Project Title: Climate-Smart Adaptation for the North-central California Coast and Ocean

Project Lead and Co-Lead:

Lead: Kelley Higgason, M.Sc.
GFNMS Ocean Climate Initiative Coordinator
Farallones Marine Sanctuary Association
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Co-Lead: Sam Veloz, Ph.D.
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Project Duration, Phase 2: 1.5 years; October 1, 2014 – March 31, 2016

Total Requested Funding: $115,667

Partners with Contributions/Leveraging for Phase 2 of Project:

Gulf of the Farallones National Marine Sanctuary (GFNMS)
- Funding for project coordination; management context expertise
- $60,000: partial salaries and benefits for Management Lead and Project Coordinator
- $12,375: in kind Sanctuary Superintendent consultation

Farallones Marine Sanctuary Association (FMSA)
- Overall project and partner coordination

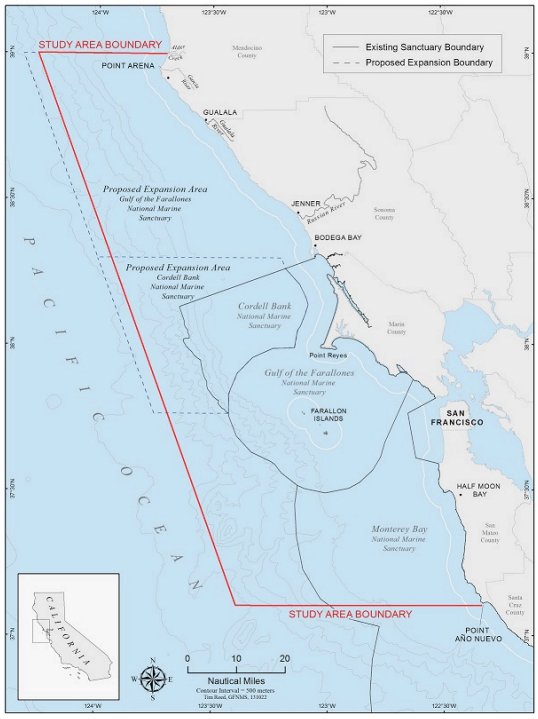
National Parks Service: Point Reyes National Seashore (PRNS); Golden Gate National Recreation Area (GGNRA)
- Project planning committee
- $5,000: in kind funds for both parks to participate on planning committee

Bay Area Ecosystems Climate Change Consortium (BAECCC)
- Project planning committee
- $2,500: in kind funds for BAECCC Coordinator to participate on planning committee

Point Blue Conservation Science (Point Blue)
- Scenario planning lead; project planning committee

EcoAdapt
- Vulnerability assessment and adaptation plan consultation; project planning committee
- $1,000: host project webpages and help provide content

California Landscape Conservation Cooperative (CA LCC)
- Project planning committee
- $2,500: in kind funds to participate on planning committee



Geographic Scope: The geography covered by this project is the North-central California coast and ocean region, from Point Año Nuevo, San Mateo County in the south to Alder Creek, Mendocino County in the north (see map). The project area overlaps with the Pacific Northwest LCC and includes portions of the following three California LCC ecoregions: North Coast, Central Coast, and Marine.

Project Summary/Management Relevance

The North-central California coast and ocean is a globally significant, extraordinarily diverse and productive marine and coastal ecosystem that is home to abundant wildlife, valuable fisheries, two national marine sanctuaries, two national parks, and a national wildlife refuge. It is a treasured resource of the San Francisco Bay Area's seven million residents that rely on this unique marine ecosystem for their livelihoods and recreation. Significant coastal areas, including Tomales Bay, Bolinas Lagoon, Estero Americano, and Estero de San Antonio, support a diversity of habitats, including eelgrass beds, intertidal sand and mud flats, and salt and freshwater marshes that provide numerous ecosystem services such as carbon storage, flood control and improved water quality (GFNMS 2008).

Marine resource managers realize the immediate threats of climate change to the resilience, health, and ecosystem services of the special coastal and ocean places they protect, yet the resources to develop appropriate management options to prepare for and respond to a changing environment are limited (Gregg et al. 2011). Adaptation planning techniques and processes are well developed, but there is a lack of application of these methods for marine systems (Gregg et al. 2011). The Farallones Marine Sanctuary Association and its partners are requesting the California Landscape Conservation Cooperative's support to enable marine resource managers to respond to, plan, and manage for the impacts of climate change to habitats, species, and ecosystem services within the North-central California coast and ocean region by utilizing expert-driven, scientifically sound assessments to provide prioritized, stakeholder-led climate-smart adaptation strategies. Specifically, project partners seek to integrate climate-smart adaptation into existing management frameworks, and provide guidance to help ensure long-term viability of the habitats and resources that natural resource agencies are mandated to protect.

