

**West Coast Governors Alliance on Ocean Health
FY2012 Regional Ocean Partnership Funding Program Focus Area 1 Funding
Request**

**The West Coast Regional Data Framework: A Next-Generation Coastal and
Marine Data Network and System to Support Regional and National Ocean
Priorities and Planning for Ocean Uses**



Primary Contact

Lisa A. DeBruyckere, WCGA Coordinator
6159 Rosemeadow Lane NE
Salem, OR 97317
Phone: (503) 704-2884
Fax: (503) 371-5939
Cell: (503) 704-2884
lisad@createstrat.com

Technical Contacts

Andy Lanier, Coastal Resources Specialist
Department of Land Conservation and Development
635 Capitol Street NE, Suite 150
Salem, OR 97301
Phone: (503) 373-0050, ext. 246
Andy.Lanier@state.or.us

Matthew Armsby, Environmental Law and Policy Fellow
Stanford Law School
559 Nathan Abbott Way
Stanford, CA 94305
Phone: (650) 724-8619
Armsbym1@stanford.edu

Financial Contact

Krystyna U. Wolniakowski, Western Director
National Fish and Wildlife Foundation (NFWF)
421 SW 6th Ave., Suite 950
Portland, OR 97204
Phone: (503) 417-8700
Fax: (503) 417-8787
Cell: (503) 702-0245
Wolniakowski@nfwf.org

Project Duration — 2 years

Proposed Cooperative Agreement between NOAA and NFWF to develop a Next-Generation Coastal and Marine Data Network and System to Support West Coast Regional and National Ocean Priorities and Planning for Ocean Uses

Amount of Funding Request (Focus Area 1) — \$741,400

The West Coast Regional Data Framework: A Next-Generation Coastal and Marine Data Network and System to Support Regional and National Ocean Priorities and Planning for Ocean Uses

Table of Contents

Project Summary1

Project Description.....1

 I. Goals and Objectives..... 1

 II. Background..... 3

 III. Management Approach and Partnerships..... 6

 IV. Audiences 9

Approach 9

 Human Network Enhancements 10

 Data System Enhancements..... 11

Benefits.....15

Project Schedule and Milestones17

Project Budget.....18

Appendices (submitted as a separate attachment)

 Appendix A. Comprehensive list of partners and collaborators for the funding proposal

 Appendix B. Regional Data Framework Coordinator Job Description

 Appendix C. WCGA Data Network ACT Phase 2 Use Case Development Task

 Appendix D. Letters of support for the Focus Area 1 WCGA proposal

 Appendix E. Resumes for lead and co-principal project investigators

Project Summary

i. Project Name/Title: The West Coast Regional Data Framework: A Next-Generation Coastal and Marine Data Network and System to Support Regional and National Ocean Priorities and Planning for Ocean Uses.

ii. Primary Contact: Lisa A. DeBruyckere, WCGA Coordinator | 6159 Rosemeadow Lane NE | Salem, OR 97317 | (503) 704-2884 | lisad@createstrat.com

iii. Recipient Organization: National Fish and Wildlife Foundation (WCGA fiscal sponsor)

iv. Other Investigators: (a) Governor's offices of California, Oregon, and Washington and (b) Regional Data Framework Action Coordination Team Co-Chairs: Andy Lanier, Coastal Resources Specialist, Department of Land Conservation and Development 635 Capitol Street NE, Suite 150 Salem, OR 97301 Phone: (503) 373-0050 ext. 246, Andy.Lanier@state.or.us ; Matthew Armsby, Environmental Law and Policy Fellow, Stanford Law School, 559 Nathan Abbott Way, Stanford, CA 94305, Phone: (650) 724-8619, Armsbym1@stanford.edu

v. Brief Project Summary:

This proposal is intended to advance actions related to Regional Ocean Partnerships and National Ocean Policy priorities by building on work achieved to date to improve geospatial data sharing and coordination to support West Coast ocean health. Funding from this request will implement Phase Two of the core elements developed for the Regional Data Framework Action Coordination Team work plan, including enhancements to the human and technological components of a Regional Data Framework¹ that links data managers, users, and systems throughout the West Coast with data, decision support tools, and human resources relevant to ocean and coastal management issues.

The National Fish and Wildlife Foundation (NFWF), acting on behalf of, and fiscal sponsor for, the West Coast Governors Alliance on Ocean Health (WCGA), proposes to launch Phase Two in the enhancement of a Regional Data Framework to:

- engage the public and stakeholders in a productive and collaborative process consistent with coastal and marine spatial planning (CMSP) guiding principles;
- provide a repository of science-based information to be accessed regionally and nationally;
- help shape a regionally coordinated approach to inform ocean management issues at the ecosystem scale;
- build regional capacity for effective planning for existing and emerging ocean uses on the West Coast as well as regional ocean priorities identified in the WCGA 2008 Action Plan and corresponding 10 Action Coordination Team Work Plans;
- address existing challenges to accessing and providing regional geospatial data; and
- enhance the Regional Data Framework to support and inform CMSP on the West Coast.

This proposal has been endorsed by the WCGA, which represents the governors of California, Oregon, and Washington.

In 2008, the WCGA released an Action Plan identifying 26 actions aimed at improving and sustaining the health of our shared coastal and ocean resources and the coastal communities that depend on them. To

¹ The Regional Data Framework is the overarching structure for regional data management, sharing, and coordination on the West Coast and encompasses both an organization of data managers and users (Network) as well as the technological infrastructure to link those data and people (System).

implement the Action Plan, 10 diverse work groups, known as Action Coordination Teams (ACTs), were established to develop comprehensive work plans for tri-state coordination and communication for coast-wide implementation. In 2011, the ACTs expressed the need for better access to, as well as improved management and sharing of scientific and geospatial information as they address specific regional priorities.

In 2012, the WCGA recognized this need by creating the Regional Data Framework ACT to develop and implement recommendations to increase the discovery and use of ocean and coastal data on the West Coast and to help the ACTs and the region address regional ocean issues. The issues include addressing the effects of sea level rise and severe climatic events on marine and coastal environments and communities; preparing for challenges faced by working waterfronts and sustainable coastal communities; exploring options for renewable ocean energy; addressing existing and emerging ocean and coastal health challenges; planning for existing and emerging uses of the ocean; and helping planners visualize the physical, biological, and human environment to support informed decision making.

The primary beneficiaries of the outcomes of the Regional Data Framework are local, tribal, state and federal decision-makers who must consider a variety of complex physical, biological, and socioeconomic issues in the conservation and management of West Coast ocean and coastal resources and uses. Additionally, these outcomes have benefits for coastal communities, academic scientists, private industry investigators, and non-governmental organizations as well as stakeholders that benefit from healthy coasts and oceans. This work is intended to coordinate efforts, avoid duplication, ensure consistency with the national approach, outlined in the National Ocean Policy, be transferable to other regional ocean partnerships, and inform national data sets necessary for National Ocean Policy implementation.

