the Initial Emergency Response".
- The **fourth step** occurs "After Agreeing to Coordinating Response/Restoration Activities".

Each step to be addressed is detailed below.

[30] A separate document, outlining how early restoration could be assessed and/or assigned for emergency restoration work performed prior to the completion of an NRDA could be developed as general guidance and seen as useful to the NRDA practitioner community.
[31] https://response.restoration.noaa.gov/maps-and-spatial-data/environmental-response-management-application-erma
[32] https://www.doi.gov/restoration/primer/response
[33] https://www.nrt.org/sites/2/files/FNRT.pdf

Table 6: Emergency Response/Restoration Best Practice Approach Framework

Step Number and Description	Questions to be Answered/Tasks to be Completed
Step 1: Before an Incident	**Before an incident occurs:** • Develop baseline on existing contamination and natural resources around the specific facility. • Evaluate available information over all locations (broader baseline data) on existing contaminants and natural resources in the area of industrial activity or transportation. • Develop an inventory of possible restoration actions for habitats and species in the vicinity of the facility, including status of restoration action (if any), organization proposing restoration, permitting and funding requirements. • Seek training opportunities to engage both technical and legal representatives for PRPs and Trustees that are likely to be involved in an actual incident. Discuss adequacy of baseline data, availability of potential early restoration projects for local resources, and how the framework may be used to expedite damage resolution.
Step 2: During Emergency Response	**During the emergency response and/or immediately following the release or spill in question:** • Identify and begin collecting ephemeral data • Assess opportunities to collect data cooperatively with others/trustees and the potential benefits and burdens of coordination at the outset. o To successfully and effectively coordinate data collection, parties may leverage a series of questions to guide the scope of data, including, (1) What question(s) is the data intended to answer? (2) How will the data help to answer the question? (3) Is the collection of data likely to result in a definitive answer? and (4) What is the appropriate scale of the sampling that will answer the question adequately? • Agree upon how PRPs can best coordinate with the response agencies actions (e.g., EPA, USCG); beyond those commonly associated with the incident command structure. • If the PRP is a vessel, steps taken before the incident above may need to be addressed concurrently with emergency response.

Step 3: Following the Initial Emergency Response	**Following the end of the immediate emergency response and prior to agreeing to initiate coordination of emergency response/restoration activities:**
	• Evaluate the potential benefits and burdens of coordination at the onset; specifically, identify when/where coordination is and is not beneficial. Examples that would favor the separation of emergency response and restoration may include cases or sites where restoration is needed in a different area unrelated to the response, or the release does not appear to have caused significant damage to natural resources.
	• Evaluate the benefits and burdens of committing to an open dialogue regarding the benefits to all coordinating parties, e.g.,
	  o With other PRPs,
	  o With natural resource trustees and response agencies, as well as
	  o With agencies which do not have direct response/restoration authorities (e.g., EPA in marine oil spill, NIOSH, USGS).
	• Consider the beneficial effects of identifying a lead Agency/Trustee and lead PRP-group; especially regarding parties who may not have the resources to maintain coordination throughout the response process.
	• Agree on the legal framework and 'damage claim' with regard to potential early restoration projects.
	• Create a common perspective regarding how early restoration will factor into the damage claim; basis of scaling or assigning credit for potential loss.
	• Agree that implementation of early restoration projects during the response phase is not an admission of liability by the PRP(s).

Step Number and Description	Questions to be Answered/Tasks to be Completed
Step 4: After Agreeing to Coordination of Response/ Restoration Activities	**After agreeing to coordinating emergency response and restoration activities** • Discuss and agree on the kinds of data that may be necessary to support the natural resource damage assessment and potential restoration opportunities. [**Note to Practitioners:** If possible, it may also be beneficial to parties to undertake this action during Step 2 of this Framework.] • Identify, assess, and discuss opportunities to collect data which could be used in both the response process and the natural resource damage assessment and restoration process. o Assess and re-evaluate the level of data adequacy and uncertainty to determine whether coordinated efforts are productive. o Evaluate potential response strategies based on their potential negative impact on natural resources. It is also possible to coordinate these actions with the SCAT and EU. ▪ Identify opportunities to avoid negative impacts through alternative strategies that also meet response requirements. ▪ Conduct upfront discussions on how best to mitigate negative impacts caused by the response. o Identify restoration goals and potential damage assessment metrics early in the response/assessment process. • Identify opportunities to implement or facilitate restoration activities (e.g., early restoration) during the response phase that are not inconsistent with contemplated response actions, particularly where it may be apparent that response actions could inhibit on-site (or offsite) restoration. • Agree upon how coordinated activities will generate NRD liability "credits" to offset a future Trustee NRD claim. • Discuss the degree to which the coordinated work will provide a way to settle some or all of the Trustees' claims for potential NRD and/or other liability claims at the site

6.4 Cost-Benefit Considerations

Considering the response/restoration interface at specific sites from the outset can be both productive and beneficial. Experience has shown that, in some cases, consideration of resource restoration issues during the emergency response phase may save time and money and possibly restore injured resources to baseline more efficiently. In fact, there are data and other information collected during an emergency response that can be leveraged during an NRDA, including oil transport, fate and trajectories, oil observation from overflights or shoreline cleanup and assessment techniques (SCAT) data, and known resources at risk[34]. While coordinating response and natural resource damage and restoration may not be desirable for all incidents, **this Framework and the steps provided herein can establish an open line of communication between response agencies, responsible parties and Trustees relative to the NRDA and potential emergency response opportunities.** This open communication, at the very early stages of the response and NRDA process, is beneficial in addressing and mitigating potential damage to natural resources, as well as potentially restoration resources and associated services back to public sooner.

Where appropriate, given a site's specific characteristics and assuming there is agreement among the parties, coordination of response and restoration activities can result in an overall process that is cost-effective, streamlined and efficient; prevents duplication of effort; minimizes the potential to "over engineer" a remedy; has the potential for parties to get to settlement and resource restoration sooner; and maximizes the potential for incorporating ecological enhancements into post-remediation restoration. Despite the potential benefits of coordinating response/restoration processes, there are also risks, including the possibility of suboptimal use of resources due to the timing of actions taken.

[34] https://www.doi.gov/restoration/primer/response

The following circumstances and/or conditions generally encourage a coordinated approach of emergency response and NRDA and restoration activities IF:

- There are multiple potential cleanup strategies that meet response requirements;
- There is some certainty that natural resources have been or will be injured;
- Response agencies, trustee agencies and potentially responsible parties (PRPs) are available and willing to consider coordinated activities; and
- Both trustee agencies and the PRPs would benefit from coordination.

6.5 Case Application of Best Practice Approach Framework

Hypothetical Tanker Diesel Fuel Release

Incident Summary:

Company A was pumping diesel fuel from a tanker (PRP) into underground storage tanks at a port dock in California. The fuel overwhelmed the tank system's oil/water separator and flowed into the drainage system, releasing up to 200,000 gallons of diesel fuel into the port, causing an oil slick along 2km of the shore, including the associated riparian habitat. In addition, some of the fuel flowed into a nearby creak and marsh area, covering approximately 10 acres of marine habitat and shoreline. Contaminants at the site include polycyclic aromatic hydrocarbons (PAHs). Alleged damaged natural resources included birds, fish, and shoreline habitats.

Step 1: Before the Incident

a. Prior to the incident, the California Department of Fish and Wildlife (CDFW) nor the PRP had not collected baseline data concerning current contamination or impacted resources in this particular port.

   i. However, CDFW in collaboration with the local municipality and a local conservation group, had identified areas of opportunity for increased natural resource restoration projects, including nesting areas for local birds.

Step 2: During Emergency Response

a. CDFW, the US Coast Guard (USCG) and PRP, met immediately following the incident to begin to identify and begin collecting ephemeral data in the port

   i. The parties agreed that collected the data cooperatively would reduce time and expense, as well as define the scope data scope.

   ii. Given the industrial nature of the port and lack of recreational resources, the parties agreed that the key natural resources for data collection would focus on the area impacted shoreline, birds and fish.

   iii. The parties developed a check in and communication protocol, as well as a central shared file system for the data collection.

a. CDFW and the USCG led the emergency response per the established incident command structure.