The Climate-Smart Adaptation project consists of two phases: 1) Vulnerability Assessment (expected completion August 2014), and 2) Adaptation Planning (for which funds are being requested; expected completion March 2016). Project partners have provided approximately $95,375 to complete Phase 1 of this project, which consists of two workshops of scientists, natural resource managers and policy experts to define focal resources and assess climate vulnerabilities of these resources. We request $115,667 in funding to complete Phase 2 of the project to convene a working group of scientists and resource managers to define distinct future scenarios for the study region using information developed in Phase 1 and develop prioritized adaptation recommendations. These recommendations will be forwarded to the GFNMS Advisory Council for acceptance, and then to the GFNMS superintendent as well as other coastal resource management agencies in the region, such as National Park Service, California State Parks, and Counties of San Mateo, San Francisco, Marin and Sonoma, for consideration in their current or future adaptation planning efforts. GFNMS will then adopt a final set of climate-smart adaptation strategies based on the Sanctuary Advisory Council recommendations, and work with the project team to develop an adaptation implementation plan. Potential ecological outcomes of integrating adaptation actions into natural resource management in the region include restoring habitats and using nature-based solutions to protect infrastructure such as the restoration of hydrologic function and floodplains in Bolinas Lagoon to provide for future wetland upland migration as well as flood and erosion control; seagrass restoration and protection in Tomales Bay to provide increased habitat, carbon storage and sequestration, improved water quality, and protection of shoreside infrastructure by reducing coastal erosion; and beach nourishment projects to protect coastal infrastructure.

To meet our project goal, the following overarching objectives will be achieved:

1. Produce scientifically sound vulnerability assessments and ecosystem services valuation through expert elicitation, regional modeling, and exhaustive literature review.
2. Develop and prioritize climate change adaptation action recommendations that can be feasibly implemented by managers, while considering a range of plausible future scenarios that incorporate interdisciplinary collaborative input.

3. Develop an implementation plan for sanctuary management based on the approved adaptation actions.
4. Serve as a pilot climate-smart adaptation project for other marine protected areas, such as national marine sanctuaries, both nationally and within California.

Capacity

Management Lead: Kelley Higgason, M.Sc.

As the lead Principle Investigator, Kelley Higgason will guide and oversee the project. She will provide a coastal management perspective during project development as well as connect the project to coastal resource management agencies. As coordinator of the GFNMS Ocean Climate Initiative and the Our Coast, Our Future (OCOF) project, Kelley Higgason has led multiple efforts in applying climate data to decision-making to integrate the best available science into management of coast and ocean resources. She provides expertise in managing collaborative and diverse teams to provide accessible and user-friendly climate data and information to resource managers. She previously provided direction and oversight for the GFNMS Ocean Climate Indicators project, which worked with over 50 regional research scientists and resource managers to coordinate the development of linked physical and biological climate change indicators for the region. In addition, she has coordinated multiple stakeholder workshops and focus group meetings to solicit management information needs for the OCOF online decision support tool to plan for and respond to sea level rise and storm hazards in the San Francisco Bay Area. Kelley also led a working group of local experts representing 16 agencies, organizations, and academic institutions to assess and downscale global climate change information into a regional climate change survey for north-central California coast and ocean ecosystems. This effort resulted in a scientifically sound, comprehensive climate change impacts report that serves as the foundation for subsequent sanctuary adaptation planning efforts. Lastly, she has been the lead organizer for three biennial Ocean Climate Summits in the Bay Area to connect coastal climate information, resources, and people across disciplines.

Science Lead: Sam Veloz, Ph.D.

As scientific lead on the project, Sam Veloz will guide the scientific components of the project, including Scenario Planning, and ensure scientific accuracy of project materials and working group outcomes. Sam has been involved with the development of a scenario planning training course with the National Conservation Training Center. In addition he has conducted quantitative scenario planning analyses to seek robust restoration prioritizations to uncertainty in sea level rise and climate change in the San Francisco Estuary. He is also in the process of leading a scenario planning project with the South Bay Salt Pond Restoration project to evaluate adaptive management alternatives.

Project Coordinator: Sara Hutto, M.Sc.

As Project Coordinator, Sara Hutto will be responsible for overall coordination amongst project team partners, clearly defining project time line and deliverables and ensuring timely delivery of products, coordinating working group meetings, coordinating meetings with project partners, and managing project logistics. Sara has served as project coordinator for Phase 1 of the North-central California Coast and Ocean Climate-Smart Adaptation project for the past year and has experience managing other complex, multi-stakeholder projects, including a ship strike management, policy and outreach project at Channel Islands National Marine Sanctuary, and the advisory councils of Channel Islands and Monterey Bay National Marine Sanctuaries. Sara has also completed Climate-Smart Conservation training from the USFWS National Conservation Training Center, the Natural Capital's InVEST training, and the Planning and Facilitating Collaborative Meetings training through the Elkhorn Slough NERR Coastal Training Program.