The entire project involves three main phases. The purpose of this proposal is to fund and implement Phase Two from October 2012–October 2014:

1. Phase One—Assess capacity and data needs on West Coast, provide mechanisms for public feedback about Regional Data Framework development, and develop a prototype Regional Data Framework tool, i.e., data registry, to allow for discovery, download, and use of regionally relevant ocean and coastal data sets.

- 2. Phase Two—Increase regional capacity for the Regional Data Framework and the WCGA to support and inform West Coast ocean management issues as identified by the WCGA, Regional Planning Body, and National Ocean Council through enhancement of human and technological components of the Regional Data Framework, including developing a map viewer and strengthening partner capacity to participate; and**

3. Phase Three—Support the integration of regional scale data sets to inform regional ocean planning and ecosystem-based resource management and develop additional analytical tools.

vi. Partners and Collaborators: A comprehensive list of partners and collaborators are listed in Appendix A, and include the West Coast Governors Alliance on Ocean Health (WCGA), the Pacific Fishery Management Council (PFMC), federal, state, and local agencies, nonprofit organizations, academic institutions, tribal sovereign governments, industry representatives, West Coast Integrated Ocean Observing Systems (IOOS) Regional Associations, and others.

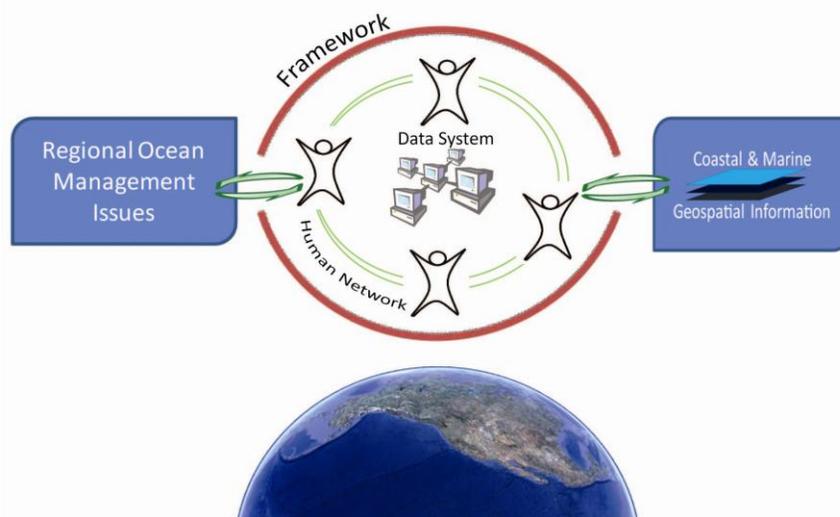
vii. Proposed funding. \$741,400

Project Description

I. Goals and Objectives

The goal of this proposal is to implement Phase Two of the core elements of the Regional Data Framework Action Coordination Team (“**RDF ACT**”) Work Plan to enhance the human and technological components of the West Coast Regional Data Framework (“**Framework**”). The Framework is the overarching structure for regional data management, sharing, and coordination on the West Coast and encompasses both an organization of data managers and users (“**Human Network**”) as well as the technological infrastructure to link those data and people (“**Data System**”). The RDF ACT is the body that represents the broader Human Network and will coordinate and oversee actions described in this proposal. Through the enhancements proposed here, the Framework will increase access to and discovery of regional oceanographic observations, geospatial records, and socioeconomic data that are essential to informing regional ecosystem-based management, CMSP activities, and issues of regional significance identified through the WCGA 2008 Action Plan².

Westcoast Regional Data Framework



The West Coast Coastal Atlas Workshop in 2009³, the California Geospatial Collaboration Workshop in 2009⁴, the WCGA-hosted stakeholder engagement workshops in each of three states in November of 2010⁵, the West Coast Regional Ocean and Coastal Data Framework Workshop in 2011⁴, and the first meeting of the RDF ACT in 2012 all incorporated the expertise of data managers, data collectors, and data users from state, federal, tribal, academic, and non-governmental institutions and recommended the development of a coordinated approach for regional data sharing and management as described in this proposal.

² http://www.westcoastoceans.org/media/WCGA_ActionPlan_lowest-resolution.pdf

³ http://dusk.geo.orst.edu/ICAN_EEA/WestCoast/West_Coast_Atlasses_Workshop.pdf

⁴ <http://www.centerforoceansolutions.org/Spatial-Data-and-Tools/Workshop-2009/main.html>

⁵ <http://www.westcoastoceans.org/index.cfm?fuseaction=content.display&pageID=137>

⁴ http://www.westcoastoceans.org/media/Data_Network_ACT/OceanDataProcngsAppends-web.pdf

In early 2012, the WCGA formalized the organization and coordination of West Coast data managers and users through a new WCGA Action Coordination Team (ACT)—the RDF ACT. In spring of 2012, this group determined their governance structure, organization, core elements of their work plan, and user feedback mechanisms. The core elements of their work plan calls for a three-phased approach to build and enhance human and technological components of the Framework. During 2012, they will implement Phase One of the project:

PHASE ONE: Assess capacity and data needs on West Coast, provide mechanisms for public feedback about Framework development, and develop a prototype application that will allow for discovery, download, and use of regionally relevant ocean and coastal data sets.

More specifically, Phase One of the project, to be completed in 2012, will:

- allow for a robust stakeholder input process to understand West Coast state and federal agency and organizational capacity to contribute and participate in Framework development. This will ensure that the technological infrastructure developed is compatible with partner organizations and takes into account the needs of West Coast users;
- identify the regionally relevant data sets that exist as well as those that are a priority for addressing West Coast issues identified by the WCGA; and
- create a web accessible prototype West Coast Data Registry (“**Registry**”) application allowing partner agencies and organizations to register their data in a central location and thereby increase access to and download of coastal and marine data.

PHASE TWO: This proposal is the second phase in a three-part project to enhance the human capacity, data, and tools necessary to implement regional CMSP.

Objectives include:

1. Continue to establish the Framework necessary to support regional ecosystem-based management on the West Coast through the hiring of a full-time staff person to function as the Framework Coordinator;
2. Implement recommendations to enhance the technological infrastructure, building on the Registry, with additional functionality including a map viewer; and
3. Formalize agreements between partner agencies and institutions to contribute and participate in the Framework.

