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## **Viability of fisheries insurance as a tool for conservation**

## **Problem**

Climate change threatens healthy oceans, sustainable fisheries, and the economies and communities that depend on them, not only through secular warming but also through variability around warming trends. This variability can produce extreme environmental events, such as marine heatwaves, that cause a broad range of ocean impacts, including shifts in species productivity and distributions, harmful algal blooms, and increased bycatch of protected species. In turn, these impacts can cause abrupt economic consequences such as fisheries closures. With climate change linked to the acceleration of extreme environmental events at unprecedented scales, intensity, frequency, and duration, we are already documenting rapid increases in both ecological and economic disasters in the oceans.

While climate impacts continue to accelerate, fisheries management agencies and fishers often lack resources or incentives to prioritize investments that can increase fisheries resilience. Yet investments such as diversifying fishing permit/quota portfolios, developing and implementing new monitoring platforms and early warning systems, restoring fish nursery habitats and natural infrastructure like oyster reefs and seagrass beds, collecting and analyzing data to detect impacts on harvested resources sooner, and setting precautionary harvest limits to ensure fish stocks remain at healthy levels are actionable in many settings. In addition to significant community impacts, sudden disruptions that cause loss of fisheries revenues can also create challenges by diverting management resources and preventing the adoption of proactive measures that might strike a balance between short-term conservative approaches and long-term resource stability and resilience.

In the United States, the Federal Fisheries Disaster Relief Assistance Program provides economic relief to fishing communities in the wake of fisheries disasters; however, the program is administratively burdensome and fails to provide timely relief or incentivize investment in actions to mitigate future impacts. Existing insurance products available to fishers in the United States do not cover loss of harvest opportunity or revenue loss from environmental impacts and do not integrate conservation and management incentives. Existing insurance products primarily include cargo, hull, and general liability and product liability, and when working with a crew of 4 or more, workers compensation insurance. Outside of the United States, there are often fewer services and resources available to help fishing communities recover from disaster-driven financial losses and incentivize fisheries management agencies to invest in resilience and risk mitigation.

Parametric fisheries insurance holds promise as a potentially scalable solution to provide timely economic relief to fishing communities in the wake of sudden loss of harvest opportunity. The conservation implications of such insurance have not been carefully studied, but our preliminary analysis suggests that insurance can be structured to create an incentive compatible product that results in greater fisheries conservation outcomes.

## **Objective**

Assess the viability of a parametric insurance product that transfers financial risk from fishers and leads to greater conservation outcomes and more resilient fisheries.

## **Approach**

### **Tasks**

We propose to assess the viability of a fisheries parametric insurance product using an iterative three-phased approach described in detail below. We will evaluate insurable environmental risks to fisheries, examine how insurance can lead to conservation outcomes, and design a survey method for assessing the demand for a fisheries insurance product. Our goal is to ultimately design a new parametric insurance product that is incentive-compatible for both fishers and insurers and leads to conservation outcomes and greater resilience.

**Phase 1. Design potential parametric insurance products for a range of environmental risks to fisheries**. TNC, emLab, and WTW will determine (i) environmental risks (that can be captured via parameters from existing datasets) best suited for a parametric insurance product based on established insurance industry criteria, such as the availability of independent and real-time monitoring with sufficient historic data; (ii) types of environmental data and fisheries data required to establish indices that meet insurance industry standards for underwriting acceptability, and (iii) the characteristics of fisheries most well-suited to parametric insurance (e.g. life history traits of targeted species) across various risks. Based on this assessment evaluating the frequency and severity of fisheries disruptions and leveraging data-rich fisheries on the US West Coast, TNC will put this theory to practice by identifying and evaluating specific environmental risks to fisheries and assessing the predictability of environmental impacts on fisheries productivity. Preliminary environmental risks that have been identified to-date, based on historic data showing a link to US fisheries disasters, include storms, marine heatwaves, harmful algal blooms, and drought. We will select 1-2 fisheries from the US West Coast to assess the viability of a parametric insurance product. WTW will then determine whether a credible parametric index[[1]](#footnote-0) and therefore product can be identified and analyzed for selected fisheries. emLab and TNC will be examining in phase 3 whether the product offers good value for money (e.g., by investigating the relationship between the amount of premium one pays and the amount one expects to get, averaged over the long term, in pay-outs).