Scientific Advisor: Lara Hansen, Ph.D.

As scientific advisor to the project, Lara Hansen will provide input, support, and guidance during the project and review the development and prioritization of adaptation actions. Dr. Lara Hansen has almost two decades of experience in the field of climate change adaptation, with a specialization in natural resources and marine management issues. Her work includes development of several practitioner texts on adaptation, generation of the first adaptation training process, experience in vulnerability assessments and adaptation strategy creation with government agencies and communities, dozens of publications on adaptation, and extensive teaching and training experience. She leads a team of highly skilled adaptation innovators at EcoAdapt, the first non-profit organization created to assist in the development and implementation of climate-informed management and planning to foster better outcomes in all facets of society.

GIS Specialist: **Dennis Jongsomjit, B.Sc.**

As GIS specialist, Dennis Jongsomjit will be responsible for producing maps and other materials for the Climate-Smart Adaptation Working Group for use in the scenario building process and development of adaptation actions. He began work at Point Blue in 2001 as an intern nest searcher at the Palomarin field station. He is now a GIS specialist and biologist, focusing his efforts on landscape and climate change factors affecting bird distributions.

Approach and Scope of Work

The Climate-Smart Conservation approach will be utilized to produce nature-based solutions that ultimately enhance carbon storage and sequestration, reduce climate change impacts on wildlife and people in order to enhance resilience, and sustain vibrant, diverse ecosystems (Ellie Cohen, Point Blue Conservation Science). The Climate-Smart Adaptation Project for the North-central California Coast and Ocean satisfies Objective 1 of the CA LCC Science-Management Framework (Framework) by serving as one of two case studies of place-based projects included in the Framework that "meet regionally identified high priority needs and address priority resources and important management issues…and lead to climate-smart conservation actions by resource managers". The following tasks describe the approach used to complete the first 3 steps of the Framework in Phase 1 (Partnerships, Information, and Decision Support), and the tasks to complete the final steps in the Framework in Phase 2 (continued Partnerships and Decision Support, Strategies and Action).

Phase 1 – Vulnerability Assessment (expected completion August 2014)

Scope of Adaptation Project

FMSA staff extensively reviewed literature specific to climate change adaptation planning processes, and brought together key GFNMS staff (including the research coordinator, resource protection coordinator and superintendent) in August 2013 to develop the geographic and temporal scope of the adaptation project, and to define the project goals. Key guiding documents and processes were used in the development of the scope of this project, including EcoAdapt's Vulnerability Assessment Workshop for the Sierra Nevada, the National Wildlife Federation's Guide to Vulnerability Assessments, the National Wildlife Federation's Quick Guide to Climate-Smart Conservation, Scenario Planning for Climate Change Adaptation, and many others.

Project Planning Committee (**Partnerships**)

A planning committee of project partners, including Point Blue, EcoAdapt, NPS, CA LCC, BAECCC, FMSA and GFNMS was convened in September 2013. The Committee, made up of scientists, adaptation professionals, and natural resource managers, is guiding the development of two information gathering workshops by advising on workshop design and organization and reviewing workshop materials, as well as providing workshop facilitation for breakout groups.

Workshop Information Gathering (**Information**)

FMSA and GFNMS staff evaluated an extensive list of species, habitats and ecosystem services in the region and identified priority resources from internal planning documents (including the GFNMS Condition Report, GFNMS Management Plan, and Climate Change Indicators Plan) as well as numerous external research publications and documents. From this evaluation, staff developed a draft list of focal resources for consideration and review by the project planning committee and for consideration in the selection of final focal resources during Workshop 1. Staff also developed habitat vulnerability information packets for Workshop 2 based on a review of current literature and the 2010 Climate Change Impacts Report, which was developed by a joint working group of the Cordell Bank and Farallones Sanctuary Advisory Councils. These habitat information packets were created to support the vulnerability assessment process by providing detailed information regarding each habitat's exposure, sensitivity and adaptive capacity to climate and non-climate impacts, as well as the vulnerability of key species.

Decision Support Workshops: 1) Focal Resources, 2) Vulnerability Assessments (**Decision Support**)

To provide the necessary information to support the Climate-Smart Adaptation Working Group in the development of adaptation recommendations, two decision support workshops were organized. Following the successful model developed by EcoAdapt for the Sierra Nevada Adaptation Project, the first workshop (Focal Resources) was held in February 2014, and brought together 30 scientists, policy experts, adaptation professionals, and natural resource managers to finalize the draft list of North-central California coast and ocean focal resources using a set of evaluation criteria. The second decision support workshop (Vulnerability Assessments), scheduled for two days in June 2014, will again bring together scientists, policy experts, adaptation professionals, and natural resource managers to assess the vulnerability of the focal resources to climate change impacts. Participants will work in habitat break-out groups based on their area of expertise to assess a resource's overall vulnerability by determining the relative sensitivity, exposure and adaptive capacity of their habitat and associated species and ecosystem services to climate change impacts, along with a confidence rating. Additional resources provided for their assessment include: a climate impacts table for the region, a literature review of climate and non-climate impacts for their habitat, and a vulnerability assessment worksheet with guided questions.