Upon completion, Phase Two will have (1) engaged a broad cross section of interested state, tribal, federal, and regional stakeholders, improving their understanding of the Framework efforts, and incorporating their input into the Framework design; (2) enhanced the state-of-the-art, web-based data sharing system to increase the access to, and discovery, download, and viewing of regional ocean and coastal data; and (3) developed cooperative agreements with regional partners to enhance Framework role and function. **The results will be increased capacity of Framework partners to inform management issues of regional significance; a data sharing System built to be interoperable, i.e., allow exchange of information, with state, regional, and national systems; and the integration of regional data useful in supporting coastal and marine spatial planning consistent with applicable federal guidelines, including those outlined in the CMSP Guiding Principles.**

MEASURABLE OUTCOMES: Phase Two successes will be measured using the following metrics (work products and established processes):

- A completed needs assessment of the technical requirements and capabilities for coastal and ocean resource managers and GIS staff to access, share, and manipulate multi-disciplinary data sets for the purposes of improved CMSP (focused on existing ACTs);
- Creation of best practices guidelines to ensure increased access, sharing, and synthesis of data among all partners to the Framework (description of specific actions needed to ensure region-wide interoperability of data portals, data compatibility, access, and metadata development);
- An established regional Framework web location that will guide interested parties to partner directories, and data sources;
- Identification of long-term hosts and maintenance options for the Framework web elements;
- Functional technical working groups to provide guidance, assess progress, and recommend adjustments to meet the Framework goals and objectives and to provide coordinated technical advice to the regional planning body (RPB) for CMSP;
- Design and development of a regional, multi-disciplinary next-generation coastal and marine Data System that will build off of and be interoperable with other systems in the region; and
- Identification of the existing and future technical, regulatory, and institutional barriers to cooperative data management.

II. Background

Regional Ocean Priorities

The West Coast Governors Alliance on Ocean Health (WCGA) was formed in 2006 as a proactive regional collaboration between the Governors of California, Oregon, and Washington to protect and manage the ocean and coastal resources along the entire West Coast. The WCGA Action Plan, released in 2008, identified 26 critical actions, several of which reference using better data and mapping capabilities for improved decision making, including Action 2.1, which specifically calls for “documenting, describing, and mapping marine and estuarine ecological communities throughout West Coast waters, characterizing existing human uses of those areas, and establishing measures to ensure effective habitat protection.” Additionally, Priority Area 6, Expand Ocean and Coastal Scientific Information, Research, and Monitoring, states that “for the states to support the collection and dissemination of scientific information, they must identify data priorities for management issues, and sustain and expand data collection,” and that there must be “regional data comparability to allow a regional gauge of the state of the ecosystem.” This proposal establishes a Framework to meet these WCGA priority objectives.

Multiple region-wide workgroups, known as Action Coordination Teams (ACTs), were established to develop comprehensive work plans⁶ for tri-state coordination and communication for coast-wide implementation of the WCGA Action Plan. Since development of their work plans, the ACTs have identified the need for access to data to achieve specific work plan tasks, including:

The Effects of Sea Level Rise and Severe Climatic Events on Marine and Coastal Environments and Communities

- plan for sea level rise and coastal inundation
- address resiliency and adaptation of coastal communities to climate change and ocean acidification
- respond to climate change adaptation and mitigation
- incorporate habitat usage and climate change information as well as spatial data on vectors for *Spartina* dispersal

⁶ <http://www.westcoastoseans.org/index.cfm?content.display&pageID=68>

Challenges Faced by Working Waterfronts and Sustainable Coastal Communities

- prepare for manmade and natural hazards, and minimize impact to coastal communities while managing multiple uses
- minimize fishing gear loss
- create/expand cross-sector partnerships to support flexible, adaptable, and resilient coastal economies
- understand current uses and plan investments and improvements in tourism and recreation infrastructure and activities

Renewable Ocean Energy Options

- avoid conflicts with other types of offshore development or uses
- provide for public access, and increase certainty and predictability for economic investments
- inform new technologies and uses of oceans

Ocean and Coastal Health Challenges

- evaluate alternatives, tradeoffs, cumulative effects, and sustainable uses
- reduce conflict, enhance compatibility among uses, and ensure sustained ecosystem function and services
- establish standards and indicators for ocean health
- address cumulative effects to ensure the protection, integrity, maintenance, resilience, and restoration of ocean and coastal ecosystems while promoting sustainable uses
- describe ecosystem structure, function, services, and human uses on a regional scale

Planning for Ocean Uses

- assess implications of alternative ocean use scenarios in the region; evaluate tradeoffs, cumulative effects, sustainable uses
- help planners visualize the physical, biological, and human environment to support informed decision making
- provide numerical ocean observations, geospatial records, socioeconomic data, and other relevant data to support regional ocean planning goals and objectives through an inclusive and collaborative stakeholder process
- inform legal and policy analysis and options for regional ocean governance and ocean planning to advance habitat conservation, renewable ocean energy, and regional and national priorities
- support state and federal ocean planning processes and decision support tools
- develop a long-term plan for hosting and sustainability of the Framework to inform regional and national priorities
- provide access to outcomes/scenarios generated by regional ocean models, climate forcing simulations, socioeconomic forecast models, sub-regional integrated ecosystem assessments, and other decision support tools
- provide a Framework that works directly with and extends the capabilities of present federally supported systems and inform current national data sets with regional information advance regional and national ocean priorities

Access to the best available information is fundamental to improving ocean resource decision making and implementing ecosystem-based management of coastal and marine environments. Often this information already exists, but is not widely known, easily accessible, or in a format that is useful for management.

The West Coast Regional Data Framework workshop, held in December of 2011, was a significant step toward improving the regional coordination and accessibility of high priority ocean and coastal data. By bringing together the technical expertise of state, federal, tribal, academic, and non-governmental

organizations, this workshop resulted in new perspectives, partnerships, and potential solutions for improving regional data sharing. Beyond the technical solutions, the establishment of a formal organization of data managers, developers, and users operating under this Framework can connect people to data in ways that have not been possible in the past. This organization of the human component of the Framework was realized in 2012, with the creation of the Regional Data Framework ACT, comprised of data management and outreach experts from state, federal, tribal, nongovernmental, academic institutions. This group represents and communicates with the broader Human Network of data managers and users on the West Coast.

The National Ocean Policy

In July 2010, the Obama Administration issued an Executive Order endorsing the first ever *National Policy for the Stewardship of the Ocean, Our Coasts and the Great Lakes*, which established an interagency National Ocean Council and a Framework for “effective coastal and marine spatial planning that establishes a comprehensive, integrated, ecosystem-based approach to address conservation, economic activity, user conflicts and sustainable uses of the ocean, coasts and Great Lakes Resources.” The policy supports a regional planning process based on large marine ecosystems. The WCGA is recognized by NOAA as the leading regional ocean partnership (ROP) for the West Coast.

