



Natural Resource Damage Assessments

A trusted partner

Natural Resource Damage Assessment (NRDA) is an integration of legal, scientific, and economics disciplines. When significant impacts to aquatic resources occur, international, federal, and state NRDA processes are initiated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Oil Pollution Act (OPA), and correspondent state laws. NRDA is supported by a large number of natural and social sciences and relies on that science to be credible and defensible to support the process and to assess alternatives. With an emphasis on restoration, NRDA leans on a breadth of disciplines and capabilities, which vary with each stage. And while the process has evolved dramatically, Stantec's cutting-edge approach has remained constant.

CONFIDENTIALITY/DEFENSIBILITY

The United States government, states, territories, and tribes manage natural resources held in trust for the public and has statutory authority to pursue damage claims to restore resources that have been injured due to the release of oil and hazardous substances. The potential for litigation exacerbates the ecological and economic complexities inherent in determining and quantifying natural resource injuries and requires support from a team who can defensibly and effectively address the technical aspects of NRDA and also support potential legal case strategies.

As your partner in the process, Stantec appreciates the importance of confidentiality in NRDA cases, and ensures our clients receive the appropriate protections when engaging in a damage assessment. In addition to our sensitivity to and awareness of confidentiality best practices in potential litigation actions, we are also mindful of the significance of defensibility. Stantec ensures the development of any deliverables associated with NRDA meets the highest standards of technical and legal defensibility.

With decades of damage assessment experience, Stantec's NRDA practitioners are well-versed in the international, federal, and state statutes that provide authority for Trustees to pursue damage claims. Our experience with dozens of NRDA cases includes expert witness and direct litigation support, as well as settlement development and negotiation. Stantec is able to bring our NRD litigation knowledge to bear at any phase of a damage assessment as a value-added service to our clients.





3,100+

Professionals

With over 3,100 environmental professionals across the globe, our environmental team can deliver the local understanding to the NRDA process.





Evolving solutions

When an oil or hazardous substance release occurs, an immediate spill response is initiated. But the NRDA process isn't as linear, nor is understanding the evolving solutions that make up a successful NRDA program. We pride ourselves on having been at the forefront of setting precedence in NRDA over the past decade and in helping our clients navigate this complex program required under the CERCLA and OPA. With over 400 offices in six continents, Stantec has the geographic reach and expertise to support our client's NRDA needs wherever they occur.

Our Environmental Services practice has more than 3,100 employees specializing in over 20 disciplines and registered in over 900 professional associations globally. Our staff have conducted NRDAs in nearly every marine, freshwater, and terrestrial environment, achieving award-winning results for our clientele. We are a proud team of assessment, restoration, and natural resource economics practitioners who are experienced in finding creative solutions to help our clients navigate the NRDA process, bringing a local understanding of your project and the community it serves. We've helped our clients successfully plan, assess, restore, and support litigation under NRDA actions. What sets us apart is our deep understanding of the regulatory drivers behind the NRDA process, our decades of expertise in natural resource injury assessment and restoration, and our respected relationships with the agencies who apply the NRDA regulatory framework across the globe.

Our commitment to safety

Stantec is committed to providing and maintaining an incident-free, healthy and safe workplace. At Stantec, we believe in doing what is right which includes sending our people home injury-free every day. Our written behavior-based occupational safety and health program, Stantec Health, Safety, Security & Environment (HSSE) Program Manual is the cornerstone of our Health & Safety Management System and outlines general employer and employee responsibilities related to health, safety, security, and the environment with more specific requirements and practices documented within our Safe Work Practices and Programs. Each employee is expected to comply with all of the requirements set forth in the HSSE Program Manual.

Our behavior-based HSSE Program is designed to provide all employees with guidelines and knowledge necessary eliminate or reduce the risk of injury, illness and damage in the workplace. This is accomplished through identification and evaluation of workplace hazards and taking action to manage the risks that arise in workplace operations (hazard recognition and control).

Our HSSE Program applies to anyone employed by Stantec including employees, consultants, contractors, subcontractors, and suppliers working within Stantec workplaces. Additionally, employees must also follow the health, safety and environment requirements specified by local legislation, clients, construction contractors, or others with responsibility for managing site and workplace safety.

Stantec's health and safety management practices are based on the OHSAS 18001 framework. We maintain formalized HSSE programs and policies that are set forth in guidance documents and include tools for implementation of our Safe Work Practices. Our HSSE program is designed to be dynamic to meet the evolving needs of our staff and clients.





1 Million

We have safely performed 1 million man hours without an incident for one of our leading Oil & Gas clients.