Step 3: Following the Initial Emergency Response

a. Following the emergency response, CDFW, USCG and the PRP met to discuss the potential benefits and burdens of coordination at the onset and determined coordination of restoration would be possible given the localized areas of the spill and the characteristics of the impacted natural resources.

b. Given the small number of parties involved in the incident, the parties determined it was not

necessary to identify a lead Agency/Trustee and lead PRP-group but would continue to follow the check in and communication protocol current the assessment and restoration process.

c. The parties agreed to focus assessment and restoration efforts on those resources where data was collected – the shoreline habitat, fish and birds.

    i. It was found during the emergency response, that there were minimal fish deaths and no impacted birds.

d. The parties also agreed that while the data would be shared, each party would be permitted to use the data for their own injury determination and assessment studies.

e. Based on the data collection and onsite work, it was agreed by the parties that there was no need for emergency restoration at the site.

Step 4: After Agreement to Coordinating Emergency and Assessment Activities

a. In their regular check in meetings, the parties agreed to a limited set of additional data that may be necessary to support the natural resource damage assessment and potential restoration opportunities, particularly relative to the shoreline habitat.

    i. The parties agreed to share the collected data but that the Trustees and PRPs could retain the right to assess and interpret the data independently, as needed.

b. Based on the data collected concerning the impacted shoreline area and the opportunity for local bird nesting habitats, the parties identified restoration to enhance bird nesting could be a potential early restoration project for the incident.

    i. CDFW assessed the scope of the nesting projects as early restoration could factor into the damage claim based on a scaling assessment and presented their findings to the PRP.

c. Parties agreed that implementation of early restoration projects during the response phase is not an admission of liability by the PRP.

d. Based on the assessment, the PRP agreed to funding the bird nesting habitat restoration project so long as the work and restoration enhancement would be credited against the final natural resource damage claim.

    i. Based on similar bird habitat restoration projects undertaken in CA and the associated costs of those activities, Attorneys for Trustees and the PRP agreed to a range of NRD liability "credits" that would be applied to a potential NRD liability claim.

6.6 Summary

The Framework described here sets forth a Best Practice Framework for coordinating response and restoration in site-specific instances. It is intended to be used by the different parties at a given site, including PRPs, response agencies, natural resource trustees, and others. **Using this Framework can save time and costs and align NRDA objectives, including desired end points, of the parties involved at specific sites.** While the material presented in this Framework focuses on natural resource issues under US laws, the considerations and proposed solutions herein may also be applicable to natural resource regimes in the UK, EU and other countries.

6.7 July 2024 Best Practice Approach Framework Workshop Agenda

EMERGENCY RESPONSE/RESTORATION BEST PRACTICE APPROACH FRAMEWORK WORKSHOP

Wednesday, July 24, 2024

AGENDA

10:00 AM

WELCOMING REMARKS ON BEHALF OF ARNOLD & PORTER KAYE SCHOLER LLP

Jeffrey Talbert, J.D., Partner, Arnold & Porter Kaye Scholer LLP

10:05 AM

OPENING REMARKS OF THE WORKSHOP'S LEAD CONVENER

Greg Challenger, Principal Marine Scientist/President, Polaris Applied Sciences

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10:15 AM

BACKGROUND ON THE FRAMEWORKS AND WHY THEY WERE DEVELOPED

Barbara J. Goldsmith, Executive Director, Ad-Hoc Industry Natural Resource Management Group; President, Barbara J. Goldsmith & Company LLC

10:30 AM

REVIEW OF KEY EMERGENCY RESPONSE/RESTORATION RELATED DEVELOPMENTS SINCE 2022

Speakers:

Lawrence Malizzi, Senior Consultant, CTEH LLC

Tony Penn, Chief, Assessment and Restoration Division, US Department of Commerce/National Oceanic & Atmospheric Administration (NOAA)

Jeffrey Wakefield, PhD., Natural Resources Technical Director, SCWA

11:15 AM

QUICK REVIEW OF THE FRAMEWORK

Greg Challenger

11:30 AM

INTERACTIVE WORK OUT – OPEN EXCHANGE AND DISCUSSION OF THE FRAMEWORK THROUGH APPLICATION TO HYPOTHETICAL CASE 1

Work Out Facilitator:

Greg Challenger

Work Out Leaders:

Vincent Foley, Partner, Holland & Knight LLP

Jean Martin, J.D., Senior Counsel, BP Legal

Brian Reilly, Senior Scientist, CSA Ocean Sciences Inc.

Mark Rockel, Senior Principal, Montrose Environmental

Jessica White, Acting Chief, Emergency Response Division, US Department of Commerce/National Oceanic & Atmospheric Administration (NOAA)

12:45 PM

BREAK FOR LUNCH

1:45 PM

INTERACTIVE WORK OUT – OPEN EXCHANGE AND DISCUSSION OF THE FRAMEWORK THROUGH APPLICATION TO HYPOTHETICAL CASE 2

Work Out Facilitator:

Greg Challenger

Work Out Leaders:

Vincent Foley

Jean Martin

Brian Reilly

Mark Rockel

Jessica White

3:15 PM

SUMMARY/OPEN DISCUSSION

Greg Challenger

3:45 PM

NEXT STEPS

Barbara J. Goldsmith

4:00 PM

ADJOURN

7.0 NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION PROCESS: BACKGROUND AND CONTEXT

At the 2024 Best Practice Approach Framework Workshops, the issue arose repeatedly that while each Framework focused on a specific topic facing today's practitioners, there were certain procedural and practice issues that should be acknowledged or in place to facilitate successful implementation of the Frameworks in actual practice. These principles, if considered at the outset, can increase efficiency, avoid effort duplication, save time and money and place the focus on resource restoration.

This chapter provides some background on the NRDA practice in which these Frameworks may be applied and some of "Guiding Principles" and "Rules of Engagement" that have been developed over the years by multi-stakeholder community and are intended to reflect the collective experience of diverse practitioners in both private and public sectors.

7.1 Legal and Regulatory Authority [35]

Liability for natural resource damages (NRD) is authorized under a number of US federal and state laws. Federal statutes authorizing natural resource damage claims include: CERCLA as amended (42 U.S.C. §§ 9601, et seq.), OPA (33 U.S.C. §§ 2701, et seq.), Clean Water Act (CWA) as amended (33 U.S.C. §§ 1251, et seq.), Marine Protection, Research and Sanctuaries Act (MPRSA), 16 U.S.C. §§ 1431 et seq., Park Systems Resource Act (PSRA). More than 40 states have statutes independently authorizing NRD claims. Federal, state, local and tribal officials (natural resource "Trustees") may file claims on behalf of the public to seek compensation from responsible parties to restore injured, destroyed or lost natural resources (land, fish, wildlife, biota, air, water, groundwater, drinking water supplies and resources). Federal Trustees include the US DOI and NOAA, while the US Department of Energy, US Department of Defense, US Department of Agriculture, and USEPA have also served as Trustees.

Liability for NRD is in addition to site remediation, clean up and removal or emergency response requirements. Statutes require that natural resources be restored to their baseline—their state before injury. If natural resources are not restored, then compensation for the interim loss also may be sought by governmental bodies designated as "Trustees" from the party responsible for the release of the contaminants. There are a wide set of variables that come into play at each NRD site, including type of site (continuing release situation versus instantaneous oil spill), affected natural resources, Trustees involved, nature of the contamination giving rise to alleged resource injuries, and number of PRPs involved.

The process to determine the extent of injury and associated compensation needs is known as NRDA. Two sets of federal regulations[36] provide an overall construct for NRDAs, both involving sequential phases of assessment and restoration. The US DOI NRDA regulations include four phases: (1) Pre-assessment Screen; (2) Assessment Plan; (3) Assessment Implementation; and (4) Post Assessment. The NOAA NRDA regulations include three phases: (1) Pre-assessment; (2) Restoration Planning; and (3) Restoration Implementation. While the regulations are not mandatory, an NRDA conducted according to the regulations will be granted a rebuttable presumption of correctness in litigation.