Vulnerability Assessment Reports (**Decision Support**)

EcoAdapt and FMSA staff will produce vulnerability assessment reports that integrate the expert-assigned scores of sensitivity, adaptive capacity, and exposure with associated information from the peer-reviewed literature and projected changes in climate. The final report will consist of the scores with confidence rankings and narratives for each focal resource assessed. The aim of this summary is to expand understanding of resource vulnerability to changing climate conditions, and to provide a basis for developing appropriate adaptation responses.

Phase 2 – Adaptation Planning (LCC funds requested)

Develop Phase 1 Summary Report (**Decision Support**)

FMSA staff will produce a summary report for Phase 1 of the project to outline the process used to select focal resources and assess their vulnerability to climate change, as well as the findings, including: a process overview; workshop summaries; and the final vulnerability assessment report. This report will serve as a guide for other adaptation practitioners, and to illustrate what is known and unknown regarding projected climate impacts in the study region and associated vulnerabilities of the region's resources. The summary report will be published as part of the Office of National Marine Sanctuaries (ONMS) Conservation Science Series and made available on the ONMS website as well as the Bay Area Ecosystems Climate Change Consortium (BAECCC) website, the Climate Commons, and the Climate Adaptation Knowledge Exchange (CAKE). FMSA staff will also host a BAECCC

presentation and discussion on the vulnerability assessment process and findings, and next steps for moving forward with adaption planning.

Continue Project Planning Committee (**Partnerships**)

The committee will continue an active advisory role throughout Phase 2 by reviewing Phase 1 and Phase 2 Summary Reports, advising on the Climate-Smart Adaptation Working Group meetings, participating on the working group, reviewing working group materials, and reviewing the adaptation implementation plan.

Convene Climate-Smart Adaptation Working Group (**Partnerships**)

Based on expertise and jurisdictional boundaries, a sub-set of representatives from local, state, and federal agencies, non-profit organizations, and academic institutions that participated in the vulnerability assessment workshops will be invited to serve on a Climate-Smart Adaptation Working Group that will meet 4-5 times over the course of 1 year. The working group will: 1) define distinct future scenarios for the study region and 2) develop prioritized adaptation recommendations.

Climate-Smart Adaptation Working Group define future scenarios (**Decision Support**)

Working group members will use the Phase 1 Summary Report and the Scenario Planning for Climate Change Adaptation guide (Moore et al. 2013) to define distinct scenarios for the study region based on the most uncertain and the most important (greatest impact) climatic and non-climatic drivers of change. Working Group members will meet and evaluate drivers of change that were identified in Phase 1 as contributors to focal resource vulnerability and rank those drivers by their relative uncertainty (in future direction and magnitude of change) and importance to management decisions. The working group will then select the top two or three most uncertain/impactful drivers and cross those drivers to create a set of plausible but also divergent scenarios to use in a scenario planning exercise. For example, the "Futures of Wild Marin" workshop (Moore et al. 2013) selected the onset of the dry season (early and late) and prevailing wind direction (easterly and northerly) and crossed those drivers to create four plausible futures (early dry season and easterly wind, late dry season and easterly wind, early dry season and northerly wind, late dry season and northerly wind). The working group will then name and describe each future scenario in preparation for the development of adaptation actions. Scenario planning is a successful and flexible approach to incorporate climate uncertainty into decision making to develop adaptation actions for multiple, plausible climate futures, and is especially useful when critical drivers of change are highly uncertain and can not be controlled (Moore et al. 2013).

Climate-Smart Adaptation Working Group develop adaptation recommendations (**Strategies**)

FMSA and Point Blue will summarize the future scenarios and create discussion templates modeled after the "Futures of Wild Marin" workshop (Moore et al. 2013), to aid the working group in brainstorming adaptation action recommendations. Based on National Wildlife Federation and Point Blue Climate-Smart Conservation Principles, and using the developed scenarios as a framework, working group members will: 1) define criteria for prioritization of adaptation recommendations (e.g. feasibility, cost-effectiveness, climate-smart, collaborative, robustness across scenarios); 2) brainstorm potential management actions for each future scenario (in an iterative process, which may result in further revision of scenarios); 3) evaluate and prioritize brainstormed actions using defined criteria; and 4) determine a final set of recommended actions. The working group chair and project coordinator will present the final recommended actions to the GFNMS Sanctuary Advisory Council for discussion and acceptance. The approved recommendations will be forwarded to the sanctuary superintendent as well as other coastal resource management agencies in the region, such as GGNRA, PRNS, California State Parks, and Counties of San Mateo, San Francisco, Marin and Sonoma, for consideration in their current or future adaptation planning efforts.