We've got the environment down to a science

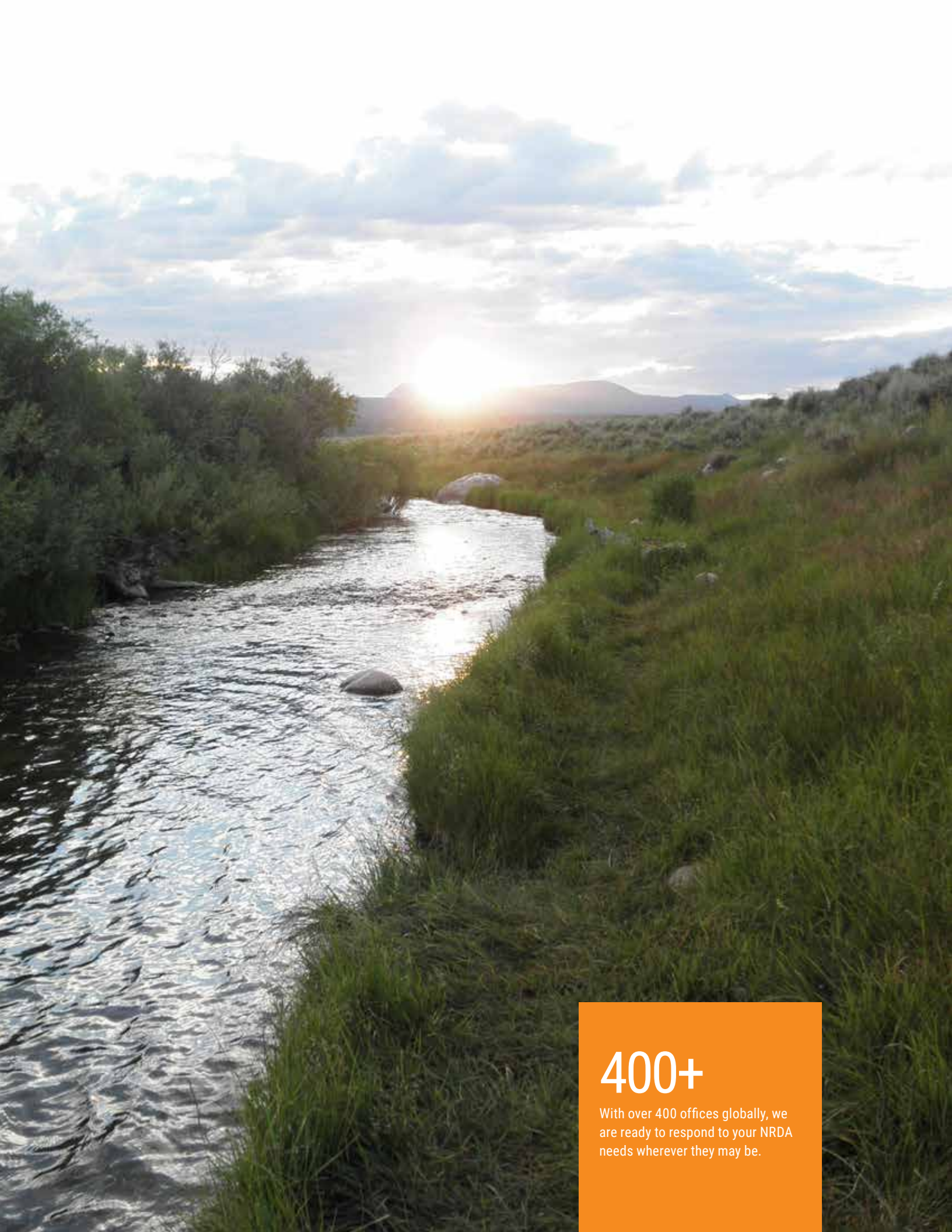
Our environmental services team members work throughout the world we have scientists and engineers on staff who are experts in each of the bioregions found throughout the planet. Over the last 3 decades, our team has traveled to the far corners of the world to complete injury assessments and restoration planning on many high profile ecological disasters and have solved complex environmental problems for our clients. Once completed, we have received several awards for our restoration work and enjoy the challenges our clients often bring to us. For example, Stantec was awarded the ACEC Grand Conceptors Award for stream restoration at Loring Air Force Base.

As part of our NRDA program, members of our Injury Assessment Team assess the nature, degree, and temporal/spatial extent of natural resource injuries, provide rapid deployment and longer-term analytics. Our Restoration Team identifies, scales, designs, and implements emergency, primary, and compensatory restoration projects. Both teams coordinate with clients, habitat and resource-specific restoration experts, and case managers throughout the NRDA process.

Stantec has provided a wide range of technical services from the discovery phase through post-remediation phases of NRDA projects, including:

- Determining and quantifying injury to natural resources
- Technical reviews of Potentially Responsible Party (PRP) studies and plans data review and analyses
- Ecological risk assessments
- Assessment planning
- Data gap analyses
- Resource injury determinations
- Developing restoration alternatives for primary and compensatory actions
- Determining the scale and costs of restoration options
- Evaluating potential restoration sites that provide service equivalency for specific lost functions and developing restoration plans
- GIS and data management
- Providing construction-phase services and long-term monitoring





400+

With over 400 offices globally, we are ready to respond to your NRDA needs wherever they may be.