7.2 Changes in Practice

The NRDA practice has evolved over the 40+ years since the passage of CERCLA in 1980. From 1980 to the present, a total of over 900 NRD claims have been filed by federal and state trustees. Over 600 of these

[35] For further background on natural resource damage (NRD) liability and related issues, see www.NRDonline.org, https://darrp.noaa.gov/ and https://www.doi.gov/restoration.

[36] Regulations promulgated by the US DOI for natural resource damage assessment and restoration activities conducted under CERCLA, see 43 CFR 11. For the regulations promulgated by US Department of Commerce natural resource damage assessment and restoration activities conducted under OPA, see 15 CFR 990.

claims have been brought under federal law or pursuant to a combination of federal and state law, while nearly 300 have been brought under state law only. At present, there continue to be a number of federal and state NRD claims still pending, some of which were initiated in the early 1980s. Over the course of the 40+-year timeline of NRD, approximately 950 settlements have resulted in some involving multiple settlements at single sites and resulting in over $12 billion in NRD.

While early legal actions and NRDAs focused on recovery of monetary settlements to compensate for lost natural resource services, latest trends have seen resolution in terms of restoration projects versus dollar value collected, as well as increased flexibility and creativity within and between parties. In addition, public and private sector parties have been open to more restoration-based approaches that promote collaboration between parties; identifies opportunities to streamline and simplify the assessment process; considers early restoration projects to restore resources and services to public use sooner; seeks to negotiate settlement of a claim (versus long-term litigation); and encourages other innovative approaches to resolution.

Examples of changes in practice that have allowed the NRDA and restoration process to proceed more expeditiously and cost effectively, including agreement to settlements outside the courtroom; incorporation of non-monetary settlement terms (e.g., land transfers, conservation easements, off-site restoration etc.); cooperative NRDAs between PRPs and trustees (as appropriate and agreed to); use of valuation methodologies such as HEA and REA; evaluating how data collected for remedial purposes might be appropriate for NRDA; engagement of experts at the appropriate time on the NRDA; PRP implementation of restoration projects; use of early restoration and/or restoration credits, and more. In addition, an increase in dialogue and practice exchange between PRPs and trustees outside of a site-specific context has allowed parties to establish relationships and open lines of communication in productive and substantive ways.

Forums that have provided these engagement opportunities have included the Group's Industry/Trustee NRD Standing Committee, the Group's Multi-Stakeholder Natural Resources Symposia, US Department of Interior's NRDA Restoration Workshops and regional Joint Assessment Teams (JATs). The Industry/Trustee NRD Standing Committee, formed in 1999, provides a focal point and a clearinghouse for communications between the industrial community and government departments and agencies on NRD liability and related assessment and restoration issues. Participants in the Committee include a subset of the industrial company members of the multi-sector Group. On an invited basis, representatives of five federal natural resource trustee Departments and Agencies (Agriculture, Commerce/NOAA, Defense, Energy, Interior), representatives from the state trustee and tribal communities and sometimes too the USEPA participate. Also, on an invited basis, five major business/industry associations (American Chemistry Council, American Petroleum Institute, National Association of Manufacturers, National Mining Association, US Chamber of Commerce) participate.

This all being said, the Group recognizes that the decision as to how to proceed through an NRDA is often governed by the specific facts and parties involved at a particular site.

7.3 Guiding Principles

While site-specific circumstances and facts ultimately guide how a NRDA and restoration process will advance at a given site, there are a series of time-tested consensus principles aimed at fostering achievement of timely and cost-effective restoration of resources. Being cognizant of these Guiding Principles[37] can aid application of the Best Practice Approach Frameworks:

1. The overall objective of NRDA and restoration is to achieve timely and cost-effective restoration of natural resource services to their baseline.
2. Engaging in conversations between the parties to identify front-end definitions of objectives and/or

[37] Goldsmith, Barbara J., et al., "Beyond the Headlines: Best Practices to Restore Natural Resources Injured by Long-Term Hazardous Waste Releases, Oil Spills and Transport and Other Accidents" *Bloomberg BNA Daily Environment Report,* August 18, 2014

assessment end points, cost or time targets, or decision-making framework that may be appropriate at a particular site.

3. Focusing the assessment process on the earliest possible evaluation of restoration options, including early restoration projects that may be implemented prior to the completion of the injury assessment.
4. Initiating discussion of restoration early in the NRDA process, which may identify opportunities to expedite the resolution of a potential claim and promote more rapid and efficient resource restoration.
5. Following the basic scientific and economic principles on which the federal NRDA regulations[38] are based for the pertinent type of release—whether or not the parties are engaged in a process that specifically follows those regulations.
6. Determining whether data collected during an ecological risk assessment should be considered for possible application during the NRDA process to eliminate redundant or unnecessary data collection and studies.
7. Where possible, using existing data, supplemented by reasonable assumptions, to reduce the work needed to reach the overall goals of the NRDA process. In some cases, the use of existing data, models and assumptions will be insufficient for one or more parties.
8. If additional data are needed to fill gaps or test assumed facts, seeking to jointly agree on studies to be done, as appropriate, to reduce duplication of effort.
9. Ensuring all data, whether pre-existing or generated at a specific site, are relevant, quality assured, and quality controlled.
10. Examining how data collected at the site could be used for multiple purposes, including remedial, NRDA and/or restoration decision making.
11. Considering that existence of injury does not always result in a loss of natural resource services to the ecosystem or to people. A loss of services must be established and measured to scale restoration projects or determine damages.
12. Quantifying lost natural resource services as reductions in services compared to the baseline (i.e., the level of services that would have existed but for the release in question), taking into account the resource recovery period and recovery rate and omitting speculative services. To the extent possible, baseline considers and adjusts for all external contributing factors, including those unrelated to the release, naturally occurring or otherwise.
13. Selecting and using assessment methods that are cost-effective, given the circumstances of the site; using available data where feasible; and focusing new studies on gathering information needed to determine injuries, quantify service losses and/or scale restoration projects.
14. Facilitating a collaborative, transparent and efficient NRDA process that offers opportunities for meaningful involvement of potentially responsible parties and others throughout the process.
15. When identifying potential restoration projects, considering viability and implementation timing of the projects, as well as potential impacts on success.
16. Considering opportunities for PRP-led implementation of restoration projects, where appropriate.

[38] See 43 *CFR* Part 11 for the US DOI regulations implementing CERCLA natural resource damage assessment and restoration activities conducted for releases of hazardous substances. See 15 *CFR* Part 990 for the US Department of Commerce/National Oceanic & Atmospheric Administration regulations implementing the OPA natural resource damage assessment restoration activities conducted for discharges of oil.

17. Identifying how "success" could be defined at the particular site which may include—for example effective collaboration and communication among trustees, PRPs, and the public; whether the process was goal oriented; timely and/or cost-effective settlement between the parties; use of science and economic principles; extent of natural resource recovery; and/or making the public whole for the natural resource service losses.
18. Leveraging lessons-learned by both trustees and stakeholders to increase effectiveness and efficiency.