The National Ocean Policy Task Force defines CMSP as “a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean and coastal areas. CMSP identifies areas most suitable for various types of activities to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives.”

The WCGA believes that planning for existing and emerging ocean uses can enable efficient use and protection of natural resources needed to sustain healthy, productive coastal ecosystems and quality of life; help people recognize the complex interrelationships between social, economic and environmental values in coastal areas and work together to balance multiple uses and optimize environmental sustainability; and support diverse economic potential, abundant recreation and tourism opportunities, and sustainable fishing and port operations.

Currently, state agencies in California, Oregon, and Washington are engaged in a variety of activities with components and products that are building blocks for regional CMSP. Notable examples include Washington State’s 2010 marine spatial planning law⁷, Oregon’s process to establish marine reserves and site renewable ocean energy facilities under its Territorial Sea Plan⁸, California’s Marine Life Protection Act Initiative⁹ that establishes a network of marine protected areas in state waters, and the California Ocean Protection Council’s 2009 resolution¹⁰ to support interagency collaboration and management of geospatial information.

The outcomes achieved through this proposal address key aspects of the CMSP National Guiding Principles and inform Essential Elements of the CMSP process. By increasing access to and discovery of regional scale geospatial data and best available science, this proposal increases the capacity of resource managers, technical GIS staff, and the public to understand and manage ocean resources on an ecosystem scale. This proposal specifically calls for both environmental and socioeconomic data to help resource managers understand the tradeoffs and cumulative impacts of existing and emerging uses of the ocean. It is designed to be responsive to the needs of a West Coast RPB when one is established. The WCGA has entered into a formal partnership with the West Coast IOOS Regional Associations so that the Framework

⁷ <http://www.ecy.wa.gov/programs/sea/msp/pdf/SB6350.pdf>

⁸ http://www.oregon.gov/LCD/OCMP/Ocean_TSP.shtml

⁹ <http://www.dfg.ca.gov/mlpa/highlights.asp>

¹⁰ <http://www.opc.ca.gov/category/projectsbystrategicplan/governance-projectsbystrategicplan/>

can be adaptable in real time to changing ocean conditions. Finally, the strong emphasis on public input into the design and implementation of the Framework ensures that applications developed will meet user needs.

The outcomes achieved through this proposal will also inform both national and regional priorities and enable the WCGA to facilitate a coordinated comprehensive approach to planning and managing marine and coastal resources by its members, stakeholders, and partners. In addition, this proposal addresses four Areas of Special Emphasis identified in the National Ocean Policy:

- Resiliency and Adaptation to Climate Change and Ocean Acidification
 - Inform research, observations, and modeling to forecast the effects of sea level rise, coastal inundation, severe climatic events, and other vulnerabilities to coastal communities
 - Enhance integration of coastal and ocean science will improve understanding of interconnectedness
 - Contribute to the development and strategies for research and monitoring
- Regional Ecosystem Protection and Restoration
 - Address science-based ecosystem protection and restoration strategies that align with regional, tribal sovereign nation, and local goals, and will help prioritize ecosystem restoration projects, facilitate collaboration among stakeholders, inform methods for control and prevention of invasive species, and protect, restore, and enhance essential habitats.
- Water Quality
 - Promote sustainable practices on land
 - Identify the impacts of urban and suburban development
 - Inform recommendations to integrate and improve pollution programs
 - Produce best management practices to control factors that degrade ecosystems
- Observations, Mapping, and Infrastructure
 - Integration of data and data sets
 - Meet regional and national needs for ocean information
 - Identify data gaps within highlighting potential opportunities among partners to address the gap
 - Contribute to data management, communication, access, and modeling

III. Management Approach and Partnerships

The West Coast RDF ACT was created in early 2012 to establish a project management approach that leverages the collective resources and expertise of numerous individuals and their respective organizations, as well as to ensure coordination among the West Coast states, federal agencies, and stakeholders. Our approach, modeled after the structure of the Northeast Data Portal management team, includes three working groups: Outreach, Data and Information Technology (IT):

- The **Outreach Working Group** serves as the communication branch of the Framework, ensures that the data products and applications meet the needs of the Framework's intended users, and establishes partnerships with data managers. The Outreach working group is led by Andy Lanier, Co-Chair of the RDF ACT.
- The **Data Working Group** of the ACT determines which data sets need to be included in the System, recommends data standards, provides technical expertise to integrate data from disparate sources into regionally relevant products, and establishes partnerships with data managers. The Data Working Group is led by Chris Romsos, RDF ACT member.

- The **IT Working Group** provides the technical expertise to integrate disparate data sets in different formats into the System, leads the development of the technological infrastructure (Data System) of the Framework by designing Data System applications including the Registry and map viewer, establishing connections with regional data providers, and hosting technical webinars about Data System functionality. The IT Working Group is led by Emilio Mayorga, RDF ACT member.

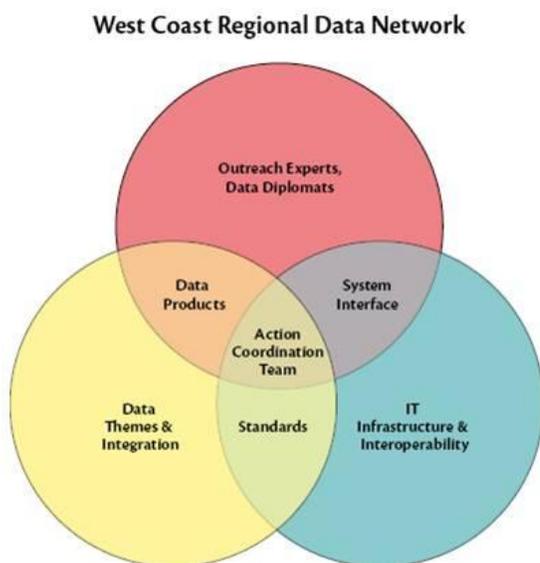


Figure 1: The three circles represent the West Coast Regional Data Network, which is the human component of the Framework. The overall goal of the Framework is to support the informational needs of the WCGA and its constituents. Three technical working groups provide the internal organization of the Network: Outreach, Data, and IT. Aspects of this proposal will be carried out by working groups and overseen and coordinated by the RDF ACT.