The Stantec team offers:

- An NRDA process that follows scientific and economic principles on which the NRDA regulations are based
- Accurate determination and quantification of loss of ecological and public use services given that contaminant exposure does not always equate to loss of services
- Selection and implementation of high-quality, cost-effective assessment methods
- A cooperative, transparent, and efficient NRDA process with meaningful and effective participation in the process
- NRDA's implemented in a manner that includes timelines, cost expectations, and constraints
- Establishment of front-end visions of desired restoration end points
- Timely and cost-effective restoration of natural resource services

NRDA services at every stage

PLANNING

- Client-specific NRDA plan development
- NRDA readiness support
- Sampling strategy protocols and logistics planning and development
- Quantitative Mitigation Analysis
- Training

ASSESSMENT

- Assessment plan design and development
- Matrix data collection
 - Source oil/CoC
 - Water
 - Air
 - Sediment
 - Tissue
- Fish surveys
- Wildlife surveys
- Loss of use studies
- Environmental and historical data (wx, hydrology, baseline resource conditions)
- Design, coordination and implementation of injury assessment studies
- Cost effective assessments
- Injury assessment studies
 - Laboratory
 - Field
 - Modeling
 - Literature

SETTLEMENT OR LITIGATION SUPPORT

- Expert witness testimony
- Deposition preparation support
- Expertise in OPA and CERCLA and implementing NRDA regulations and process
- Litigation support
 - Technical evaluation of studies and claims
 - Technical studies
- Settlement negotiation support

RESTORATION

- Emergency restoration
- Primary restoration
- Compensatory restoration
- Identification and selection of preferred restoration alternatives
- Pilot studies
- Scaling and discounting
- Restoration plan development
- Restoration design
- Evaluation and ranking of restoration alternatives
- Cost engineering
- Construction bidding
- Implementation
- Long-term monitoring
- Adaptive management





Connections you can count on

Key Staff Introductions

MEET THE TEAM



Tim Reilly
NRDA Program Manager

Tim Reilly is an environmental scientist and natural resource damage and risk assessment expert with over 31 years of experience in performing freshwater, marine, and coastal environmental risk assessments and conducting natural resource damage assessment, remedial oversight, and restoration of habitats impacted by oil and hazardous substances and other anthropogenic impacts to the coastal and marine environment.

Tim has been involved in assessing the distribution and toxicological interactions of oil and hazardous materials in surface water, groundwater, and terrestrial environments. He has played a key role in determining biological, physical, and chemical response strategies, ecological restoration, and remedial and damage compensation options at hundreds of contaminated sites throughout the United States, Latin America, Oceania, Europe, and the Middle East.

Tim has led national and international economic and environmental claim development and adjudicatory efforts associated with oil spills and hazardous material releases valued at hundreds of millions of US dollars.



Joe Steinbacher
NRDA Senior Scientist

Joe Steinbacher is an interdisciplinary ecologist with nearly 20 years of professional experience in NRDA and natural resource management. His experience includes program oversight and coordination of some of the largest Superfund and oil spill damage assessments in the country. Joe has a broad technical background with an emphasis on environmental contamination, and has been involved in numerous scientific investigations in aquatic, estuarine, marine, and terrestrial ecosystems. He has applied his interdisciplinary skill set in academic, government, and commercial settings to develop solutions to environmental challenges that foster sustainable outcomes. Joe has successfully led technical working groups through the injury assessment process to value injured resources and identify restoration options, in a timely and cost-effective manner.

As a proponent of expedited NRD settlements, Joe has been invited to deliver workshops on cooperative NRDA for the Department of Defense and various industry groups. He is a skilled facilitator and consensus-builder, and has effectively managed the needs and expectations of multiple stakeholders to drive the NRDA process in an efficient and economical manner, while maintaining scientifically and legally defensible standards. For his contributions to NRDA projects, Joe was awarded the Department of Commerce Bronze Medal and the United States Coast Guard Meritorious Team Commendation.



John Jengo
Senior NRDA Scientist

John Jengo's 30 years of experience in site remediation has facilitated potential in-river sediment NRDA's for legacy industrial sites; these calculations have involved evaluating what impacts may have been caused by the full life cycle of facility operations, the areal extent of the potential impacts in the adjacent surface water bodies, and the number of years and degree of potential degradation, but also whether potential impacts were reduced when operational improvements such as wastewater treatment plants or remediation systems protective of surface waters went on-line. Such work has included appraising the baseline condition of the affected surface water resources because the historical quality of those waters are a critical factor in calculating an accurate, and oftentimes less costly, potential NRD liability. John's demonstrated expertise in estimating potential natural resource damage has also incorporated testing various desirable forms of compensatory restoration, including dam removals, which often prove to be the most cost-effective method to settle sediment and wetland NRD liability. John's negotiations with NOAA, USFWS and local State Environmental Protection Agencies have resulted in groundbreaking legal settlements to remove numerous low head dams to restore historically significant migratory fish spawning runs. John's dam removal projects have won multiple awards, including the 2014 New Jersey Governor's Environmental Excellence Award for Water Resources and the 2017 Hudson River Estuary Program/NY-NJ Harbor & Estuary Program Conservation Achievement & Reconnecting the Tributaries Award.



Mike Hester
Senior NRDA Scientist

Mike Hester has more than 25 years of environmental consulting experience, including management of NRDA and restoration projects, NRDA claim development, supervision of multi-disciplinary teams on complex multi-year projects, and investigation and remediation of petroleum and hazardous materials releases. He is responsible for senior project management associated with all aspects of NRDA, environmental investigation and restoration services, including research, planning and implementation of complex NRDA projects; in addition, he provides technical support services for regulatory oversight of investigation and remediation of CERCLA (Superfund) sites. He has worked closely with oil spill modelers to evaluate the fate and effects of petroleum in the environment, and has supervised teams of technical staff and subcontractors on numerous projects assessing the environmental impacts of anthropogenic contaminants in marine, freshwater, groundwater, and terrestrial ecosystems. Mike's expertise and training include natural resource injury assessment; environmental impact analysis; contaminated site restoration; environmental risk assessment; environmental chemistry; hydrology, limnology and oceanography; statistics, data analysis, and applied mathematics; applied ecology; and wetlands biology.