7.4 Rules of Engagement

The following are consensus "Rules of Engagement," which may also be relevant and helpful in site-specific matters and are intended to serve as a starting point to promote successful interaction among the parties, minimize procedural roadblocks and achieve shared goals. It has been shown over the years that establishing trust among PRPs and Trustees is key to successful restoration of injured natural resources at a particular site. These Rules of Engagement were identified over the course of the four 2024 Best Practice Approach Workshops, as well as drawn from the Group's "Cooperative Natural Resource Damage Assessment Agreements – Guiding Principles and Sample Provisions" document prepared by the Industry/Trustee NRD Standing Committee[39] and other Group materials:

1. Engage appropriate parties (PRPs, Federal Trustees, State Trustees, Tribal Trustees, Response Agencies) as early in the process as possible.
2. Enter into the process with a shared understanding of overall objectives of the NRDA and restoration process.
3. Be cognizant of the factors that bog down and unnecessarily elongate the process, in order to inform effective plans, actions and decision making.
4. Identify which party will coordinate the joint actions at a site, when agreed to and appropriate, and consider development of a checklist or decision tree for specific roles.
5. Recognize that the steps of the NRDA and restoration process can occur sequentially and/or concurrently to suit site-specific needs.
6. Consider relationships to and interactions with related processes (e.g., such as remediation or emergency response) and establish relationships and communication with the parties who are involved in those processes.
7. Seek to understand each party's priorities (e.g., PRPs and Trustees) to identify common interests.
8. Agree to communicate in good faith, transparently and with an open mind.
9. Treat all other parties with courtesy and mutual respect.
10. Listen in good faith to the views expressed by other parties and give fair consideration to those views.
11. Try to resolve any questions or disputes amicably and expeditiously.
12. Throughout the NRDA and restoration process, engage various stakeholders and technical experts early and frequently (from site investigation to remedial design to restoration project coordination).
13. Recognize that individual personalities can sometimes impact success or failure at a particular site.

[39] Ad-Hoc Industry Natural Resource Management Group Industry/Trustee NRD Standing Committee, "Cooperative Natural Resource Damage Assessment Agreements – Guiding principles and Sample Provisions", Reissued September 2024 (https://nrdonline.org/documents/CooperativeNRDADoc.pdf).

The Guiding Principles and Rules of Engagement identified above demonstrate key considerations that, if raised at the outset of the NRDA process, can help facilitate use of the Best Practice Approach Frameworks, as well as a broader assessment and restoration process.

8.0 NATURAL RESOURCE SYMPOSIA AGENDAS

Since 1999, the Group has convened a dozen Natural Resources Symposia, each with its own theme. These Symposia constitute a unique multi-stakeholder examination of national and international scope natural resource related policies and practices, with a strong focus on innovative and cutting-edge approaches and identification of greatest needs moving forward.

This chapter provides copies of the Natural Resource Symposia agendas convened in 2020, 2022 and 2023. The Symposia were convened by the Group in cooperation with The George Washington University School of Law, The George Washington University Environmental and Energy Management Institute, The Environmental Law Institute and others. The 2020 Symposium was convened virtually, and the 2022 and 2023 Symposia were held at The George Washington University Law School in Washington, DC.

Each program brought together an outstanding set of speakers and participants—ranging from government policy makers; to senior officers, appointees and staff responsible for implementing corporate and government policies; to attorneys, consultants, academics and other experts working in the trenches on natural resource matters. These multi-stakeholder sessions included informative, provocative and spirited dialogues that lead to a broad set of ideas and plans for follow up—namely the four Best Practice Approach Framework provided herein.

2020 NATURAL RESOURCES SYMPOSIUM

NATURAL RESOURCES AT A CROSSROADS PART 1:

HOW 2020 HAS AFFECTED NATURAL RESOURCES LAW AND POLICY AND HIGHLIGHTED THE IMPORTANCE OF PRIVATE/PUBLIC COLLABORATIONS TO ADVANCE SHARED OBJECTIVES

Thursday, September 17, 2020

AGENDA

12:00 PM

WELCOME AND OVERVIEW OF THE TWO PART SYMPOSIUM PROGRAM

Barbara J. Goldsmith, Executive Director, Ad-Hoc Industry Natural Resource Management Group; President, Barbara J. Goldsmith & Company LLC

Scott Fulton, President, Environmental Law Institute

12:15 PM

OPENING REMARKS: POST-COVID STRATEGIES – A NEW ERA FOR NATURAL RESOURCE ISSUES IN THE US AND WORLDWIDE

2020 has been a year of challenge and change. These remarks will identify how and why companies and other stakeholders need to carefully set priorities, consider cost-effectiveness and sustainability imperatives, exhibit transparency and be innovative in the way natural resource matters are approached. In addition, the remarks will focus on why and how both public and private sectors need to do things differently – given that society is in a place and time with many challenges, as well as opportunities for fundamental change. The remarks will be delivered by a nationally recognized figure with broad understanding of natural resources law and policy and allied issues and needs.

Roger, Martella, General Counsel, Environment, Health and Safety, General Electric; Former General Counsel, US Environmental Protection Agency

1:00 PM

PANEL SEGMENT: 2020 IS THE YEAR OF CHANGE – WHY WE NEED A NEW WAY OF DOING THINGS

This segment will examine continuing influences – beyond COVID-19 – on the "shape" of natural resource related policy and practice in the US and globally. Each panelist will begin with brief introductory remarks to lay out the respective issue, followed by a facilitated discussion led by a moderator. Some of the US and international influences to be discussed during this segment will include: climate change effects/initiatives, including the EU Green Deal; the rise in attention to PFAS/PFOS and other chemicals; recent US and other court decisions of note; deregulatory and related efforts in the US and abroad intended to spur post-COVID recovery; emerging and new environmental legislation, including UK post-Brexit developments; and more. Panelists will include key corporate and government decision-makers, as well as university, think tank, and other thought leaders.

***Moderator*: Thomas D. Blackman**, LM Fellow, Environment, Safety & Health, Ethics and Enterprise Assurance, Lockheed Martin Corporation

Speakers:

Susan Avery, Ph.D., President Emerita, Woods Hole Oceanographic Institution **(*Climate Change*)**

John D. Graham, Ph.D., Professor, Paul H. O'Neil School of Public and Environmental Affairs, Indiana University; Former Administrator, Office of Information and Regulatory Affairs (OIRA), Office of Management and Budget, Executive Office of the President **(*Deregulation*)**

Alex Beehler, Assistant Secretary of the Army for Installations, Energy and Environment, US Department of Defense **(*Emerging Contaminants*)**

Debora A. Sivas, Luke W. Cole Professor of Environmental Law, Director, Environmental Law Clinic, Director, Environmental and Natural Resources Law & Policy Program, Senior Fellow, Stanford Woods Institute for the Environment, Stanford Law School **(*Role of the Judiciary*)**

Ben Stansfield, Partner, Gowling WLG (UK) LLP **(*Developing Legislation*)**

2:30 PM

BREAK

2:40 PM

GREETINGS FROM US DEPARTMENT OF THE INTERIOR AND NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION LEADERSHIP

Scott Cameron, Acting Assistant Secretary for Policy, Management and Budget, US Department of the Interior

Tim Gallaudet, Ph.D., Rear Admiral, US Navy (Ret.); Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy NOAA Administrator, US Department of Commerce

3:00 PM

ADVANCING COMMON OBJECTIVES AND PROJECTS -- CONTINUING THE MULTI-STAKEHOLDER DISCUSSION

This segment will continue the multi-stakeholder discussions of the Group's Fall 2018 Natural Resource Symposium and Fall 2019 State of the Practice Meeting to identify how both public and private sector parties can move policies and practices forward jointly in a way that advances shared objectives and needs. This segment will highlight those activities that leverage private and public partnerships to advance common interests. Each speaker will provide brief remarks highlighting current and proposed collaborative public/private activities or projects that have (or could) enhance efficiency, maximize benefits, support innovation and more. The segment will include a facilitated discussion among speakers by a moderator. Panelists will include key corporate and government leadership, as well as representatives from conservation, university and other settings as appropriate.