This Phase 1 effort will result in a technical term sheet for the most promising parametric insurance product(s), environmental data requirements, and guidance on characteristics of fisheries best suited to parametric insurance.

**Phase 2. Determine the potential for a fisheries parametric insurance product to incorporate incentives to drive conservation outcomes.** emLab, working with TNC, will lead the identification and theoretical evaluation of mechanisms for insurance to achieve conservation outcomes. Building on our current work looking at the intentional incorporation of conservation-based moral hazard into an insurance product, we will also explore the following preliminary list of mechanisms: (a) implicit incentives for individual behavior change; (b) external insurer requirements for behavior change or actions; and (c) collective action requirements or incentives (e.g., premium reductions). TNC will collaborate with emLab to identify a range of potential conservation actions[[2]](#footnote-1) for evaluation, including actions that broadly increase fisheries resilience and sustainability and those that mitigate specific ecological and/or economic impacts of environmental risks identified in Phase 1. WTW will advise on the insurance aspects (such as requirements and risk appetite) using market knowledge and expertise. This evaluation will include assessment of key considerations such as the efficacy of insurance as a conservation mechanism relative to other solutions such as Payment for Ecosystem Services schemes or management requirements, and the potential for adverse selection to work in favor of, or against, conservation goals.

Phase 2 will deliver guidance on the design principles for incorporating conservation in fisheries insurance products, including recommendations specific to select insurable fisheries and environmental risks identified in Phase 1. Phase 2 will also illuminate a set of conditions under which insurance has no effect on behavior, and possibly a set of conditions under which insurance causes perverse incentives.

**Phase 3. Evaluate the viability** **of the fisheries resilience parametric insurance** **product(s)** by testing of one or more conceptual models, informed by the findings of Phases 1 and 2 and refined through direct outreach with relevant fishery and insurance industry stakeholders. emLab will develop the methodology for assessing the demand for the fisheries insurance product(s) given varying components (e.g., premiums, payout schedule, etc.) which most likely will be some kind of discrete choice experiment to elicit preferences. This will build on emLab’s parametric insurance user guide, currently under development, that sets the foundation for defining the factors that affect the insurability of a fishery, where insurability refers to both fishers being willing to purchase an insurance product and insurers being willing to provide the product. TNC will lead the demand assessment and conduct fishery stakeholder outreach based on emLab’s proposed approach. WTW will look at the supply side and lead insurance industry outreach with potential risk-takers and use our market knowledge to ascertain potential underwriting acceptability. Ultimately, if this partnership is able to design a viable product (or multiple versions), we would like to run a randomized control trial in future project phases to test different elements of the insurance design and rollout. Phase 3 will deliver a methodology and an assessment of demand for an insurance product that explicitly considers conservation outcomes in its design. We will also put together the final results from all three phases to determine the viability of a parametric insurance product that can deliver on conservation outcomes (see *Products*).

### **Products**

High level findings and guidance for fishery practitioners and insurance industry experts interested in parametric insurance for fisheries will be summarized in a white paper, with promising detailed findings published in peer reviewed journal article(s) as appropriate.

### **Partnership**

We will leverage the unique expertise, experience, and track record of collaboration between the Environmental Markets Lab (emLab) at UCSB, The Nature Conservancy and WTW to advance this exploration.

**The Nature Conservancy (TNC)**

TNC has been at the forefront of advancing solutions for sustainable fisheries globally for more than 15 years. We use collaborative, science-based approaches to engage with fishermen, communities, and governments to improve the management of fisheries to protect biodiversity and provide food and livelihoods. Our fisheries projects and on-the-ground expertise span more than 25 countries, impacting over 1,000 marine and freshwater species. Our boots-on-the-ground capacity and existing relationships allow us to engage with fishermen in communities to design and test context-appropriate solutions. TNC can leverage recent and ongoing scientific analysis of relevant environmental risks and fisheries impacts across more than 60 US West Coast species to assess the viability of a parametric fisheries insurance product. TNC also brings expertise in developing partnerships and implementing innovative financing solutions to a broad range of conservation challenges, including development of insurance products for wildfire and coral reef resilience.