MEET THE TEAM



Doug Stewart
NRDA Principal Scientist

Doug Stewart is a Professional Wetland Scientist and Ecologist with over 20 years of professional natural resource consulting experience throughout North America. He is a Senior Principal with Stantec's Environmental Services Practice and is a US Sector Leader for Oil & Gas. Doug focuses on natural resource characterization in both terrestrial and aquatic environments, ecological impact assessments, ecological risk assessment ecological restoration, permitting, expert witness testimony, and third party reviews. Throughout his career, Doug has lead several NRDA projects in the US. Most notably, Doug has worked on the former Loring Air Force Base NRDA for the past 23 years. His work at the former Loring included baseline ecological characterizations, injury assessment, risk assessments, ecological restoration, and long-term monitoring. In 2001, this project was recognized by the National Academy of Science for the successful restoration of wetland and stream habitat following a complex, large-scale sediment removal action. The stream restoration at Loring was selected by the ACEC for the Grand Conceptor Award in 2000. Doug is known throughout the regulatory community as an expert wetland scientist and is commonly engaged in regulatory enforcement actions for his expertise and litigation support.



Steve Pelletier
**Senior Terrestrial Biologist, US Ecosystems Discipline
Lead for Environmental Services**

Steve Pelletier is a Certified Wildlife Biologist, Professional Wetland Scientist, and Certified Professional and Licensed Forester with over 30 years of professional experience. He specializes in site- and landscape-level habitat and natural community analyses, forest ecology/management, wetland assessments, and project impact analysis and compensation, and offers expertise in a variety of rare species evaluations, avian risk assessments, and impact mitigation measures for projects ranging from transportation to energy development. Steve's NRDA experience includes both habitat and avian related injury assessments following major spill events in both Massachusetts and California, and has involved working with NRDA Trustees as an RP Lead in Technical Work Groups. He has served on the State of Maine Oil Spill Advisory Committee, and is currently contracted as a Principal Investigator for NRDA response events within Maine. Steve was involved with coastal impact assessments during the Buzzards Bay oil spill near Cape Cod, which required rapid mobilization and coordination in an evolving emergency response atmosphere. He has coordinated avian impact evaluations within the coastal zone, conducted intensive surveys of shorebird, waterfowl and wading bird populations in affected areas, and helped NOAA develop information to plan habitat restoration efforts. In addition, Steve has served as the Senior Biological Lead for emergency spill response activities following spill events in North Dakota and Alberta, Canada, with duties that have included agency coordination and initial design, deployment, and management of biological study plans, and daily coordination and oversight of emergency response teams assessing spill related impacts to aquatic, riparian, and terrestrial taxa and natural communities.



J. George Athanasakes
Senior Habitat Restoration Scientist

George Athanasakes has a diverse background that includes civil engineering, stream restoration, wetland restoration, and watershed planning. He has served as the Project Manager and/or Design Engineer on over 50 ecosystem restoration projects incorporating a variety of restoration techniques. While these projects include numerous ecosystems in the Great Lakes region, George's services are often retained to consult on ecosystem restoration projects throughout the United States. Due to his broad restoration experience, George has instructed several restoration training workshops and has presented at many national conferences on the subject. In addition, he has authored a number of papers on the subject and helped to bring innovation to the field of stream restoration by leading the development of the RIVERMorph software, which is the industry standard for stream restoration software throughout the United States and internationally. George has also led projects ranging from under \$20K to over \$3 million in value and has lead teams of over 40 persons. His present duties include leading Stantec's Ecosystem Restoration division.



Don Fuller, PE
Senior NRDA Scientist

Don Fuller is a Professional Engineer with over 25 years of experience in geotechnical, environmental, and waste management and containment facility engineering. Over the course of his career, Don has been involved in environmental site characterization, remediation feasibility, technical design and analysis, project scheduling, construction management, development of QC programs, and regulatory permitting for various Superfund and waste containment facilities. He has a strong background in project and resource management and engineering design, as well as technical writing. His project experience includes broad scope Superfund characterization and remediation design projects that include evaluation of vertical and horizontal expansions for waste containment facilities, multi-layer stability analyses, environmental site assessments, environmental sampling, remedial investigations, and feasibility studies. Don's mitigation experience includes jurisdictional stream and wetland systems, and threatened and endangered species impact studies. Don was the Program Manager for the 2008 Kingston Plant fly ash incident response and recovery, and provided direct oversight of 600 people during ash recovery operations.



Representative
NRDA project
experience

GUANICA OIL SPILL RESTORATION PLANNING

Puerto Rico

In August 2007, the Genmar Progress discharged approximately 45,000 gallons of oil into the Guayanilla Bay of Puerto Rico. Approximately 30 miles of shoreline along the southwestern coast of Puerto Rico were potentially exposed to oil. Oil exposure resulted in injuries to a variety of natural resources, including: fish, birds, marine invertebrates, seagrass and mangrove habitats, sea grape trees, and public use. Stantec is supporting the Trustees' prime consultant, LTCL, to develop restoration options and select the preferred restoration alternative to compensate the public for natural resource losses resulting from the incident and prepare an Oil Pollution Act (OPA)-mandated restoration plan.