Develop Adaptation Implementation Plan and Incorporate into Sanctuary Management (**Action**)

The GFNMS superintendent will review the recommended actions forwarded by the Advisory Council, and through consultation with GFNMS program coordinators, adopt a final set of adaptation actions to be implemented by the sanctuary. FMSA staff, in consultation with the GFNMS superintendent and staff, will then develop an Adaptation Implementation Plan that will be reviewed by the project planning committee, including a summary of adaptation actions, implementation prioritization and schedule, estimated cost and potential funding sources, and potential partners. The Implementation Plan will be divided into three project initiation sections: 1) Near-term (less than 5 years to implement; 2) Mid-term (5-10 years to implement); and 3) Long-term (over 10 years to implement). GFNMS staff will immediately begin incorporating adaptation strategies into sanctuary management as resources allow. Immediate actions may include revising permit review criteria, additional analysis on climate change impacts incorporated into NEPA documents, and prioritization of restoration activities based on climate change impacts.

Develop Phase 2 Summary Report (**Action**)

FMSA staff will produce a summary report for Phase 2 of the project to outline the adaptation planning process utilized, as well as lessons learned in adaptation planning. The summary report will provide an index of recommended actions by region and by habitat type for easy reference by local managers. All adaptation actions recommended by the working group will also be included as a reference for regional management agencies when considering the incorporation of the project's outcomes into their planning documents. The summary report will be published as part of the Office of National Marine Sanctuaries (ONMS) Conservation Science Series and made available on the ONMS website, as well as the BAECCC website, the Climate Commons, and CAKE.

Provide Project Outreach

FMSA staff (and project partners as feasible) will provide a national webinar training to all ONMS staff and in person trainings to Monterey Bay, Channel Islands and Olympic Coast National Marine Sanctuary staff on the vulnerability assessment and adaptation planning process utilized, project findings, and the development of the implementation plan. FMSA staff will also host a BAECCC presentation and discussion on the project process and findings, and next steps for moving forward with implementation of actions.

Deliverables/Timeline/Accessibility: See deliverables table.

Measuring Results:

Success of the project will be measured by the incorporation of the recommended actions into regional management plans and the implementation of those recommended actions. FMSA staff will track the inclusion of recommended actions into regional planning documents by consulting with GFNMS, GGNRA, PRNS, California State Parks, Counties of San Mateo, San Francisco, Marin and Sonoma, and BAECCC members. Our target is that relevant actions are incorporated into the National Park Service's general management plan, long-range transportation plan, climate adaptation-restoration projects such as the Giacomini wetland in GGNRA, and the Climate Friendly Parks Program, as well as the GFNMS management plan and Marin and Sonoma Counties Local Coastal Plan Updates for Sea Level Rise. The longer-term successes will be measured by the implementation of the strategies, such as increased area of habitat restored as a nature-based solution to addressing climate change impacts.

Success will also be measured by the transferability of the project to other regions, specifically other sanctuary sites in California and throughout the nation. As stated above, FMSA staff (and project partners as feasible) will provide a national webinar training to all ONMS staff and in person trainings to

Monterey Bay and Channel Islands National Marine Sanctuary staff. FMSA staff will track which sanctuary sites initiate climate adaptation planning as a result of the GFNMS effort.

Value-added and Transferability

To date, the CA LCC has provided valuable support to many important projects throughout San Francisco Bay and inland that further the LCC mission, but has not had the opportunity to invest as heavily in the region's globally significant, extraordinarily diverse, and productive marine ecosystem that supports abundant wildlife and valuable fisheries in a variety of habitats, including open ocean, nearshore tidal flats, rocky intertidal areas, estuarine wetlands, subtidal reefs, and coastal beaches. This project provides an opportunity for the CA LCC to reach its objective of supporting place-based projects that lead to climate-smart conservation actions by resource managers in the currently underrepresented North Coast, Central Coast, and Marine Ecoregions The LCC has already made an important investment in this project by supporting Phase 1 through knowledge transfer from previous climate-smart adaptation projects, content expertise, and funding. Using the developed decision support materials from Phase 1, the LCC has the opportunity to continue to support this effort to now develop actionable outcomes and an adaptation implementation plan for a region that has previously not been accounted for in adaptation planning. Operating at the management-science interface, the LCC is uniquely positioned to contribute to this effort by providing a valuable partnership for this project through lessons learned and knowledge transfer from the Sierra Nevada vulnerability assessment and adaptation planning project.