***Moderator*: Lin Harmon-Walker**, Interim Director of the Environmental and Energy Law Program and Visiting Associate Professor of Law, The George Washington University Law School

To be replaced by: **Achinthi Vithanage**, Professorial Lecturer in Law, The George Washington University Law School; Adjunct Professor, The Trachtenberg School of Public Policy and Public Administration, The George Washington University

Speakers:

Steve D. Cook, Deputy Assistant Administrator, US Environmental Protection Agency; Chair, Superfund Task Force

Michael J. Anderson, Ph.D., Environmental Program Manager, California Department of Fish and Wildlife, Oil Spill Prevention and Response

Lynn Scarlett, Chief External Affairs Officer, The Nature Conservancy; Former Deputy Secretary, US Department of the Interior

John J. Forrer, Ph.D., Director, Institute for Corporate Responsibility, Associate Research Professor of Strategic Management & Public Policy Associate Faculty, Trachtenberg School of Public Policy and Public Administration, The George Washington University; Fellow, One Earth Future Foundation; Senior Fellow, Atlantic Council; Senior Fellow, Canadian Centre for the Responsibility to Protect, University of Toronto

4:30 PM

ROUNDTABLE DISCUSSION: ACTIVITIES OF THE INDUSTRY/TRUSTEE STANDING COMMITTEE AND CONTINUING THE DISCUSSION IN PART 2 OF THE SYMPOSIUM PROGRAM

This segment will feature a roundtable discussion with some representatives of the Group's long standing (since 1999) Industry/Trustee NRD Standing Committee. Several core joint activities undertaken to date, reflecting common objectives across the spectrum of interests represented, will be highlighted. The discussion will also share some of the issues currently being explored by the Committee, including opportunities for coordination of remediation and restoration, cooperative natural resource damage assessment "templates", training of the next generation of practitioners and more. We will also set the stage for the Symposium's Part 2 to be held in Fall 2021.

Co-Moderators:

Barbara J. Goldsmith

Tony Penn, Chief, Assessment and Restoration Division, US Department of Commerce, National Oceanic & Atmospheric Administration (NOAA)

Speakers:

Karolien Debusschere Ph.D., Deputy Coordinator, Louisiana Oil Spill Coordinator's Office, Department of Public Safety & Corrections, Public Safety Services; Chair, States NRD Alliance

Steve Glomb, Director, Office of Restoration and Damage Assessment, US Department of the Interior

Jean Marin, Senior Counsel, Litigation & Regulatory, BP

Steven Miller, Deputy Assistant General Counsel, United States Department of Energy

Larry Tippit, Member, Environmental Department, Peoria Tribe of Indians of Oklahoma (Tentative)

5:15 PM

CLOSING AND NEXT STEPS

This segment will provide a quick summary of our Part 1 program and what can be expected in the planned in person Part 2 Symposium program to be held at The George Washington University Law School in Fall 2022.

5:30 PM

ADJOURN

2022 NATURAL RESOURCES SYMPOSIUM

PART 2: NATURAL RESOURCES AT A CROSSROADS PART 2:

HOW RECENT EVENTS HAVE AFFECTED NATURAL RESOURCES LAW AND POLICY AND HIGHLIGHTED THE IMPORTANCE OF PRIVATE/PUBLIC COLLABORATIONS TO ADVANCE SHARED OBJECTIVES

Day 1: Thursday, September 15, 2022

AGENDA

9:00 AM

WELCOME

Ad-Hoc Industry Natural Resource Management Group

Barbara J. Goldsmith, Executive Director, Ad-Hoc Industry Natural Resource Management Group; President, Barbara J. Goldsmith & Company LLC

The George Washington University Law School

Dayna Bowen Matthew, J.D., Ph.D., Dean and Harold H. Greene Professor of Law, The George Washington University Law School

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9:15 AM

AGENDA REVIEW AND DESIRED OUTCOMES

Barbara J. Goldsmith

9:30 AM

OPENING ADDRESS: BIG PICTURE ISSUES INFLUENCING OUR PATH FORWARD

In late 2020, our speaker identified three key drivers of change: the clear connection between our environment and safety; the evolution of traditional "CSR" reporting into corporate action for good; and the need to incorporate time into environmental policy, climate change and other issues. We will hear an update on these drivers real time and how it can instruct where we go from here in addressing the complex of environmental, energy and societal objectives and needs we continue to face.

Roger Martella, Vice President, Chief Sustainability Officer, GE

10:00 AM

KEYNOTE ADDRESS

Introduction: ***Lisa Palmer, National Geographic Visiting Professor of Science Communication, The George Washington University School of Media and Public Affairs***

Juliet Eilperin, Pulitzer Prize-Winning Journalist, Book Author, Deputy Climate and Environment Editor, The Washington Post

10:45 AM

PLENARY SESSION: UPDATE ON ISSUES AND CHALLENGES RELATED TO THE SYMPOSIUM THEME

Speakers will examine individually, and collectively, a suite of issues pertinent to our deliberations and how private work and public/private partnerships are teeing up fresh approaches and solutions. Among them: shifts in regulatory and judicial practices, corporate accountability and reporting, "forever chemicals", climate change effects and energy balance – all of which affect stewardship of natural resources.

Moderator: ***H. Jordan Diamond, President, Environmental Law Institute***

Speakers:

John Cruden, J.D., Principal, Beveridge & Diamond PC; Former Assistant Attorney General, Environment and Natural Resources Division (ENRD), US Department of Justice

Sally Fisk, J.D., Vice President and Assistant General Counsel, Chief Counsel - Environmental & Sustainability Law, Pfizer, Inc.

Nathaniel "Nat" Keohane, Ph.D., President, Center for Climate and Energy Solutions

Jeff Rose, Vice President, Government Relations and Public Policy, Battelle

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12:15 PM

BREAK FOR LUNCH

1:00 PM

LUNCH SESSION SPEAKERS

Introduction: ***Randall S. Abate, J.D., Assistant Dean for Environmental Law Studies, The George Washington University Law School***

Scott Lundgren, Director, Office of Response and Restoration, US Department of Commerce, National ***Oceanic & Atmospheric Administration (NOAA) on behalf of Richard W. Spinrad, Ph.D., Under Secretary of Commerce for Oceans and Atmosphere & NOAA Administrator, US Department of Commerce***

Heidi King, Research Professor, The George Washington University Regulatory Studies Center

2:00 PM

EXPERT PANEL: CLOSER COORDINATION OF REMEDIATION AND RESTORATION – A POSSIBLE MODEL

A proposed Best Practice Framework to facilitate coordination of remediation and natural resource restoration at sites nationwide, where appropriate, will be presented and discussed. Following review of the Framework, a panel of multi-stakeholder experts will respond to a series of specific questions aimed at identifying how the framework could be used more broadly in actual practice.

Moderator: ***Jean Martin, J.D., Senior Counsel, Litigation & Regulatory, BP***

Presentation of the Framework: ***Steven Jones, Ph.D., Senior Ecologist, GHD (retired)***

Panelists:

Cas Bridge, Project Manager, Environmental, Chevron

David Charters, Ph.D., Environmental Response Team, Office of Superfund Remediation and Technology Innovation, US Environmental Protection Agency

Jeff Martin, J.D., Partner, Hunton Andrews Kurth LLP

Tony Penn, Chief, Assessment and Restoration Division, US Department of Commerce, National Oceanic & Atmospheric Administration (NOAA)

Rebecca Stevens, Restoration Coordinator/Program Manager, Hazardous Waste Management Program, Coeur d'Alene Tribe

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3:30 PM

BREAK

3:45 PM

EXPERT PANEL: CONSIDERING PFAS ISSUES IN THE NATURAL RESOURCE DAMAGES CONTEXT – A POSSIBLE MODEL

A proposed Best Practice Framework to evaluate PFAS issues in the context of natural resource damage assessments undertaken at sites nationwide will be presented and discussed. Following review of the Framework, a panel of multi-stakeholder experts will respond to a series of specific questions aimed at identifying how the framework could be used more broadly in actual practice.