The RDF ACT (area where all circles overlap in Figure 1) oversees and coordinates the activities of all three working groups and fosters cross-pollination of ideas among the groups and throughout the Human Network. The RDF ACT assumes responsibility for the Human Network's organizational and governance policies, ensures that the three technical groups work together to support the information needs of the WCGA and West Coast stakeholders, and oversees the scope of work in this proposal. The working groups are open to any interested member of the West Coast data community, and the ACT benefits from inclusion of representatives from each working group and from the WCGA as well as well as representatives from each West Coast state, tribes, federal agencies, NGOs, academic institutions, and other stakeholders.

The RDF ACT developed core elements of a work plan¹¹ that describes their 3–5 year vision and strives to maximize opportunities for collaboration, data sharing, and integration of federal, regional, and state efforts. Specific federal involvement includes participation on the RDF ACT as well as providing in-kind contributions and expertise to advance specific tasks in the work plan. The RDF ACT meets monthly to track progress and ensure efficient and coordinated implementation of the work plan. In addition, other entities, such as the Pacific Fishery Management Council, and other key regional organizations, have opportunities, through the outreach proposed in the core elements of the RDF ACT work plan, to provide input and perspectives to the development of the Framework.

The RDF ACT is chaired by Matt Armsby and Andy Lanier, and includes the following members:

Matt Armsby, Co-Chair, Stanford Law/Center for Ocean Solutions (COS)

Andy Lanier, Co-Chair, Oregon Dept. of Land Conservation and Development (DLCD)

¹¹

http://www.westcoastocceans.org/media/Data_Network_ACT/DataNetworkACT_WorkPlan_CoreElements_032212.pdf

Greg Benoit, California Coastal Commission (CCC)
Christina Cairns, NOAA Coastal Services Center (CSC)
Brodie Cox, Washington Dept. of Fish and Wildlife (WFDW)
Tanya Haddad, Oregon Dept. of Land Conservation and Development (DLCD)
Emilio Mayorga, Northwest Association of Networked Ocean Observing Systems (NANOOS)
Samantha Murray, Ocean Conservancy
Jan Newton, Northwest Association of Networked Ocean Observing Systems (NANOOS)
Jim Power, U.S. Environmental Protection Agency (EPA)
Rachel Rodriguez, Yurok Tribe
Chris Romsos, Oregon State University (OSU)
Rex Sanders, US Geological Survey (USGS)
Joel Shinn, U.S. Fish and Wildlife Service (USFWS)
Charles Steinback, EcoTrust
Steve Steinberg, Southern California Coastal Water Research Project (SCCWRP)
Scott Toews, California Ocean Protection Council (OPC)

In addition to overall management oversight for the proposed work provided by the technical expertise of the RDF ACT, we propose forming Project Teams to manage contracted work described in this proposal. For all work that must be contracted, a competitive bidding process will be conducted by NFWF according to the contract requirements as listed for each task below. To determine which entities are uniquely qualified to conduct the work described in competitive bids, the RDF ACT Coordinator will convene a proposal review team comprised of at least three individuals with expertise in the services requested, and overseen by at least one of the RDF ACT Co-Chairs. The Project Teams will be responsible for:

- developing the criteria against which proposal bids will be reviewed and scored;
- reviewing and scoring contractor bids that come into NFWF after the request for proposals is made; and
- recommending the preferred contractor to NFWF based on the contractor with the highest rating and ability to carry out the work in the time requested.

Upon awarding the contract, the Project Team will serve as the project oversight for that work, by meeting regularly with the contractor, discussing the scope of work listed in the contract requirements below, and ensuring that the work proceeds on time, within budget, and meets the deliverable requirements.

The National Fish and Wildlife Foundation — The Fiscal Agent to the WCGA

The NFWF was established by Congress in 1984 as an independent not-for profit organization to be the vehicle for the USFWS to establish public-private partnerships. In the early 1990s, NOAA recognized the need to have a similar instrument and underwent a deliberative process to determine whether to create a new entity or to adopt the NFWF as their official foundation. Based on NFWF's success with the USFWS, and with NOAA's concurrence, Congress expanded NFWF's Charter to include NOAA's mission in 1994. Since then, NFWF has been NOAA's not-for-profit foundation and has continued to develop strong partnerships with many different programs within NOAA. NFWF also has partnerships with 20 other federal agencies.

NFWF will serve as the fiscal agent for the WCGA to provide all financial management, grant administration, related technical assistance services, and the reporting needed to support implementation of WCGA initiatives by the states of Oregon, Washington and California, and third party contractors. NFWF's excellence in financial management, combined with its extensive experience bringing experts, managers, industry and stakeholders together to deliver marine and coastal management results, and its seasoned and competent staff make it the ideal fiscal agent for the WCGA's participation in NOAA Regional Ocean Partnership Funding Opportunity. NFWF consistently receives unqualified opinions, with no findings of significant or material weaknesses, on its annual financial and A-133 audits.

NFWF will:

- reach into diverse sectors of the grantee community;
- efficiently solicit proposals through an online application system and then administer grants;
- assist with generating/documenting grantee match;
- raise additional public and private funds through partnerships to leverage investments;
- develop grant contracts, track all expenditures and report on measurable outcomes; and
- coordinate across agencies to maximize the effectiveness of federal funds towards shared objectives.

NFWF will assist WCGA in leveraging funds with other public and private donors to expand the amount of funds available for CMSP efforts in the West Coast region. As fiscal agent for the WCGA, NFWF will work with the WCGA to manage funds raised and help the grantee/partners to develop work plans and grant agreements, and coordinate the reporting and account for the funds both programmatically and financially to donors/funding sources for West Coast initiatives.

IV. Audiences

The primary audiences are WCGA Action Coordination Teams, which include resource managers, technical GIS staff, and stakeholders from the states of California, Oregon, and Washington, federal agencies (e.g., NOAA, BOEM, EPA, USFWS, USGS), academic, non-governmental organizations, and tribal sovereign nations. Specific audiences include:

- West Coast state agencies including coastal zone management offices, and program-specific offices (e.g., fisheries, nongame species programs, Governor's offices, maritime resource programs, public utility commissions);
- federal agencies and tribal sovereign governments with an interest in coastal and ocean management, science, and governance;
- ocean user groups and commercial and private sector stakeholder sectors, including tourism and recreation groups, offshore energy, and renewable energy developers, commercial and recreational fishing groups, ports, shipping and navigation interests, and marine trades;
- the regional research community, including the ocean observing systems, universities, and Sea Grant programs; and
- stakeholders concerned with habitat protection and ocean conservation, including local government leaders, non-governmental organizations, fishers, recreationists, entities with tourism interests, and other businesses dependent on healthy and resilient coastal and ocean ecosystems.

