

## MARINE FISH MANAGERS GUIDE TO CLIMATE CHANGE PROPOSAL

### Background

Supporting sustainable U.S. fisheries management is important to ecosystem health and human and economic well being. These fisheries (commercial, recreational, and subsistence) include both wild capture and farmed (aquaculture), and provide important contributions to the world and U.S. economy. Marine fish are an important source of protein providing food to over 1.5 billion people generating 43.5 million jobs worldwide. In the U.S., fisheries contribute 1.3 million to the economy, \$200 billion in sales and are responsible for 60% gross domestic product (GDP) in coastal economies. In 2011, commercial fisheries landings totaled 9.9 billion pounds valued at \$5.4 billion. A 2006 survey of U.S. anglers found that the recreational industry generated \$82 billion in sales and \$24 billion in income. In 2008, the North American aquaculture industry generated approximately \$1.6 billion.

Climate change, in addition to other localized and regional impacts, such as pollution and overfishing, is having and will continue to have cascading effects on all aspects of fisheries, including fish production, fish stocks, essential fish habitats, fishing-dependent communities, and resource managers (hereafter collectively referred to as “fisheries”). Globally, there is now strong awareness of the vulnerability of fisheries to changes in climate, and growing concern about the implications of climate variability and change for fisheries sustainability and food security. Climate-driven changes in ocean conditions are already affecting marine ecosystems, fish stocks and the communities and economies that depend on them worldwide. These impacts are expected to increase with continued changes in the planet’s climate system causing much risk domestically and internationally in food supply, jobs, revenue, human health, security, and heritage.

### Goal

Fisheries managers and fishing industry leaders require robust information and tailored guidance to better understand these implications and respond to the challenges of climate change. To address these needs, we propose to convene the relevant fisheries adaptation managers and thinkers to develop a fisheries guide on how to address changing climate, building on successful guides developed for coral reef managers and other sectors. The *Fish Managers Guide to Climate Change* will serve as a written guidance and online module allowing full access to relevant case studies, literature, tools, and a network of practitioners.

### Scope of Work

In the late 1990’s, the coral reef community saw the demonstrated impacts of climate change on the resource they managed. Climate change projections indicate that the 21st century will see further, far-reaching impacts to marine and aquatic systems. While many of these global changes are inevitable, the magnitude of many impacts can be reduced through local actions. Coral reef managers have been at the leading edge of climate change adaptation. They have benefited from targeted knowledge products and capacity-building efforts, such as the Reef Manager’s Guide to Coral Bleaching and the Reef Resilience Training program<sup>1</sup>. Fisheries management has reached a similar point of awareness and need. It would be a good opportunity (right timing, ample need, initial thinking) to convene the relevant fisheries managers and adaptation thinkers to develop guidance similar to that developed for coral reef management. The proposed guidance will include the following components:

- 1) **Working Group:** Build a working group of key players to build concepts, content, and writing teams. The first working group meeting will convene during the National Adaptation Forum in Denver, CO April 3, 2013

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<sup>1</sup> See the [Reef Managers Guide to Coral Bleaching](#) for an earlier iteration of this concept

- 2) **Vulnerability Assessment:** Conduct a vulnerability assessment with NOAA Fisheries Service- to identify, quantify, and prioritize the fisheries and fish stocks vulnerabilities to climate change.
- 3) **Funding and Implementation Plan:** Develop a funding and implementation plan along with working group members and partners.
- 4) **Fish Managers Guide (the product):** Along with working group members, field experts, and editors develop the guide's outline and assign writing assignments.
- 5) **Online Platform:** Create an online platform, as a module on the Climate Adaptation Knowledge Exchange (CAKEx.org), for content allowing full access to relevant case studies, literature, tools, and people, while also allowing a discrete landing page for those desiring specific content on fisheries management and climate change.
- 6) **Training module and Outreach:** Develop training materials and curriculum to support a program of capacity-building workshops (subject of subsequent proposal) for fisheries leaders and managers.

### Proposed Guide Outline

#### 1. Introduction- Climate Change Impacts to Fish and Fish Stocks

- Why we need information about fish stocks, fisheries, and climate change?
- Direct and indirect effects; interactions between climate change and other stressors
- Introduce idea of costs and benefits of action/inaction, opportunities, and benefits of early action (even if you can't remove vulnerability, competitive advantage in being first to adapt)

#### 2. Section 1: How is Climate Change (and related changes) affecting fisheries

- Overview of impacts to fishery type and biome and management system (commercial versus subsistence, and industrial versus traditional)
- Critical roles of observations, observation systems, long term monitoring, assessments, etc...

#### 3. Intermission 1: How to integrate climate change vulnerability assessment into your work; is my fishery vulnerable?

#### 4. Section 2: Assessing vulnerability of fish stocks and fisheries in changing climate

- Review of vulnerability and risk assessments
- Overview of vulnerabilities on population dynamics, community structure, distribution, range shifts, and spawning aggregations
- Review of vulnerabilities of current fisheries management practices including essential fish habitat, marine reserves, aquaculture/hatcheries, fisheries closures, and individual fishing quotas.

#### 5. Intermission 2: How to integrate adaptation into your work, can my fishery adapt?

#### 6. Section 3: Climate Ready Fisheries Management?

- Scenario planning, tools, and examples
- Managing for ongoing change including range shifts, changing fecundity, recruitment, survival, life history, and changing carrying capacity.
- Managing for episodic stresses such as anoxia, upwelling shut down, disease outbreak, and HABs
- Managing for specific changes; ocean acidification and invasive species
- Managing aquaculture needs.

### Proposed Partners

EcoAdapt, NOAA Fisheries, USFWS, Universities, Fisheries Commissions, Commercial Fisheries Association, Recreational Fisheries Associations, Fisheries Science Center, State Governments, and International Partners.

### Timeline and Estimated Cost

2 years/ \$650,000