Moderator: ***Lana Rowenko, J.D., Kelley Drye & Warren LLP***

Presentation of the Framework: ***Kristin Robrock, Ph.D., Managing Engineer, Exponent***

Panelists:

Kegan Brown, J.D., Partner, Latham & Watkins, LLP

Karolien Debusschere, Ph.D., Deputy Coordinator, Louisiana Oil Spill Coordinator's Office, Department of Public Safety & Corrections, Public Safety Services; Chair, States NRD Alliance

William H. Desvousges, Ph.D., President and Owner, W.H. Desvousges & Associates

J. Barton Seitz, J.D., Senior Counsel, Baker Botts, LLP with input from colleague Alexandra Dapolito Dunn, Partner, Baker Botts, LLP

5:15 PM

DAY 1 SUMMARY/DAY 2 PREVIEW

Randall S. Abate, J.D. and Barbara J. Goldsmith

5:30 PM

ADJOURN

Day 2: Friday, September 16, 2022

9:00 AM

WELCOME

Ad-Hoc Industry Natural Resource Management Group

Barbara J. Goldsmith, Executive Director, Ad-Hoc Industry Natural Resource Management Group; President, Barbara J. Goldsmith & Company LLC

The George Washington University

Jonathan P. Deason, Ph.D., P.E., Co-Director, Environmental and Energy Management Institute; Lead Professor, Environmental and Energy Management Program, The George Washington University

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9:15 AM

EXPERT PANEL: EVALUATING CLIMATE CHANGE AND NATURAL RESOURCE DAMAGES – A POSSIBLE MODEL

A proposed Best Practice Framework to consider climate change and extreme whether effects in the context of natural resource damage assessments undertaken at sites nationwide will be presented and discussed. Following review of the Framework, a panel of multi-stakeholder experts will respond to a series of specific questions aimed at identifying how the framework could be used more broadly in actual practice.

Moderator: ***Emily Sanford Fisher, General Counsel, Corporate Secretary, and Senior Vice President, Clean Energy, Edison Electric Institute***

Presentation of the Framework: ***Paul Boehm, Ph.D., Principal Scientist, Exponent***

Panelists:

Darrin Gambelin, J.D., Partner, Downey Brand LLP

Emily Joseph, Director, Office of Restoration and Damage Assessment, US Department of the Interior

Theodore Tomasi, Ph.D., Managing Principal, Integral Consulting Inc.

Robert Twilley, Ph.D., Chairman of the Board & Interim CSS Executive Director, Professor, LSU College of the Coast & Environment

11:00 AM

PATH FORWARD ON THE BEST PRACTICE FRAMEWORKS

This segment will briefly summarize actions suggested during the three expert panels to encourage collaborative use of the Frameworks.

Barbara J. Goldsmith

Timothy Hoelzle, Deputy Director, Office of Restoration and Damage Assessment, US Department of the Interior

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11:30 AM

2022 SYMPOSIUM KEY OBSERVATIONS AND FOLLOW UP ACTIONS

This segment will look back at the broader issues discussed during the Symposium program to identify key points and areas for action.

Barbara J. Goldsmith

Jason Kinnell, Principal Economist and Founding Partner, Veritas Economic Consulting

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12:00 PM

ADJOURN

2023 NATURAL RESOURCES SYMPOSIUM REDUX

INFLUENCES, PERSPECTIVES, NEEDS ONE YEAR LATER

A ONE DAY SPECIALTY MEETING – TOOLS TIPS AND OPPORTUNITIES FOR COMPANIES, NGOS, OTHERS

Wednesday, November 15, 2023

AGENDA

10:00 AM

WELCOME

Randall S. Abate, Assistant Dean for Environmental Law Studies, The George Washington University Law School

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10:15 AM

RECAP OF SYMPOSIUM CONVERSATIONS AND TODAY'S EXPECTATIONS

This introduction will review key points and follow on actions resulting from the Group's Natural Resource Symposium held in Fall 2022, including the impetus for the "Redux" program, and highlight goals for the day's discussions.

Barbara J. Goldsmith, Executive Director, Ad-Hoc Industry Natural Resource Management Group; President, Barbara J. Goldsmith & Company LLC

10:30 AM

COMPANIES KEEPING UP WITH CHANGE: EVOLUTION AND REINVENTION TO MEET TODAY'S PRIORITIES

We are pleased to again welcome Roger Martella, who has contributed key insights in prior Symposia on the changing role of companies and their contributions to environmental progress, to identify how companies are meeting today's challenges, corporate mandates, demands for clean energy and other global natural resource policies and demands.

Roger Martella, Group Vice President, Chief Sustainability Officer, GE and GE Vernova, Global Head of Engagement, Government Affairs, and Policy, GE Vernova

11:00 AM

WHAT HAS HAPPENED SINCE FALL 2022 (LOTS!)

After introductory remarks by the Moderator, our panel of experts will identify important developments since Fall 2022 and discuss what this means for the multi-stakeholder community in terms of policy, practice synergies and site-specific applications – including the uptick of private/public initiatives to fulfill shared objectives. Key influences to be featured include corporate transparency and emerging ESG reporting requirements; climate change; PFAS and other emerging contaminants; the role of the judiciary; and public/private partnerships and collaborations.

Moderator:

Johanna Adashek, Visiting Associate Professor and Environmental Law Fellow, The George Washington University Law School

Speakers:

John Cruden, Principal, Beveridge & Diamond; Former Assistant Attorney General, Environment & Natural Resources Division, US Department of Justice

Michael Gerrard, Andrew Sabin Professor of Professional Practice and Director, Sabin Center for Climate Change Law, Columbia Law School

Peter Hage, Senior Director, Corporate Relations, National Fish and Wildlife Foundation

Jeff Rose, Vice President, Government Relations and Public Policy, Battelle

Jessica Thurston, Vice President, Environmental, Social, and Governance (ESG) and Sustainability, Paramount Global

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12:15 PM

BREAK FOR NETWORKING LUNCH

1:15 PM

NATIONAL NATURE ASSESSMENT - WHAT IT MEANS FOR BUSINESS AND OTHERS

Participants will hear about the ongoing and unique US National Nature Assessment which is assessing the status, trends, and future projections of America's lands, waters, wildlife, biodiversity and ecosystems and the benefits they provide, including connections to the economy, public health, equity, climate mitigation and adaptation, and national security. Work completed thus far and plans forward, as well as ways that individuals and stakeholder groups can be involved, will be discussed.

Featured Speaker:

Phillip Levin, Ph.D., Director, National Nature Assessment, US Global Change Research Program, White House Office of Science and Technology Policy; Professor of Practice, University of Washington

Introduced by:

Jonathan P. Deason, Ph.D., P.E., Executive Director, Environmental and Energy Management Institute; Lead Professor, Environmental and Energy Management Program, The George Washington University

2:00 PM

PLAN FORWARD ON BEST PRACTICE APPROACH FRAMEWORK WORKSHOPS AND RELATED ISSUES

Participants will first hear a Summary of the substantial work undertaken since the 2022 Natural Resources Symposium by four Multi-Stakeholder Working Groups (1) PFAS; (2) Remediation; (3) Climate Change; and (4) Emergency Response – and their interrelationship with natural resource damages assessment and restoration, including finalization of Best Practice Approach Frameworks on each topic. Plans underway for four topic-specific Workshops to be held in 2024 will then be described, followed by a Roundtable Conversation and audience Q&A involving the 2024 Workshop "Lead Conveners" and key stakeholders.

Overview of Multi-Stakeholder Working Group Activity and Related Work Products

Barbara J. Goldsmith

Preview of 2024 Best Practice Approach Framework Workshops

Kegan Brown, Partner, Latham & Watkins

Multi-Stakeholder Roundtable/Q&A

Kegan Brown (PFAS)

Greg Challenger, Principal Marine Scientist, Polaris Applied Sciences (Emergency Response)

Steven Goldberg, Partner, Downey Brand LLP (Climate Change) represented by Monica Browner, Associate, Downey Brand LLP and Patrick Veasy, Counsel, Downey Brand LLP

Steve Jones, Senior Ecologist, GHD retired (Remediation)

Sally Kniffen, Environmental Specialist, Saginaw Chippewa Indian Tribe

Tony Penn, Chief, Assessment and Restoration Division, US Department of Commerce, National Oceanic & Atmospheric Administration (NOAA)

2:45 PM

WHAT'S HAPPENING WITH US DOI'S NRDAR REGULATIONS

In early 2023, the US Department of the Interior (DOI) issued an Advance Notice of Proposed Rulemaking concerning its natural resource damage assessment and restoration (NRDAR) regulations. A short briefing will be provided by US DOI with an update on their ongoing revision of the regulations pursuant to improving flexibility, efficiency and cost-effectiveness, as well as expediting restoration.