Approach

The approach is to carry out actions described in core elements of the RDF ACT Work Plan to enhance the human and technological components of the Framework to support and inform regional ecosystem-based management, CMSP, and regional ocean management issues as described by the WCGA. Some of the work will be implemented with in-kind contributions from the RDF ACT and Working Group members. Additionally, to the extent possible we will try to adapt technology that has already been developed in other Regional Ocean Partnerships, and likewise make our technology transferable to others. For contracted work, a competitive bidding process will be conducted according to the contract requirements as listed for each task below. To determine which entities are uniquely qualified to conduct the work described in competitive bids, the RDF ACT Coordinator will convene a proposal review team comprised of at least three individuals with expertise in the services requested, and overseen by at least one of the RDF ACT Co-Chairs. The panel will develop a set of review standards and criteria against which all

proposal responses will be reviewed and scored, and a contractor selected.

Human Network Enhancements

Task 1: Provide coordination and administrative support for the RDF ACT.

To support the enhancements to the Framework described in this proposal, we intend to hire a full-time contractor to coordinate with Framework partners to curate available data, facilitate stakeholder linkages to the Framework, support the work of the RDF ACT, and serve as the project lead on the Project Teams convened to oversee the work described in this proposal. Additionally, the RDF ACT will oversee the implementation of its work plan and will need to meet at critical points to make decisions about the development of the Data System and governance of the Human Network. To facilitate these important decisions, we propose to host an annual meeting to make critical decisions, communicate progress of the work plan, and address governance issues.

- a. Provide funding/administrative support to hire a full-time Framework Coordinator to support all aspect of Framework development, including overseeing proposed work, and coordinating with Framework partners.
- a. Plan for annual meetings of RDF ACT members and working groups.
- b. Provide travel assistance, lodging, and meals for RDF ACT members and technical working groups.

Approach:

- a. Based on the job description listed in Appendix B, hire a full-time Framework Coordinator to support the Framework and oversee all aspects of proposed work.
- b. Host an annual RDF ACT and Working Groups meeting to make decisions, communicate progress on work plan implementation, and address governance issues.

Outcomes:

- a. A full time coordinator who will:
 - a. Coordinate with the Outreach Working Group to conduct formal outreach and actively engage key state agency data stewards, data managers, and constituents of state agencies to inform the development of geospatial data services, i.e., discovery, visualization and dissemination.
 - b. Serve as the primary liaison between the Framework members and the WCGA ACT to ensure the regional portal development approach is meeting the data needs of the WCGA stakeholders.
 - c. Coordinate with the Data Working Group to establish a regional coastal and marine data inventory and assist the RDF ACT to identify strategic approaches.
 - d. Coordinate with the IT Working Group to conduct quality assurance and review of shared services and work with service providers to resolve service interoperability problems.
 - e. Coordinate with Project Teams to oversee scope of work proposed here and ensure work meets requirements and is delivered on time.
- b. An annual meeting for the RDF ACT and Working Groups to develop ACT governance policies, make critical decisions, and track progress of work plan.

Task 2: Identify partners/agency organization and data diplomats and assess the institutional/human capacity of Human Network partners.

Data diplomats are people that serve to maintain and update data streams housed in partner agencies and organizations; these data diplomats will act as points-of-contact within their agencies for data-related

questions from the Human Network and stakeholders. The identification of these individuals will help increase the “connectivity” in both the human and technological components of the Framework and provide for increased data discovery of ocean and coastal data necessary for regional ocean management. Identification of these data diplomats within each partner agency will be critical to the success of this effort by increasing efficiency and ease of access to data.

- a. Distribute communication materials about the Framework developed by the Outreach Working Group (in Phase 1) to partner agencies to garner support for this effort.
- b. Outreach and Data Working Group identifies a “data diplomat” within partner organizations and agencies.
- c. Outreach and Data Working Group formalizes “data diplomat” role through signing of Statement of Support to act as the point-of-contact to contribute to the Framework.
- d. The Data Working Group consults with “data diplomats” about the capacity to host data and provide data to the Framework.
- e. The Data Framework ACT will create a directory of “data diplomats,” including contact information, and make this information available to Data System users on the web.

Outcomes:

- a. A member directory page with partner contacts, including data diplomats so that Data System users and regional stakeholders have key contacts for particular data sets.
- b. A “statement of intent to support” signed by Framework partners.

Data System Enhancements

Task 3: Initiate the development of software to meet the specific needs of one other WCGA ACT, to be selected by the WCGA Executive Committee, using semantic web technology and use case development methods.

Semantic web technology, i.e., a common framework that allows data to be shared and reused across application, enterprise, and community boundaries, integrates multiple data sources to help answer complex, interdisciplinary science and policy questions; and enables easier integration with ocean.data.gov. Use case development helps ensure that the selected ACT is happy with the software, and enables easier software extensions to meet future needs. If this task succeeds, we will propose future tasks using this development method to meet the needs of other WCGA ACTs.

Semantic web technology and use case development are used by ocean.data.gov. Using these methods, we can ensure better integration with national CMSP efforts.

We propose three cycles of development. In each cycle:

- a. Convene a Project Team, including contractor experts, ACT domain experts, and IT Working Group and Outreach Working Group members as well as others.
- b. Host a use case development workshop that results in working prototype software.
- c. Evaluate the prototype software.

Contract requirements

Contracts for this work will be competitively bid. The contractor shall initiate the development of computer software for solving the problems identified through a semantic web technology and use case development process with one WCGA ACT. The scope, restraints, and other requirements shall be identified during the development process.

The contractor shall conduct at least three iterative development cycles, through prototype and evaluation. Contractor deliverables include: all versions of all intermediate products, including but not limited to text descriptions, concept maps, models, charts, ontologies, and software source code; three or more working prototype software sets; and complete software and user documentation. The Contractor shall deliver intermediate products electronically within an agreed upon period of time following product development. The Contractor's proposal shall include the details of delivery, including product descriptions and formats, and the proposed timeline for each major step of the development cycle. The final system and all documents must be delivered by the dates specified in the contract (Appendix C for full description).

The WCGA will supply one or more domain experts, who are representatives from one Action Coordination Team (<http://www.westcoastoceans.org/index.cfm?content.display&pageID=68>), to be selected by the WCGA Executive Committee.

Outcomes:

- a. Functioning Data System software that meets the needs of one ACT (as a pilot to garner lessons learned for other ACTS as well as regional and national priorities).
- b. Data System software that may be reused to meet the needs of other ACTs, or other regional ocean partnerships.
- c. A semantic web-based Data System that could integrate with Ocean.Data.Gov.

TASK 4. Continue to develop data registry with broader Human Network input and address public data requests received online.