This project will serve as a model for the National Marine Sanctuary System (NMSS), consisting of 14 sanctuaries and monuments throughout the nation, as a first of its kind effort and will be presented to staff nation-wide through an informational webinar. It will be especially relevant to the three other Pacific coast sanctuaries (Channel Islands, Monterey Bay, and Olympic Coast), and FMSA staff will work to provide in-person presentations to those staff and discuss ways in which many of the vulnerability assessment reports and final adaptation actions may also be transferrable to these sites, and/or how the overall process could be replicated for each site. Our ultimate goal is that the materials, outcomes and process from this project will serve as a model for natural resource managers locally and worldwide to ensure long-term viability and resilience of coast and ocean resources. One immediate step we are taking to further this goal is to provide a webinar introduction to climate-smart conservation in marine protected areas (MPAs) in August of this year as part of a national MPA webinar series, highlighting this project's process and initial outcomes. This series, hosted by NOAA's Marine Protected Areas Center, is focused on building and strengthening MPA networks, and draws a diverse international audience, including MPA and coastal managers, NGOs and students.

Citations:

Gregg, R.M., L.J. Hansen, K.M. Feifel, J.L. Hitt, J.M. Kershner, A. Score, and J.R. Hoffman. 2011. The State of Marine and Coastal Adaptation in North America: A Synthesis of Emerging Ideas. EcoAdapt, Bainbridge Island, WA.

Moore, S.S., N.E. Seavy, and M. Gerhart. 2013. Scenario planning for climate change adaptation: A guidance for resource managers. Point Blue Conservation Science and California Coastal Conservancy.

NOAA Gulf of the Farallones National Marine Sanctuary Final Management Plan. 2008. Volume II of IV. 451 pp.

Deliverable Name	Deliverable Type (select from pull-down)	Expected Delivery Date	Description	How will access to this product be provided? (See examples)	Target Audience (be as specific as possible)
Quarterly Financial and Progress Reports	Administrative	Quarterly	These are the quarterly reports required of all projects.	Quarterly Financial and Progress Reports should be emailed to CA LCC	Financial: CA LCC; Progress: CA LCC and Partners
Project Summary Report for Phase I	Report	FY15; 11/1/2014	A summary report for Phase 1 of the project to outline the process used to select focal resources and assess their vulnerability to climate change, as well as the findings, including: a process overview; workshop summaries; and the final vulnerability assessment report.	This report will be posted on the project webpage as well as the Climate Commons Site	Climate-Smart Adaptation Working Group; adaptation practitioners worldwide, and federal, state, and local natural resource managers in the study region
Request Climate-Smart Adaptation Working Group	Other, describe in Description field	FY15; 11/19/2014	At the November 2014 Sanctuary Advisory Council meeting, FMSA staff will request the formation of the Climate-Smart Adaptation Working group.	The request and subsequent vote by the advisory council will be available in the meeting minutes, posted to the GFNMS website.	not applicable
Convene Climate-Smart Working Group	Other, describe in Description field	FY15; 2/1/2015	Based on expertise and jurisdictional boundaries, a sub-set of representatives from local, state, and federal agencies, non-profit organizations, and academic institutions that participated in the vulnerability assessment workshops will be invited to serve on a Climate-Smart Adaptation Working Group that will meet 4-5 times over the course of 1 year. The working group will: 1) define distinct future scenarios for the study region and 2) develop prioritized adaptation recommendations.	Membership to the working group will be documented and included in all following deliverables.	not applicable
Climate scenarios for the study region	Report	FY15; 4/1/2015	Based on the most uncertain and most important drivers of change, working group members will define and describe distinct climate scenarios for the study region during one all-day workshop and email review.	This report will be posted on the project webpage as well as the Climate Commons Site	Climate-Smart Adaptation Working Group; adaptation practitioners worldwide, and federal, state, and local natural resource managers in the study region