Emily Joseph, Director, Office of Restoration and Damage Assessment, US Department of the Interior

3:00 PM

GAMEPLAN FOR 2024 AND BEYOND

A brief recap of the areas for action identified over the course of the day will be highlighted, including Framework-specific Workshops planned for 2024 and other opportunities. Actions that can be undertaken by individual stakeholder groups, as well as collaboratively, will be discussed.

Jean Martin, Senior Counsel, BP

Jay Pendergrass, Senior Advisor and Former Vice President for Programs and Publications, Environmental Law Institute

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3:15 PM

SUMMARY/CLOSING

Barbara J. Goldsmith

3:30 PM

ADJOURN

9.0 BEST PRACTICE APPROACH FRAMEWORK CO-AUTHORS AND CONTRIBUTORS

Many legal, technical, economic and other experts contributed to the development of the four Best Practice Approach Frameworks herein, including initial drafting and subsequent editing and refinement. The paragraphs below recognize some of these individuals; the Group apologizes if persons have been inadvertently omitted.

Contributions were both written and oral via review and comment as well as interactive discussions at the Group's 2022 and 2023 Natural Resources Symposia and the 2024 Best Practice Approach Workshops. Moreover, in 2023 and 2024, Multi-Stakeholder Working Group were set up and persons participating, representing a broad range of organizations in both public and private sectors (as noted in chapter 2), were asked to review the Frameworks at various junctures of their development.

Framework Co-Authors

Paul Boehm, Ph.D., Exponent, Inc.[a]; Kegan Brown, J.D., Lowenstein Sandler LLP [b]; Greg Challenger, Polaris Applied Sciences [d]; William H. Desvousges, Ph.D., W.H. Desvousges & Associates [b]; Brian Ferrasci-O'Malley, J.D., Nossaman LLP [d]; Nicholas Gard, Ph.D., Exponent, Inc. [a]; Darrin Gambelin, J.D., Pacific Gas and Electric [a]; Steven Goldberg, J.D., Stoel Rives LLP [a]; Robert Haddad, Ph.D., Exponent, Inc. [d]; Steven Humphreys, J.D., Kelley Drye & Warren LLP [b]; William Jackson, J.D., Kelley Drye & Warren LLP [b]; Steve Jones, Ph.D., GHD (Retired) [c]; Jason Kinnell, Veritas Economic Consulting [c]; Jean Martin, J.D., BP [d]; Jeff Martin, J.D., Hunton Andrews Kurth [c]; Reed Neuman, J.D. Nossaman LLP [d]; Thomas Pearce, Latham & Watkins [a]; Gregory Wall, J.D., Hunton Andrews Kurth LLP [b]; Greg Wilkinson, J.D., Vinson & Elkins LLP [d]; Ralph J. Stahl Jr., Ph.D., Dupont (Retired) [c]; Theodore, Tomasi, Ph.D., Integral Consulting Inc. [a]

Best Practice Approach Workshop Leads and Workout Leaders

Paul Boehm, Ph.D., Exponent, Inc.[a]; Kegan Brown, J.D., Lowenstein Sandler LLP [b]; Monica Browner, J.D., Stoel Rives LLP [a]; Greg Challenger, Polaris Applied Sciences [d]; Dave Charters, USEPA [c]; Vincent Foley, Holland & Knight LLP [d]; Gary Fremerman, US Department of Agriculture [a]; John Gardella, CMBG3 Law [b]; Steven Goldberg, J.D., Stoel Rives LLP [a]; Thomas Gulbransen, Battelle [b]; Josh Heltzer, First Environment [c]; Miranda Henning, BCES, Integral Consulting Inc. [a]; Mike Johns, Ph.D., Windward Environmental [c]; Steve Jones, Ph.D., GHD (Retired) [c]; Benjamin Lippard, J.D., Vinson & Elkins LLP [c]; Jean Martin, J.D., BP [a, d]; Thomas Pearce, Latham & Watkins [a]; Tony Penn, US Department of Commerce/National Oceanic & Atmospheric Administration [c]; Brian Reilly, CSA Ocean Sciences Inc. [d]; Kristin Robrock, Ph.D., P.E., Exponent, Inc. [a]; Mark Rockel, Montrose Environmental [d]; William Schew, GHD [c]; Ryan Stifter, Roux[a]; Theodore, Tomasi, Ph.D., Integral Consulting Inc. [a]; Patrick Veasy, J.D., Stoel Rives LLP [a]; Jessica White, US Department of Commerce/NOAA[d].

Other Reviewers/Commentors

Annie Gibbs, Windward Environmental LLC[a, b]; Tim Hoelzle, US DOI[d]; Mike Johns, Ph.D., Windward Environmental LLC[a, b]; Emily Joseph, US DOI [a, b]; J. Barton Seitz, Baker Botts LLP [c]; Rebecca Stevens, Couer d'Alene Tribe [c]; Sharon Thomas, Battelle [b]; Robert Twilley, Ph.D., Louisiana State University College of the Coast & Environment [a]; and others too numerous to list.

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a: Climate Change/NRD Best Practice Approach Framework; b: PFAS/NRD Best Practice Approach Framework; c: Remediation/Restoration Best Practice Approach Framework; d: Emergency Response/Restoration Best Practice Approach Framework

10.0 ADDITIONAL RESOURCES AND REFERENCES

This chapter provides a compilation of various resources for each Best Practice Approach Framework topic available at the time of publication of this document. We welcome suggestions and/or additions, as appropriate.

10.1 PFAS/Natural Resource Damages

Websites

- **Battelle**: Battelle's PFAS ANNIHILATOR

Government

- **Department of Commerce/NOAA**: Project Begins to Address the Science of PFAS During Oil Spill Response
- **Department of Defense**: DOD PFAS website
- **US DOI:**
  - Office of Environmental Policy and Compliance Guidance:
    - Per- and Polyfluoroalkyl Substances (PFAS) Analysis Supplemental Guidance and Communication Plan Template (Available Upon Request) (July 2023)
    - Protective Actions regarding Per- and Polyfluoroalkyl Substances (PFAS) (January 2022)
  - US Geological Survey (USGS):
    - Guide to Per- and Polyfluoroalkyl Substances (PFAS) Sampling within Natural Resource Damage Assessment and Restoration
- **USEPA:**
  - USEPA Designation of PFOA and PFOS as CERCLA Hazardous Substances: Final Rule (2024)
  - US EPA PFAS Website
  - TSCA Section 8(a)(7) Reporting and Recordkeeping Requirements for Perfluoroalkyl and Polyfluoroalkyl Substances (2023)
- **US DOI**: Guidance Memo issued in Jan 2022: Protective Actions regarding Per- and Polyfluoroalkyl Substances (PFAS)

Published Articles

- "PFAS Litigation", Thomas Bloomfield, et al., Natural Resources & Environment; Chicago Vol. 36, Iss. 1, (Summer 2021)
- "How the Safe Drinking Water Act & the Comprehensive Environmental Response, Compensation, and Liability Act Fail Emerging Contaminants: A Per- and Polyfluoroalkyl Substances (PFAS) Cast Study", Carly Johnson, 42 Mitchell Hamline L. J. Pub. Pol'y & Prac. 91 (2021)
- "Commentary: PFAS Experts Symposium: Statements on regulatory policy, chemistry and analytics, toxicology, transport/fate, and remediation for per and polyfluoroalkyl substances (PFAS) contamination issues", John A. Simon, et al., Remediation, Volume 29, Issue 4, Autumn 2019

10.2 Climate Change/Natural Resource Damages

Websites

- **C2ES (Center for Climate and Energy Solutions)**: About C2ES and Building Climate Resilience Program
- **Environmental Law Institute**: Climate and Energy Program
- **Louisiana State University**: Coastal Sustainability Studio

Government

- **Coeur d'Alene Tribe**: Tribal Climate Adaption Guidebook
- **Department of Agriculture**: 2021 Policy Statement for Climate Adaptation and Resilience
- **Department of Commerce/NOAA**: 2021 Climate Action Plan for Adaptation and Resilience
- **US DOI**: 2021 Policy Statement for Climate Adaptation and Resilience
- **State of Louisiana**: State of Louisiana Climate Action Plan

