CALIFORNIA
OCEAN SCIENCE TRUST

CO-DESIGNING A SAFETY NET

Workshop Summary and Collaborative Steps Toward Innovative West Coast Fisheries Insurance in a Changing Climate

SEPTEMBER 2025

ABOUT THIS REPORT

This report, developed by the California Ocean Science Trust, synthesizes discussions on the viability of insurance as a risk transfer tool for West Coast wild capture fisheries. It encapsulates the key findings from a workshop that convened academics, members of the fishing community, relevant decision-makers, and individuals from the insurance sector. The report also identifies potential next steps and knowledge gaps for developing an insurance product for West Coast fisheries.

ABOUT CALIFORNIA OCEAN SCIENCE TRUST

California Ocean Science Trust (OST) strengthens the bridge between scientific research and sound ocean management. Created by state legislation, OST supports and brings world-class science and innovation together with state and federal policymakers to accelerate progress toward a healthy and resilient coast and ocean. To learn more, visit oceansciencetrust.org. California Ocean Science Trust brings the best available science on ocean and coastal issues directly to California and federal policymakers to empower them to make their own informed, science-based decisions about the management of marine resources. OST is non-partisan and non-advocacy, and does not engage in lobbying—OST outreach is not designed to advocate for particular policy outcomes or actions and its science-based information is shared with individual and groups of decision makers broadly, without consideration of their political affiliation or position on ocean science-relevant topics.

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EXECUTIVE SUMMARY

Commercial fisheries are vital for food security, livelihoods, and coastal economies, but are increasingly vulnerable to disasters arising from climate change impacts like marine heatwaves and harmful algal blooms. The existing U.S. federal fisheries disaster declaration process provides some relief but is often slow and insufficient for long-term resilience. There is growing interest in complementary risk management and transfer tools, particularly insurance, to provide timely financial aid to impacted fishermen. While traditional indemnity insurance covers property and life in the fishing industry, no widely available products exist for wild capture fisheries against harvest or revenue loss due to environmental impacts.

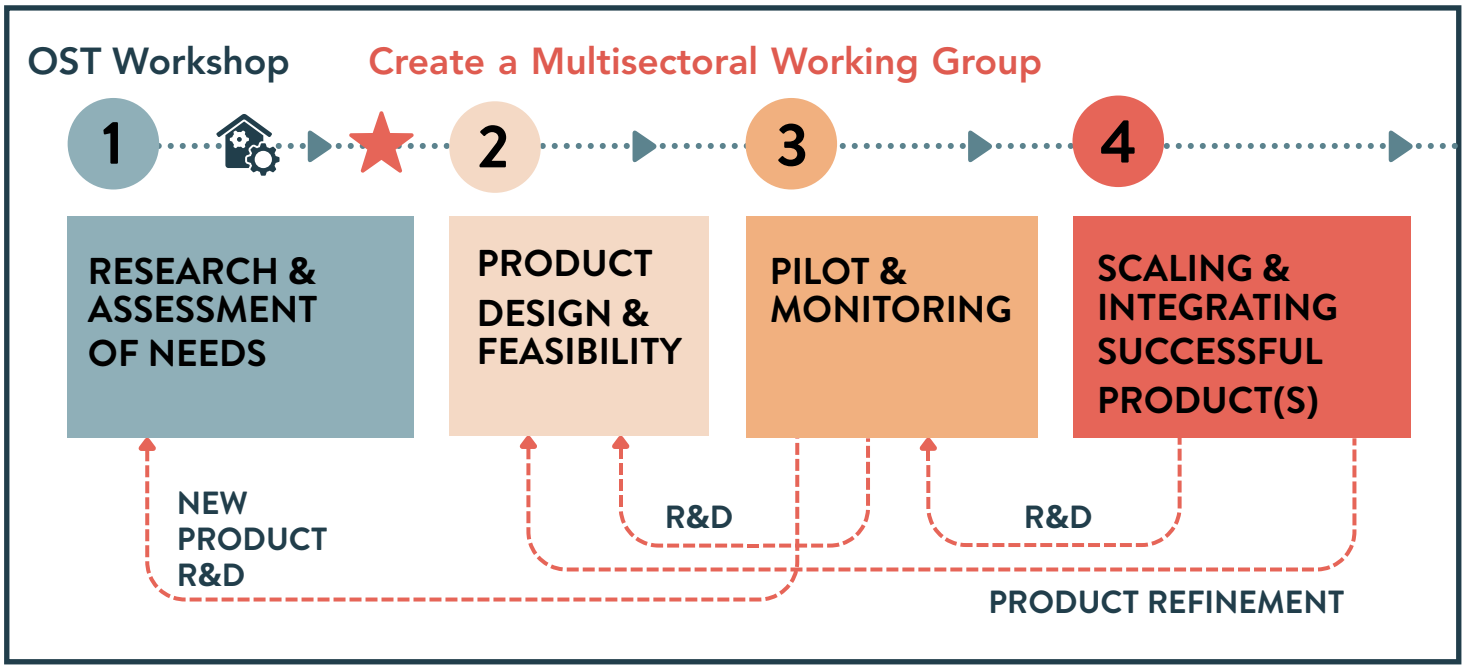
A workshop hosted by the California Ocean Science Trust on May 2nd, 2025 confirmed strong interest in developing fisheries insurance for the West Coast. For the workshop, OST brought together experts and perspectives from academia, fishing communities, state agencies, and the insurance industry to develop a shared understanding of the risks facing fishing communities and whether insurance innovations may help support commercial fishermen and local fishing economies into the future. The group discussed pilot projects and recent research around fisheries insurance. There was interest in group- or community-based schemes and parametric insurance with triggers based on either environmental factors or management decisions like fishery closures. The workshop concluded with a consensus on the need to explore innovative financial tools and to establish a multisectoral working group comprising of fishermen, insurers, and researchers to collaboratively develop a pilot insurance product, while simultaneously addressing crucial knowledge gaps in environmental and fishery data, trigger mechanisms, and economic loss analysis.