To facilitate restoration for injured resources, Stantec is working with the Guanica Trustee Council (composed of U.S. Fish and Wildlife Service and Puerto Rico Department of Natural and Environmental Resources) to identify candidate restoration actions and evaluate their potential to compensate for interim losses of natural resources through restoration of resources of the same type and quality, and of comparable value, as those injured. These candidate restoration actions are being evaluated, based on OPA selection criteria, to identify and select preferred restoration alternatives.

Stantec is determining the scale of restoration actions identified by the Trustees as their preferred restoration alternatives, using appropriate metrics for measuring equivalency for injured resources. Economic valuation tools, such as habitat or resource equivalency analyses and value-to-cost approaches, to compensate for loss of public use injuries, ensure suitable restoration will be implemented that addresses the natural resource injuries resulting from this incident and makes the public whole.

DEEP WATER HORIZON OIL SPILL RESPONSE

Mississippi Canyon, Louisiana, Mississippi, Alabama, and Florida

Stantec ecologists provided ecological services to assist BP with the cleanup of oil associated with the Deepwater Horizon oil spill in the Mississippi Canyon in the Gulf of Mexico.

The Deepwater Horizon oil spill response required the removal of oil from the affected shorelines. Many cleanup activities had the potential to cause inadvertent but significant impacts to natural and cultural resources. As part of an emergency Section 7 consultation under the Endangered Species Act, the U.S. Fish and Wildlife Service (USFWS) developed a list of Best Management Practices (BMPs) to minimize the impacts to federally listed species, designated critical habitat, and candidate species.

Stantec staff helped to implement and document compliance with the technical guidance developed by the Incident Command and USFWS. Natural Resources Advisors (NRA) worked within the Mobile Incident Command Center. Stantec staff worked in concert with BP and the cleanup operations to implement the program.

NRA Team Leaders attended daily operations planning meetings and suggested ways to maximize cleanup efficiency while minimizing resource impacts. NRAs delineated sensitive natural and cultural resources, directed cleanup crews and mechanized equipment away from these areas, and advised field operations on the least intrusive locations for staging and ingress/egress to the beach. Cleanup activities were continuously monitored and, where state or federal authorization was required, the NRAs gathered required permitting information. The NRA program assisted field operations personnel with BMP compliance by providing agency personnel with a single point of accountability for natural and cultural resource issues, collected data for the Section 7 administrative record, reduced NRDA liability, and, minimized impacts to the Gulf of Mexico shoreline during this historic response.

Housatonic River Superfund Project Characterization, Assessment and Restoration Design Support

Housatonic River Watershed, Massachusetts and Connecticut

The Housatonic River project is one of the largest restoration sites in the U.S., and has been characterized as “one of the most far-reaching cleanup plans of its kind.” Stantec has been involved in the project since 1998, performing ecological characterizations, assessing ecological impacts, and designing restoration measures for the initial 12-mile study area and the 150-mile “rest of river” section.

SCOPING STUDIES: RAPID ECOLOGICAL CHARACTERIZATION OF 150 MILES OF RIVER

As a member of the risk assessment team on the Housatonic River site, Stantec designed and conducted ecological surveys and sampling efforts to help evaluate contaminant effects on the environment and habitats. Stantec began with detailed biological studies of the initial 12-mile study area, including natural community mapping, wetland surveys, floodplain and river characterizations, mussel surveys, small mammal studies, and ecological receptor identification. Data from field surveys were converted to electronic maps and GIS files for inclusion in data models. To streamline field work, Stantec developed a set of comprehensive species-habitat matrices showing ecological data for all Housatonic natural communities. Subsequent work included a screening-level ecological characterization of the 150-mile rest-of-river extending from Pittsfield, MA through CT to the ocean.

FIELD SURVEYS AND ECO RISK SUPPORT

After the initial scoping studies, Stantec executed leading-edge surveys and sampling programs in support of an ecological risk assessment. These studies included: vernal pool surveys of salamanders and wood frogs; mink and otter tracking; raptor surveys; leopard frog and bullfrog collection; mussel collection and dive surveys; waterfowl capture; bat surveys; and small mammal trapping. Using electrofishing methods, Stantec biologists performed multiple fisheries surveys in the Housatonic and prepared tissue samples for contaminant analysis. Stantec's detailed study of amphibians in vernal pools, which provided statistical analyses of reproductive and environmental data, has emerged as a model for

defendable, quantitative vernal pool assessments. All study plans were developed in consultation with other team members, and strict operating procedures, sampling protocols, and safety plans were developed and followed throughout the project period.