Published Documents

- "Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070", Jeffrey Rissman, et al., Applied Energy, Vol 266, 2020
- "Implications of global climate change for natural resource damage assessment, restoration, and rehabilitation", Rohr, Jason R. et al., Environmental Toxicology Chemistry, 2013
- "Natural Resource Damages for Climate Change - An Idea Whose Time Is Not Yet Come, Part II: Climate Change NRD Claims—Get Coverage", J. Wylie Donald, Ira Gottlieb & Jocelyn Gabrynowicz Hill, Environmental Claims Journal, Vol 21, 2009
- "Natural Resource Damages for Climate Change - An Idea Whose Time Is Not Yet Come, Part I: NRD Claims are Not Currently Viable under CERCLA", Ira Gottlieb, J. Wylie Donald, & Jameson A. L. Tweedie, Environmental Claims Journal, Vol 24, 2008

10.3 Coordinating Remediation/Restoration

Government

- **Department of Commerce/NOAA**: Oil Spill Guidelines and Resources; Environmental Response Management Application (ERMA); NAO 210-110: Damage Assessment, Remediation and Restoration Framework
- **US DOI**: Policy for Signature of Non-Case Specific Natural Resource Damage Assessment and Restoration (NRDA Restoration)

  Program-Related Documents and Documents Involving both CERCLA/OPA

  Response and NRDAR Program Activities- May 25, 2001
- **US Department of Energy**: NATURAL RESOURCE DAMAGE ASSESSMENT COOPERATION AND INTEGRATION (2012)
- **USEPA:** Natural Resource Damages: Notification and Coordination Activities;
- **State of Louisiana:** Regional Restoration Planning Program (RRP Program)

Published Articles

- "If coordination of remediation and restoration under CERCLA is such a good idea, why is it not practiced more widely", Ralph G. Stahl, Jeffrey Martin, Theordore Tomasi and Barbara J. Goldsmith, Journal of Environmental Management (2023)
- "How Might We Pick Up the Pace of Remediating Contaminated Sites in the United States?", Ralph Stahl, Timothy S Bingman, Bradley A Grimsted, and Christopher S Waldron, Integrated Environmental Assessment and Management—Volume 15, Number 6—pp. 1029–1033 (2019)
- Coordinating ecological risk assessment with natural resource damage assessment: A panel discussion by Mike Ammann, Rebecca Hoff, Mark Huston, Ken Jenkins, Tony Palagyi, Karen Pelto, Todd Rettig, Anne Wagner (SETAC Integrated Environmental Assessment and Management Journal, 2015)
- Integrating Natural Resource Damage Assessment and Environmental Cleanup Activities at CERCLA and RCRA Sites, Remediation Journal, Vol. 23, Issue 2 by Matthew Duschesne, 2013
- Munns, JR., W. R., A. W. Rea, and M. G. Barron. Improving Hazardous Waste Remediation and Restoration Decisions Using Ecosystem Services. Presented at 4th Annual National Conference on Ecosystem Restoration, Baltimore, MD, August 01 - 05, 2011
- "The Nexus Between Ecological Risk Assessment and Natural Resource Damage Assessment Under CERCLA: Introduction to a Society of Environmental Toxicology and Chemistry Technical Workshop", Stahl RG, Gouguet R, Charters D, Clements W, Gala W, Haddad R, Helm R, Landis W, Maki A, Munns WR, Young D., Integr Environ Assess Manag. 2009 Oct; 5(4)
- "Translating Ecological Risk to Ecosystem Service Loss", Munns WR Jr, Helm RC, Adams WJ, Clements WH, Cramer MA, Curry M, DiPinto LM, Johns DM, Seiler R, Williams LL, Young D., Integr Environ Assess Manag. 2009 Oct; 5(4)
- "Ecological Risk Assessment and Natural Resource Damage Assessment: Synthesis of Assessment Procedures", Gala W, Lipton J, Cernera P, Ginn T, Haddad R, Henning M, Jahn K, Landis W, Mancini E, Nicoll J, Peters V, Peterson J., Integr Environ Assess Manag. 2009 Oct; 5(4)
- "Effective Coordination and Cooperation Between Ecological Risk Assessments and Natural Resource Damage Assessments: A New Synthesis", Ronald G Gouguet , David W Charters, Larry F Champagne, Mark Davis, William Desvousges, Judi L Durda, William H Hyatt, Rachel Jacobson, Larry Kapustka, Rose M Longoria, Integr Environ Assess Manag. 2009 Oct; 5 (4)

10.4 Coordinating Emergency Response/Restoration

Government

- **USEPA**: Natural Resource Damages - Notification and Coordination Activities
- **USEPA**: Oil Spills Prevention and Preparedness Regulations
- **Louisiana**: Regional Restoration Planning Program
- **National Response Team**: Federal Natural Resource Trustees and ICS/UC NRT-RRT
- **US Coast Guard**: National Pollution Funds Center
- **US Department of Commerce/National Oceanic & Atmospheric Administration**: Oil Pollution Act Regulations, 15 CFR Part 990 Natural Resource Damage Assessments
- **US Department of Commerce/National Oceanic & Atmospheric Administration:** Environmental Response Management Application (ERMA)
- **US DOI Restoration Program:** "How NRDAR and Response Work Together"

11.0 ABOUT THE AD-HOC INDUSTRY NATURAL RESOURCE MANAGEMENT GROUP AND ITS KEY PARTNERS

The Group is comprised of major companies from various sectors. Founded in 1988, the Group is uniquely focused on the intersection between natural resources (e.g., air, water, land, species) and industrial activities inclusive of manufacturing, energy exploration, production and use, minerals mining, renewable resources, and transportation by land and sea. Its overarching objectives are two-fold: (1) to provide unparalleled support to its member companies; and (2) to facilitate reasonable, balanced and predictable policies and practices worldwide.

The Group's experience relative to NRD liability, assessment and restoration is extensive. The Group has served a key leadership role within the industrial community for decades and has collaborated and/or engaged in ongoing dialogue and practice exchange with government and others relative to the US NRD regimens under CERCLA, OPA and other federal and state laws, as well as the Environmental Liability Directive in the EU and similar liability regime worldwide.

The Group has undertaken significant work to advance the state of the practice and encourage a natural resource practice arena that is reasonable, balanced and predictable. This has been evident through its series of Natural Resources Symposia (convened since 1999), seminars, state of the practice meetings, briefings, industry workshops and other events; development of white papers, issue papers, best practice and other documentation on key legal, technical and economic issues; joint projects undertaken with key partners, including federal, state and tribal trustees; comments on regulatory proposals and related activities; sponsorship of manuscripts for subsequent publication in peer-reviewed journals; and more.[40] In short, the Group has a unique perspective on natural resource liability and related matters, given its longevity and collective experience.

The Group partnered with all the entities shown in the image below (from the Group's 2023 Natural Resource Symposium Redux Program) to bring lawyers, scientists, economists and others together from private and public sectors to discuss, in real time, the influences, needs and perspectives attendant to natural resource policies and practice and associated opportunities, including the Best Practice Approach Frameworks.

[40] The full scope of the Group's work can be found on its website here: https://www.nrdonline.org/accomplishments.php4.

Ad-Hoc INDUSTRY
NATURAL RESOURCE MANAGEMENT GROUP

NATURAL RESOURCES SYMPOSIUM REDUX:

INFLUENCES, PERSPECTIVES, NEEDS ONE YEAR LATER

A ONE DAY SPECIALTY MEETING – TOOLS, TIPS AND OPPORTUNITIES FOR COMPANIES, NGOS AND OTHERS

November 15, 2023
The George Washington University Law School, Washington, DC

Brought to you in collaboration with:

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We also recognize the following cooperating partners via the Group's Industry/Trustee Standing Committee:

USDA

State NRD Alliance

energy API

American Chemistry Council

NATIONAL ASSOCIATION OF Manufacturers

NMA

For further information on these topics, inquiries or to provide comments, please contact us at info@nrdonline.org.