The Registry application that will be developed in Phase One will serve as the technological backbone of the Data System. A Registry acts as a “catalogue of catalogues,” that will have the capability of connecting to the Framework through an external facing website, or other technical mechanisms. This Registry will provide the ability to download regional data sets in multiple formats and is modeled on the NOAA CMSP data registry. As the data needs of the WCGA and regional stakeholders grow, additional data in multiple and varied formats will be needed. By increasing the data holdings contained in the Registry, the Framework will be able to address and inform more and varied ocean management issues as raised by regional stakeholders.

- a. Based on assessment and selection of web hosting options in Phase One, support for web hosting will be provided for two more years.
- b. The Framework coordinator position hired in Task 1 will work with the “data diplomats” in partner agencies and coordinate an online forum to assess regional needs to inform the acquisition of new data (online forum to be generated by the Outreach Working Group of the RDF ACT during Phase One).
- c. Based on priority data sets identified in Phase One and through the online forum referenced earlier, we will hire a contractor to integrate state and local scale data sets into priority regional scale data sets, i.e., socioeconomic, human use, ecological, that can be used to inform regional ocean management and planning issues identified by the WCGA and West Coast RPB.

Approach:

- a. Select a web host from providers that offer server space and performance that will meet the needs described by the Data System design (Phase One and Phase Two, Task 1).
- b. Hire a contractor to integrate priority local and state data into regional scale data. This work might be conducted at universities with laboratories with graduate students that specialize in integrating disparate GIS data.

Outcomes:

- a. Web hosting for Data System for two more years.
- b. Increased capacity of partner agencies and organizations to contribute to the Data System.
- c. Enhanced capability and content of the Registry to meet additional user needs, including additional formats for data download.

TASK 5: Select featured data sets for data viewer.

Based on feedback from the WCGA and other stakeholders, specific priority regional data sets will be selected for inclusion in the data viewer/mapper of the enhanced Data System. These will be the data sets that will form the initial content for data exploration and analysis within the Data System.

- a. The Data Working Group will prioritize and select featured data sets based on input from the WCGA and Human Network.
- b. The Data Working Group will prepare featured data sets for inclusion in the data viewer, including ensuring proper format, documentation, metadata.

Approach:

- a. In-kind contributions of time and resources from the Data Working Group.
- b. Use the services provided by the RDF ACT Coordinator as an ACT Point-of-contact, coordinator, website manager, and quality assurance tech for the Framework.

Outcomes:

- a. A list of available data sets, where they exist, their complete metadata records, and the Point-of-Contacts for each.
- b. A catalogue of regional scale data sets in the proper format and correct symbology for inclusion in the Data System and available for download and analysis by regional stakeholders.

TASK 6: Develop enhanced Data System, including data viewer/mapper functionality and tools designed in Task 3.

The ultimate goal of Phase Two for the Framework is to increase the capacity of the Human Network and Data System to support and inform regional ocean management issues identified by the WCGA and West Coast RPB. By enhancing the Data System, and building on the Registry, the Framework will allow for easy access to the data, decision support tools, and people needed to inform and support regional ocean management. In addition to a viewing application and download functionality (Registry), the Data System will include functionality as described and outlined in the Use Case studies and Semantic Web development conducted in Task 3.

- a. Convene a Project Team to steer viewer/mapper development, including members of the RDF ACT, IT Working Group, Outreach Working Group, and Framework coordinator.
- b. Hire a GIS web developer/contractor.
- c. Establish a work plan, communication mechanisms, and timelines to complete a prototype map viewer.
- d. Based on Data System design assessment from Phase One and use cases from Task 3, develop a map viewer, making use, to the greatest extent possible, of existing resources and in-kind support from partner organizations (e.g., ESRI, NOAA).

Approach:

- a. Form a Project Team to guide the development of Data System functionality targeted by this Task. This team will include the IT and Outreach Working Group coordinators, as well as selected members of the RDF ACT, Task 3 Project Team, and the IT Working Group.

- b. Hire a developer/contractor.
- c. Establish a work plan, communication mechanisms, and timelines for the Project Team, to complete a prototype map viewer.
- d. Based on Data System design assessment from Phase One and use cases from Task 3, develop a map viewer, making use, to the greatest extent possible, of existing resources and in-kind support from partner organizations.
- e. Assess, prioritize, and incorporate additional functionality prototyped in Task 3.

Contract requirements:

Contracts for this work will be competitively bid. The contractor shall develop a user-friendly, web-based map viewer for geospatial data catalogued in the Registry. The viewer will be grounded on standards-based web services facilitated by the Registry for access to the data catalog, data ontology, map layer visualization, and data-download functionality. The contractor shall also work with the Task 3 contractor and the Project Team to integrate and scale the Task 3 prototype functionality prioritized for this Task. Criteria for selection of the contractor will include the ability to efficiently integrate with the Registry and related tools developed in Phase One and enhanced in Task 4, and to optimize the use of web hosting services in coordination with the Registry and other tools to minimize costs and redundancy. The scope, constraints, and other requirements shall be identified during the development process.

The contractor shall conduct at least three iterative development cycles, through prototype and evaluation. Contractor deliverables include: all versions of all intermediate products, including but not limited to text descriptions, concept maps, system architecture charts, description of integration with Registry, and software source code; three or more working prototype systems; and complete system and user documentation. The Contractor shall deliver intermediate products electronically within one week of development. The Contractor's proposal shall include the details of delivery, including product descriptions and formats, and the proposed timeline for each major step of the development cycle. The final system and all documents must be delivered by the dates specified in the contract.

This task shall be carried out in two stages, producing two distinct versions of the map viewer and associated tools. The second and final version will incorporate user feedback resulting from the first version.

Outcomes:

- a. An enhanced Data System that is web accessible and includes user-friendly map viewing and download functionality that is driven by and directly integrated with the Registry.
- b. Advanced Data System functionality derived and prioritized from the use case-driven prototype developed in Task 1.

TASK 7: Ground truth usability of the Data System with regional users and stakeholders.

To confirm that the Data System meets the needs of regional stakeholders, we will create several mechanisms for feedback on Data System design, interface, and usability. These will include providing user feedback surveys on the web through the Data System itself, host targeted focus groups with WCGA ACTs, policy makers, and other stakeholders to evaluate user experience, and host regional workshops to conduct outreach on the utility of the Data System and demonstrate functionality.

Approach:

- a. The Outreach Working Group will create a user feedback survey for inclusion in the Data System and Human Network web pages to solicit feedback from Data System users.

- b. The RDF ACT and Outreach Working Group will plan and host targeted focus group webinars (comprised of other ACTs, policy makers, community, e.g.) for different sectors to evaluate user experience (year 1).
- c. The RDF ACT will host four regional workshops/town halls to launch the Data System and conduct outreach about Data System utility to different regional stakeholder groups.
- d. Based on feedback received through online survey and focus group webinars, the IT group will craft a plan to implement changes to increase user experience satisfaction.