Deliverable Name	Deliverable Type (select from pull-down)	Expected Delivery Date	Description	How will access to this product be provided? (See examples)	Target Audience (be as specific as possible)
Recommended adaptation actions	Report	FY16; 11/1/2015	Working group members will develop a prioritize a list of recommended adaptation actions over 3-4 meetings and present to the GFNMS advisory council to be voted on at their November 2015 meeting, and forwarded to the superintendent and other natural resource management agencies	This report will be posted on the project webpage as well as the Climate Commons Site	Federal, state and local natural resource management agencies, including GFNMS, CBNMS, NPS, CA State Parks, and the Counties of San Mateo, San Francisco, Marin and Sonoma
Adaptation Implementation Plan	Adaptation Plan	FY16; 3/15/2016	Based on the approved adaptation actions, FMSA staff, in consultation with the GFNMS superintendent and staff, will develop an Adaptation Implementation Plan, including a summary of approved adaptation actions, implementation prioritization and schedule, and participating partners.	This plan will be posted on the project webpage as well as the Climate Commons Site	Sanctuary Superintendent and staff, adjacent sanctuary communities, and santuary stakeholders (e.g., partner agencies, and commercial and recreational stakeholders)
Summary Project Report for Phase II	Report	FY16; 3/31/2016	FMSA staff will produce a summary report for Phase 2 of the project to outline the adaptation planning process utilized, as well as lessons learned in adaptation planning. The summary report will provide an index of recommended actions by region and by habitat type for easy reference by local managers.	This report will be posted on the project webpage as well as the Climate Commons Site	Climate-Smart Adaptation Working Group; adaptation practitioners worldwide, and federal, state, and local natural resource managers in the study region
Project outreach and trainings	Training, Outreach, or Workshop	FY16; 3/31/2016	FMSA staff will provide a national webinar training to all ONMS staff and in person trainings to Monterey Bay and Channel Islands National Marine Sanctuary staff on the vulnerability assessment and adaptation planning process, project findings, and the development of the implementation plan. FMSA staff will also host a BAECCC presentation and discussion on the project and next steps.	The webinar training will be recorded and made available on the project webpage and the Climate Commons Site. Other trainings and outreach opportunities will be made available to those interested.	Federal, state and local natural resources managers in the study region, other west coast sanctuary sites, and all ONMS staff.

Climate-smart Adaptation for the North-central California Coast and Ocean
California Landscape Conservation Cooperative 2014 Proposal Budget

Project duration: 1.5 years; October 1, 2014 - March 31, 2016

Budget Categories	CA LCC Request	Partner(s) Contribution(s) (monetary)	Partner(s) Contribution(s) (non monetary value/in-kind)	Total
FMSA salaries with fringe and overhead (20% FTE Higgason - guide and oversee the project; provide coastal management perspective during project development; connect the project to coastal resource management agencies; 50% FTE Hutto - overall coordination amongst project team partners; clearly defining project time line and deliverables and ensuring timely delivery of products; coordinating working group meetings and meetings with project partners; managing project logistics)	$ 25,431.00	$ 60,000.00	$ -	$ 85,431.00
GFNMS salary and fringe (periodic superintendent consultation)	$ -	$ -	$ 12,375.00	$ 12,375.00
Project Planning Committee (in kind participation GGNRA, PRNS, CA LCC, BAECCC)	$ -	$ -	$ 10,000.00	$ 10,000.00
Subcontract 1: Point Blue (guide the scientific components of the project, including Scenario Planning, and ensure scientific accuracy of project materials and working group outcomes; produce maps as needed; provide input, support, and review during the development and prioritization of adaptation actions	$ 36,404.00	$ -	$ -	$ 36,404.00
Subcontract 2: EcoAdapt provide input, support, and guidance for the project and review the development and prioritization of adaptation actions)	$ 20,054.00	$ -	$ -	$ 20,054.00

Budget Categories	CA LCC Request	Partner(s) Contribution(s) (monetary)	Partner(s) Contribution(s) (non monetary value/in-kind)	Total
Travel (project and working group meetings, professional conferences for Higgason and Hutto; travel reimbursement for working group members and project team as needed)	$ 8,000.00	$ -	$ -	$ 8,000.00
Equipment (one laptop computer for use in travel to project team and working group meetings)	$ 2,000.00	$ -	$ -	$ 2,000.00
Supplies (5 working group meetings: food, venue, materials; in kind website support from EcoAdapt)	$ 4,500.00	$ -	$ 1,000.00	$ 5,500.00
Subtotal	$ 96,389.00	$ -	$ -	$ 96,389.00
Total Overhead (20%)	$ 19,277.80	$ -	$ -	$ 19,277.80
Total	$ 115,666.80	$ 60,000.00	$ 23,375.00	$ 199,041.80

Kelley D. Higgason
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EDUCATION:

MS, 2008, Environmental Management
University of San Francisco, CA
BS, 2000, Thesis Honors, Marine Biology
University of California, Santa Cruz

PRESENT POSITIONS:

Ocean Climate Initiative Coordinator contracted to Gulf of the Farallones National Marine Sanctuary (GFNMS) (2007-present) Responsibilities include: integrating climate change adaptation, monitoring, mitigation, and communication into sanctuary management through expert working groups, regional partnerships, and research collaborations; fundraising for staff and programmatic support

Our Coast–Our Future Coordinator, GFNMS/Point Blue/USGS/Coravai (2010-present) Responsibilities include: overall coordination of the public-private partnership, project time line, and deliverables; management of integrated project activities; project outreach; stakeholder engagement and feedback; technical assistance; development of project reports; fundraising for all project costs