DATA MANAGEMENT/GIS: HOUSATONIC DATA MART

Stantec translated Housatonic field data into electronic formats, and created hundreds of project-related GIS data layers and digital imagery sets. Working with digital maps and aerial photography, Stantec created base maps for field surveys and ArcInfo GIS files for compilation and evaluation of natural resource data. Stantec also uploaded spatial datasets into a web-based datamart created by the prime contractor, evaluated GIS data using ArcView, and produced web-ready electronic files for the USEPA website. To provide modelers and other data users with more efficient access to ecological data, Stantec also designed and produced a low-cost, electronic “Ecological Characterization of the Housatonic River” report covering all ecological aspects of the project area. This interactive report included extensive narrative descriptions of natural communities, geology, hydrology, species and their habitats. It also provided site-specific digital photos, maps, data files, detailed species profiles, and scanned field data forms, all interlinked to appropriate narrative sections.

ALTERNATIVES ANALYSES: EE/CA AND REMOVAL ACTION WORK PLAN REVIEWS

Stantec staff worked closely with engineers and project managers of Weston Solutions, Inc., as well as with federal and state agency personnel, to assist in the preparation of the Engineering Evaluation and Cost Analysis (EE/CA) for the site. Because of our extensive site-specific ecological knowledge, Stantec was able to efficiently review and comment on the baseline habitat data, removal action methods, habitat restoration, and project design. Our comments were used successfully during Agency negotiations to modify the proposed Removal Action Work Plan (RAWP). Stantec demonstrated the value of involving ecologists throughout the design effort, and our subsequent work expanded to include more design



elements and habitat studies including review of hydrologic flow data, assistance with river cross-section design, development of streambank and streambed restoration plans, streamlined habitat monitoring plans, and preliminary habitat restoration objectives; and preparation of existing conditions maps and narratives for river and riparian habitats. Stantec continued working on the EE/CA in 2000, with detailed habitat assessments and monitoring including an expanded aquatic habitat assessment, a vegetation study to identify riverbank planting needs, photo documentation, installation and monitoring of water temperature data loggers, and installation of macroinvertebrate reference stations.

MITIGATION: SSERC RESTORATION DESIGN

Stantec worked closely with team engineers, the U.S. Army Corps of Engineers, and the U.S. Environmental Protection Agency (USEPA) on restoring the first 1.5 Mile Reach of the Housatonic in the Site Specific Environmental Restoration Contract (SSERC) phase. Stantec's pre-design tasks included aquatic habitat assessments, hydraulic modeling, developing Habitat Restoration Objectives (HROs), and developing streambank and streambed restoration design matrices and plans for the engineering group. To develop HROs, Stantec conducted aquatic habitat assessments to provide better baseline information. Assessments included such variables as channel width and depth, hiding cover, velocity/depth regimes, bank stability, spawning areas, stream-side shade, and habitat unit sizes and locations.

In the design phase, Stantec's tasks included evaluations of construction impacts, reviews of bioengineering and armoring designs in different shear stress and discharge regimes, consulting with nurseries, riverbank planting plans, alternatives analyses, design specifications for riverbed structures, cost estimates, and iterative discussions of designs with team engineers. Stantec also reviewed method limitations such as costs, fill requirements, and construction complexity. Design specifications addressed riverbank armor, bank slope

length and grade, bed load movement, construction schedule flexibility, slope stability, and ease of merging stabilization structures. Boulder stability and scour analyses of riverbed structures were computer modeled to ensure that riverbed and riverbanks were protected and objectives for aquatic habitat were met. Stantec also reviewed method limitations such as costs, fill requirements, and construction complexity. Stantec also reviewed construction staging and storage areas to ensure that natural resource impacts would be minimized. Using local ecosystem and species knowledge, Stantec helped develop construction phasing schedules that minimized natural resource impacts, helping the project avoid costly construction delays or modifications. Technical design drawings were produced by Stantec's CAD/GIS department in close coordination with team engineers, and included detailed schematics of riverbed structures, riverbank restoration methods, planting zone maps, and restoration cross sections.

PUBLIC OUTREACH

As the lead ecologists on the Housatonic Project, Stantec biologists have been called upon by the USEPA in a variety of ways to provide information to the public. Stantec's tasks in this area have included providing a range of materials for posting on the USEPA Housatonic website, drafting reports suitable for public dissemination, and attending public meetings and press conferences to provide ecological overviews and answer questions.

Reports developed and supported by Stantec are available for review at the USEPA website available at www.epa.gov/housatonic/cleaninguphousatonic.html.

REFUGIO BEACH OIL SPILL

Santa Barbara County, California

On May 19, 2015, a 24-inch diameter underground pipeline owned and operated by Plains Pipeline, L.P. ruptured near Refugio State Beach in Santa Barbara, California causing the release of crude oil onto area beaches and into the Pacific Ocean. Plains Pipeline, L.P. estimates the total release at 101,000 to 140,000 gallons of crude oil, of which an estimated 21,000 gallons reached the ocean. The release occurred in an area of intense regulatory oversight and environmental interest. On the morning of May 20, Plains Pipeline, L.P. requested Stantec mobilize to the release site to provide Natural Resources Damage Assessment (NRDA) representation and a range of other environmental services in support of emergency response operations.