Outcomes:

- a. Webinars held to demonstrate and solicit input from targeted focus groups of Data System users.
- b. A report to the RDF ACT and IT working groups about feedback on the user interface and utility of the Data System.
- c. Four workshops held throughout the region to gather stakeholder input on Data System performance and design.
- d. A report to the RDF ACT and IT working groups from the Outreach Working Group describing the feedback received about user interface and performance of the Data System.

Benefits

The benefits of completing the objectives in this proposal would be a major step forward in the ability to discover, use, and apply information, access available decision support tools, and conduct geospatially smart planning for the West Coast as it relates to the increasingly complex task of marine and coastal management. The entire nation will benefit from the increased capacity to conserve and sustainably develop ocean and coastal resources.

A Framework is a necessary first step to support regional CMSP. An interoperable database will:

- help facilitate a synthesis of relevant science in support of marine ecosystem-based management;
- help address the Areas of Special Emphasis identified in the National Ocean Policy and site-specific management needs identified by the WCGA as high-priority issues of regional concern (e.g., community responses to climate change, conservation and habitat protection, marine renewable energy development, gaps in seafloor habitat mapping, sediment and erosion issues, marine debris, polluted runoff, and invasive species);
- support the infrastructure developed by the West Coast IOOS Regional Associations (SCCOOS, CeNCOOS, NANOOS) and incorporate data visualization and geospatial mapping tools;
- be developed with input from regional stakeholders;
- build upon existing CMSP activities;
- make use of forecasts and tools to evaluate alternative coastal and ocean use scenarios;
- constitute a robust and interoperable data visualization system that can accommodate multi-disciplinary data inputs and integrate disparate geospatial data, bio-physical data, social science information, and associated uncertainties in an explicit manner;
- contribute directly to the data access and synthesis requirements of the sub-regional IEAs; and
- offer tangible benefits to coastal and ocean resource managers who are engaged in science-based decision-making.

Other expected benefits from this project include a robust, *Next-Generation Coastal and Marine Data System to support Regional and National Ocean Priorities and Planning for Ocean Uses*, and other pragmatic outcomes and outputs that substantially build capacity for regional ocean governance along the West Coast through development of tools and processes to support planning for existing and emerging uses of the ocean. Collaboration with state and federal agencies, regional fisheries management organizations, tribal sovereign

governments, ocean resource stakeholders, and others will help inform the questions that can drive data needs. The enhanced Framework, proposed here, will support efficient and effective stakeholder engagement. The core elements of the RDF ACT Work Plan include key nexus points for the West Coast and its many communities to participate in the development, use, and future of the Framework. The proposed work will identify key existing data sets as well as data gaps and needs. In addition, this proposal ensures long-term sustainability by incorporating a long-term plan for hosting and future versions and upgrades. All of these, and other benefits, will ensure effective CMSP along the West Coast.

Project Schedule and Milestones

Project Schedule	Timeline and Milestones							
	Months 1-3	Months 4-6	Months 7-9	Months 10-12	Months 13-15	Months 16-18	Months 19-21	Months 22-24
Human Network Enhancements								
Task 1. Provide coordination and administrative support for the RDF ACT.	■	■	■	■	■	■	■	■
Task 2. Identify partners/agency organization and data diplomats and assess the institutional/human capacity of Human Network partners.	■	■	■	■	■	■	■	■
Data System Enhancements								
Task 3. Initiate the development of software to meet the specific needs of one other WCGA ACT, to be selected by the WCGA Executive Committee, using semantic web technology and use case development methods.	■	■	■	■				
Task 4. Continue to develop data registry with broader Human Network input and address public data requests received online.				■	■	■	■	■
Task 5. Select featured data sets for data viewer.				■	■	■	■	■
Task 6. Develop enhanced Data System, including data viewer/mapper functionality and tools designed in Task 1.				■	■	■	■	■
Task 7. Ground truth usability of the Data System with regional users and stakeholders.							■	■

Project Budget

Detailed budget information, including elements of a Form SF-424A, cannot be completed until the West Coast Governors Alliance solicits requests for proposal to achieve the outcomes described in this application. However, the following is a brief narrative justification of the budget:

	Year 1	Year 2	Purpose for Funding
<u>Human Network Enhancements</u>			
Task 1. Provide coordination and administrative support for the RDF ACT.	(a) \$13,000 (b) \$100,000 ¹²	(a) \$13,000 (b) \$100,000 ¹³	(a) Convene the RDF ACT annually to develop and implement Work Plan and provide for recorded Webinars. (b) Hire a full-time coordinator to coordinate the RDF ACT and its website, perform data quality assurance and quality control, and liaison with agency data diplomats about the capacity to host data.
Task 2. Identify partners/agency organization and data diplomats and assess the institutional/human capacity of Human Network partners.	Completed by coordinator from Task 1	Completed by coordinator from Task 1	A member directory page with partner contacts, including data diplomats so that Data System users and regional stakeholders have key contacts for particular data sets. A “statement of intent to support” signed by Framework partners.
<u>Data System Enhancements</u>			
TASK 3. Initiate the development of software to meet the specific needs of one other WCGA ACT, to be selected by the WCGA Executive Committee, using semantic web technology and use case development methods.	\$110,000	\$0	\$80,000 for development of the use cases, \$20,000 for use case implementation, and \$10,000 to support a GIS analyst developer
Task 4. Continue to develop data registry with broader Human Network input and address public data requests received online.		\$110,000	Integrate state and local geospatial data sets into regional scale data.

¹² Note in the description we have the salary as a range, but that these figures will include benefits and travel costs not explicitly stated above.

¹³ Note in the description we have the salary as a range, but that these figures will include benefits and travel costs not explicitly stated above.

Task 5. Select featured data sets for data viewer.	IN KIND	IN KIND	Prioritize selected featured data sets based on input from WCGA ACTs and Human Network and prepare featured data sets.
Task 6. Develop enhanced Data System, including data viewer/mapper functionality and tools designed in Task 1.	\$150,000 (development cost plus one year hosting fee)	\$20,000 (one year hosting fee); \$50,000 (upgrade/second version of viewer)	Hire a GIS web developer to produce a data viewer that is web accessible, pay for hosting fees, and produce an upgrade/second version of the viewer.
Task 7. Ground truth usability of the Data System with regional users and stakeholders.		\$8,000	Host four town hall meetings to evaluate user experience.
Subtotal	\$373,000	\$301,000	
Overhead cost (10%)	\$37,300	\$30,100	
Subtotal	\$410,300	\$331,100	
TOTAL	\$741,400		