RELEVANT PAST POSITIONS:

Sanctuary Advisory Council Coordinator, GFNMS (2006-2011)
Seabird Protection Network Coordinator and Management Plan Review Assistant, GFNMS (2005-2006)
Project and Volunteer Coordinator, Coastal Watershed Council (2004-2005)

SELECTED PUBLICATIONS:

Duncan, B.D., K.D. Higgason, T.H. Suchanek, J. Largier, J. Stachowicz, S. Allen, S. Bograd, R. Breen, H. Gellerman, T. Hill, J. Jahncke, R. Johnson, S. Lonhart, S. Morgan, J. Roletto, F. Wilkerson. 2013. *Ocean Climate Indicators: A Monitoring Inventory and Plan for Tracking Climate Change in the North-central California Coast and Ocean Region.* Report of a Working Group of the Gulf of the Farallones National Marine Sanctuary Advisory Council. 72pp.

Ackerly, David D., Rebecca A. Ryals, Will K. Cornwell, Scott R. Loarie, Sam Veloz, Kelley D. Higgason, Whendee L. Silver, and Todd E. Dawson. 2012. Potential Impacts of Climate Change on Biodiversity and Ecosystem Services in the San Francisco Bay Area. California Energy Commission. Publication number: CEC-500-2012-037. 49 pp.

Largier, J.L, Cheng, B.S., and Higgason, K.D., editors. 2010. Climate Change Impacts: Gulf of the Farallones and Cordell Bank National Marine Sanctuaries. Report of a Joint Working Group of the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries Advisory Councils. Marine Sanctuaries Conservation Series ONMS-11-04. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 121 pp.

McElhany, P., Alin, S.R., Busch, D.S., Pavia, R., Higgason, K.D., Katz, S., Phinney, J., Sutton, A.J., Feely, R.A., Stein, J., Brancato, M.S., Bowlby, E., Roletto, J., and Etherington, L. 2010. West Coast Ocean Acidification Research Plan [in "NOAA Ocean and Great Lakes Acidification Research Plan"]. NOAA Special Report. 39–57 of 143 pp.

Higgason, K. D., and Brown, M. 2009. Local solutions to manage the effects of global climate change on a marine ecosystem: a process guide for marine resource managers. ICES Journal of Marine Science, 66: 1640–1646.

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EDUCATION

Ph.D. Ecology, University of California Davis, September 2002-July 2008
B.A. Environmental Studies, University of California, Santa Cruz, June 1997.

RESEARCH EXPERIENCE

Point Blue Conservation Science, Spatial Ecologist current
Bryson Interdisciplinary Climate People and the Environment postdoctoral fellow, Department of Geography, Center of Climatic Research, University of Wisconsin Madison. 8/2009-7/2010. Advisor: Jack Williams
Postdoctoral Researcher, Department of Environmental Science and Policy, UC Davis,7/08-8/09Advisors: Susan Harrison/ Hugh Safford.

SELECTED PEER REVIEWED PUBLICATIONS

Williams, J.W., Blois, J.L., Gill, J. L., Gonzales, L. Grim, E., Ordonez, A., Shuman, B. and **Veloz, S. D.** Model systems for a no-analog future: species associations and climate during the last degalciation. *Annals of the New York Academy of Sciences*. Online Early.

Veloz, S.D., Nur, N., Salas, L. Jongsomjit, D., Stralberg, D., Wood, J. K., and Ballard, G. 2013. Modeling climate change impacts on tidal marsh birds: Restoration and conservation planning in the face of uncertainty. *Ecosphere* 4(4):49.

Veloz, S.D., John Williams, Blois, J., Feng He, Zhengyu Liu, Bette Otto-Bliesner. 2012. No-Analogue Climates and Shifting Realized Niches During the Late Quaternary: Implications for Species Distribution Models. *Global Change Biology*, 18: 1698-1713.

Veloz, S.D. , Williams J, Lorenz, D., Notaro, M., Vavrus, S., Vimont, D. 2012. Identifying climatic analogs for Wisconsin under 21st-century climate-change scenarios. *Climatic Change*, 112: 1037-1058.

SELECTED RECENT GRANTS

2013-2014: PI Using scenario planning to support climate-smart adaptation for the South Bay Salt Ponds Restoration Project: A case study for making science accessible to managers. Funded by the CA LCC.

2012-2013: (Co-PI) Develop Analyses, Modeling, and Decision Support System Training Curriculum to Support Improved Plant and Animal Conservation in the Face of Climate Change. Funded by the CA LCC.

2012-2013. (Co-PI) Developing tools for detecting climate change impacts on birds and their habitats in the desert southwest Fish and Wildlife Service Region 2. Funded by US Fish and Wildlife Service Region 2, Desert LCC and Sonoran Joint Venture.