TNC’s roles will include leading the identification of relevant environmental risks and fisheries and environmental data, as well as the vetting of conservation actions. TNC will lead relevant outreach with fishery stakeholders, including fishing communities and policymakers, including assessment of demand-side marketability. Outreach may range from informal interviews to more formalized focus groups, workshops, and/or surveys.

**WTW** (formerly Willis Towers Watson) is a leading global advisory, broking, and risk solutions company with roots dating to 1828 and a current market capitalization of over USD 31 billion. WTW is also home to the Climate and Resilience Hub (CRH), with over 120 staff and a network of a further 100+ personnel across wider WTW business units, geographies, and corporate functions. The CRH project team has extensive expertise assessing, developing, and implementing risk management tools and risk transfer instruments around the world, particularly extending innovations in risk analytics into disaster risk management and financing for a broad range of organizations and communities who have not traditionally benefited from the tools and products of the insurance industry. We have a demonstrated track record in executing innovative consulting and advisory projects, particularly in developing parametric insurance solutions in coastal and islands states. One such example is our work with Rare Inc. and funded by the Ocean Risk and Resilience Action Alliance (ORRAA) to assess the feasibility of a parametric insurance program to protect fisherfolk in the Philippines for the consequences of low or no-catch during bad weather periods.

WTW’s role will start with identifying and evaluating potential data sources that reliably and transparently document environmental conditions of interest, and designing parametric indices based on the data which capture the consequential risks facing US Pacific fishers. WTW will then undertake actuarial analysis of the historical datasets to evaluate the performance of each index (which forms the basis for evaluation of pricing) and validation of real-time data feeds to confirm the operational feasibility of the parametric product.

**The Environmental Markets Lab (emLab)** is a research organization at the University of California Santa Barbara that leverages rigorous and innovative methods to enhance the ecological and economic performance of fisheries and other marine sectors. Our team includes renowned natural resource economists with expertise in fisheries management, bioeconomic modeling, and conservation finance. emLab can leverage recent and ongoing work on designing innovative financial tools that help mitigate risk in fisheries and how these tools can be leveraged to motivate positive behavior change that ultimately yields greater conservation outcomes.

emLab's role will include determining the potential for a fisheries insurance product to drive conservation outcomes and designing methodology for assessing fisher demand for an insurance product. We will provide the theoretical underpinning for identifying potential opportunities (and limitations) for achieving conservation outcomes through fisheries insurance.

**Additional Partners.** TNC, emLab and WTW recognize value in bringing additional partners in where they complement the partnership’s expertise and experience. This might include James Watson at Oregon State, who brings expertise in HABs monitoring and impacts, and Mike Weir from the Woods Hole Oceanographic Institute who is a marine resource economist and brings expertise in behavioral and experimental economics to study individual preferences in emerging resource policy.

**Timeline and Budget**

Timeline: January 1, 2023 - June 30, 2024 (18 months)

We request an estimated ~$550,000 over 18 months to support the three organizations ($193,000 to TNC, $115,000 to WTW and $242,000 to UCSB) across all three phases of this work. We would be happy to provide a detailed budget as requested.

1. A credible parametric index is one that serves a good proxy for the impacts one is trying to capture (i.e., low basis risk); is based on dependable, transparent and independent data sources; and for which a time series of the index and the as-if losses to a parametric insurance structure can be developed which is robust and defensible (i.e., risk-takers won’t put large error bars on the loss profile such that the view of risk in the product is highly divergent between the client and the market). [↑](#footnote-ref-0)
2. Conservation actions may include policies, actions, or investments in i) habitat restoration to mitigate impacts of storms and create more productive fish nursery grounds, ii) expanded data collection and monitoring to facilitate early warning systems or inform more rapid and effective response to environmental disruptions, iii) precautionary harvest rules that ensure fish populations have sufficient buffer to withstand and recover from sudden impacts, iv) reducing impacts on non-target species and marine habitats through use of selective gear, and/or seasonal and spatial measures, v) increasing community resilience by protecting livelihoods and/or reducing dependence on single fisheries/stocks and planning for emerging fisheries and needs. [↑](#footnote-ref-1)