We represented Plains Pipeline, L.P. in the Environmental Unit of the Planning Section under Unified Command. In this role, we provided shoreline cleanup assessment technique, remedial excavation oversight, waste management, biological monitoring, archaeological monitoring, stormwater/erosion control planning, land surveying, geotechnical engineering, civil engineering, restoration, and emergency permit compliance and reporting services. Stantec also provided Plains Pipeline, L.P. with NRDA Case Management and Technical Work Group representation responsible for assessing resource specific loss or injury. Stantec assisted Plains Pipeline, L.P. establish a formal collaborative NRDA process with the Trustee agencies, guided the development of assessment work plans, participated in data collection and analysis, assessing injury/loss to resources, and restoration planning. In this role, Stantec routinely interacted with involved regulatory agencies including but not limited to the United States Environmental Protection Agency, United States Coast Guard, United States Fish and Wildlife Service, California Department of Fish and Wildlife, State Water Resources Control Board, California Coastal Commission, California State Parks, and Santa Barbara County. Our work supporting Plains Pipeline, L.P. and the local community affected by the spill continues.

BUZZARDS BAY OIL SPILL DAMAGE ASSESSMENT

Massachusetts and Rhode Island

Stantec played a pivotal role in assessing habitat and wildlife impacts during the 2003 Buzzards Bay oil spill near Cape Cod. This project required rapid mobilization of Stantec's field biologists and coordination in an evolving emergency response atmosphere. On April 27, 2003, the Bouchard Barge 120 hit an obstacle in Buzzards Bay, creating a twelve-foot rupture in the hull and spilling 98,000 gallons of No. 6 oil. To date, the oil is known to have impacted an estimated 90 miles of shoreline, numerous bird species, and recreational uses of the bay.

Approximately 450 birds were killed by the oil spill, including loons, scoters, mergansers, oyster catchers, terns (including roseate terns), eiders, and piping plovers. The trustees were particularly concerned about impacts to roseate terns and piping plovers, two federally protected species. Working closely with NOAA, US Fish & Wildlife Service, State of Massachusetts, State of Rhode Island and Wampanoag Tribe representatives, Stantec coordinated avian impact evaluations within the coastal zone, monitored cleanup activities in sensitive habitat areas, conducted air photo interpretation and overflight surveys to determine the extent of the plume and affected area, conducted intensive ground and air surveys of waterfowl and wading bird populations in the affected area, and helped NOAA develop information to plan habitat restoration efforts.

PRE-ASSESSMENT NRDA

Massachusetts and Rhode Island

The pre-assessment will allow quantification of potential liability and develop a proactive NRDA approach.

Stantec assisted BGD Company, a subsidiary of Chevron U.S.A., in conducting a pre-assessment Natural Resources Damage Assessment (NRDA). While the United States Fish and Wildlife Service is currently not conducting an NRDA of the Cuyahoga River and Big Creek, the internal pre-assessment screening at the site is fundamental in developing informed management actions at the site. The pre-assessment screen was conducted to determine whether a natural resources injury may have occurred and if a pathway of exposure exists. The process was modeled after the pre-assessment screen used as prerequisite to conducting a formal NRDA. This will allow quantification of potential liability and develop a proactive NRDA approach with applicable Trustees (United States Fish and Wildlife Service, Ohio Environmental Protection Agency). Stantec has conducted a Data Review and Landscape Analysis, similar to a pre-assessment screening, to assist in this determination.





LORING AIR FORCE BASE REMEDIATION AND RESTORATION

Limestone, Maine

Since 1993, Stantec and our scientific staff have been the primary service provider at the former Loring Air Force Base. This work has included initial remedial investigations through restoration, site closure, and long-term ecological monitoring. Over the past two decades, Stantec staff have completed almost all of the terrestrial and aquatic tasks associated with Operable Unit 13 and the East Branch of Greenlaw Brook. Our work has included base-wide ecological characterizations prior to sediment and soil removal actions; ecological risk assessment support, planning, design, and construction oversight of the ecological restoration; and long-term biomonitoring and documentation of restoration success. As recently as 2014, Stantec provided services associated with long-term biomonitoring of PCBs. This work included water quality and sediment monitoring, macroinvertebrate monitoring, and fish sampling and analysis.

This project, one of the largest and most complex ecological restoration projects in the northeast, is used as an example of successful wetland and stream restoration by both the scientific community and state and federal resource agencies. Remediation and restoration work included removal of 100,000 cubic yards of sediments containing polychlorinated biphenyls (PCBs), pesticides, PAHs, total petroleum hydrocarbon (TPH), and metals from a high-value brook trout stream and floodplain wetland and restoration of 55 acres of palustrine wetland and 2.5 miles of riverine / high value brook trout stream. This project is used by the National Academy of Science as an example of successful stream and wetland restoration and was selected by The American Council of Engineering Companies for the Grand Conceptors Award in 2000.

CALLAHAN MINE NATIONAL PRIORITIES SITE REMEDIATION INVESTIGATION AND FEASIBILITY STUDY

Maine

The Callahan Mine is a former 150-acre zinc and copper mine located adjacent to and under a tidal estuary on the Atlantic coast. It was the only intertidal metal mine in the world at the time of its operation in the 1960s. There are large waste piles, a tailings pond, and several buildings and structures left from the mining activities. The open pit mine ceased operations in 1972, and the site is currently under water and subject to daily tidal exchange. The site was named to the EPA National Priorities List in 2002. An Administrative Order of Consent (AOC) between EPA, Maine DEP, and Maine Department of Transportation (DOT) was finalized in 2005. The AOC provides a framework for the performance of the remaining work to complete the remedial investigation and feasibility study (RI/FS). EPA remains the federal lead agency for the site and is responsible for the selection of the cleanup action in collaboration with Maine DOT. Stantec was retained by the client to provide expert environmental support for the RI/FS. Stantec's initial role has included developing major components of the RI/FS Work Plan and conducting extensive ecological characterization and sampling in the study area. Stantec's tasks have included extensive mapping of terrestrial and marine habitats in exposure areas, wildlife surveys, biota sampling in aquatic and intertidal environments (including fish and benthic macroinvertebrates), water quality testing, surface water sampling, identifying food chain models and ecological receptors, developing conceptual environmental pathway models, and assisting in the design and preparation of a baseline ecological risk assessment. Stantec and other team members have coordinated planning and remedial investigation activities with representatives from EPA, Maine DEP, Maine DOT, U.S. Geological Survey, U.S. Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration.



Massachusetts Housatonic River Watershed Restoration Program: Restoration Coordinator

Multiple locations within Housatonic River Watershed, Massachusetts

The Housatonic River Natural Resource Damages Assessment and Restoration project is one of the largest environmental clean-up and restoration projects in the U.S., and has been characterized as "one of the most far-reaching cleanup plans of its kind." Riverbed and floodplain sediments in a 12-mile section of the river were contaminated by historic releases of PCBs from industrial facilities, and investigations prompted state agencies to issue consumption advisories in an area extending across two states. The project is overseen by Natural Resource Trustees from the Commonwealth of Massachusetts, U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration and the State of Connecticut. As part of the Consent Decree for the project, the Potentially Responsible Party paid over \$15 million in natural resource damages (NRD), which is managed by the Natural Resources Trustees. The Massachusetts SubCouncil (MA SubCouncil) is responsible for disbursing approximately half of the Housatonic River NRD funds to implement restoration projects in the Massachusetts portion of the Housatonic River watershed.

Since 2005, under contract to the USFWS, Stantec has assisted the MA SubCouncil of the Housatonic River Natural Resource Trustees in developing a Restoration Plan, overseeing the implementation of the Restoration Plan, and overseeing and advising on elements of Restoration Work defined in the Consent Decree. Before NRD funds could be used to implement restoration projects, the Trustees had to develop a Restoration Plan that evaluated a reasonable number of restoration alternatives and explained the rationale behind choosing the restoration projects that will be implemented. The MA SubCouncil retained Stantec to coordinate development of the Restoration Plan, coordinate public outreach and involvement, provide technical review of restoration project alternatives, and monitor the implementation of restoration projects. Stantec assisted the MA SubCouncil in developing a Restoration Planning Strategy (RPS) and a Restoration Project Selection Procedure (RPSP), both of which included public outreach and public review. These documents are available for review at the project website (www.mahousatonicrestoration.org) and identify and define the following elements:

- Restoration goals and priorities of the MA SubCouncil;
- Project solicitation processes;
- Project evaluation processes, including the criteria that will be applied to proposed restoration projects;
- Processes for compliance with NEPA and the Massachusetts Environmental Policy Act; and
- Methods by which the MA SubCouncil selects restoration projects for implementation.

The RPSP included a unique approach to enabling significant public involvement in the evaluation of proposed restoration projects.

Stantec also assisted the MA SubCouncil in drafting a Programmatic Environmental Assessment (PEA) for the overall project. This NEPA document streamlines the implementation of many restoration activities and is directly integrated with the Restoration Plan (RP). Stantec has subsequently assisted the MA SubCouncil in development of three rounds of restoration planning documented in the Round 1, 2, and 3 Restoration Plan and Supplemental Environmental Assessments (RP/SEAs). Each of these documents identifies the specific restoration goals and priorities for the identified round of NRD-funding; defines the proposal evaluation process, including the criteria that applied to review of proposed restoration projects and methods by which the MA SubCouncil select restoration projects for NRD funding; and addresses the processes for compliance with NEPA and MEPA. These documents are available for review at the project website (www.ma-housatonicrestoration.org).

Stantec has assisted the MA SubCouncil with public involvement components of this NRD Program including drafting meeting agendas, disseminating meeting announcements, arranging meeting facilities, developing presentation materials, facilitating public meetings, and providing meeting summaries. As a component of the public outreach portion of the project, Stantec created and maintains the official MA SubCouncil website at (www.mahousatonicrestoration.org), which offers background information about the project, public meeting notices, and a repository of public documents including draft and final planning documents. Stantec also maintains the Restoration Public Record at multiple public physical repositories and on-line at the project website. Under this contract, Stantec has also provided advice, oversight, and monitoring related to elements of Restoration Work defined in the Consent Decree, including site visits and inspections, document review, and reporting.

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We collaborate across disciplines and industries to bring buildings, energy and resource, environmental, and infrastructure projects to life. Our work—engineering, architecture, interior design, landscape architecture, surveying, environmental sciences, project management, and project economics, from initial project concept and planning through design, construction, and commissioning—begins at the intersection of community, creativity, and client relationships.

Our local strength, knowledge, and relationships, coupled with our world-class expertise, have allowed us to go anywhere to meet our clients' needs in more creative and personalized ways. With a long-term commitment to the people and places we serve, Stantec has the unique ability to connect to projects on a personal level and advance the quality of life in communities across the globe.

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