Developing an insurance product for commercial West Coast fisheries is a multifaceted process with great potential to enhance economic resilience against environmental shocks. This report outlines steps that can be taken toward developing an insurance product for West Coast fisheries including development phases, key partners and their roles, and the establishment of a multisectoral working group. The insurance product development process proposed covers four key phases:

1. **Research and Assessment of Need:** Understanding risks, stakeholder needs, and reviewing existing models
2. **Product Design and Feasibility:** Convening a multisectoral working group to define product types and triggers, secure funding, and conduct actuarial analyses
3. **Pilot and Refinement:** Testing the product in selected fisheries/communities, and monitoring performance
4. **Scaling and Integration:** Expanding successful pilots, refining products, and integrating insurance into broader resilience strategies

Collaboration amongst key partners, including researchers, state government agencies, the insurance industry, the fishing industry, and nonprofits throughout the process and via a structured mechanism like a working group, would help address knowledge gaps, facilitate codesign of tailored products, and provide timely financial aid to impacted fishermen to ensure long-term viability and effectiveness. A well-designed fisheries insurance product could bolster financial and risk management tools available to fishermen, ultimately increasing economic resilience of insured fisheries under a changing climate.

PHASES OF DEVELOPING A FISHERIES INSURANCE PRODUCT



INTRODUCTION

FISHERIES ARE VULNERABLE TO CLIMATE-RELATED RISK

Commercial fisheries provide critical sources of food and livelihood, and underpin the economies and cultures of coastal communities. As climate change increases environmental variability and the intensity, frequency, and duration of extreme events (e.g., marine heatwaves, harmful algal blooms, storms), fishery interruptions and disasters (defined in law as an unexpected, large decrease in fish stock biomass or other change that results in significant loss of access to the fishery resource[1]) are also increasing in frequency and intensity in the United States (U.S.), resulting in varying economic challenges for fishing communities.[2] These communities often lack a form of immediate financial relief when an unforeseen disaster strikes that causes production losses or reduces fishing opportunities, making it harder for fisheries and fishing communities to recover from losses until favorable conditions return. Disasters can lead to cascading effects across the market chain due to the disruption of critical businesses. This scenario can look like fishermen filing for bankruptcy, processors consolidating capacity in order to survive, and ancillary businesses like ice houses and fuel docks shutting down.

In the U.S., federal fisheries disaster assistance (via the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1861a) was authorized to provide economic relief to fishing communities affected by disasters. However, the program can take between 1.3 years and 4.8 years[3] to deliver funds to fishing communities. Additionally, the funds provided often cover only a fraction of the actual economic losses from fishery disruptions and may not effectively reach those most in need of assistance. Recent amendments through the Fishery Resource Disasters Improvement Act (P.L. 117-328, Div. S, Tit. II, 136 Stat. 4459, 5261) seek to shorten the fishery disaster assistance timeline. Even with this update, there is continued and growing interest in exploring complementary risk management tools to provide timely relief and to support fishing dependent businesses during not just one, but potentially multiple periods of recovery from environmental shocks. Recent insurance innovations focused on addressing persistent and emerging climate risks more broadly have spurred new thinking on financial tools for fisheries' climate resilience. Improvements in environmental risk information for the ocean and broader political support for climate adaptation measures provide enabling conditions to explore insurance as a risk management tool for West Coast wild capture fisheries.

INSURANCE AS A RISK MANAGEMENT TOOL

With the increasing threat of climate-related economic loss for the fishing industry, there is a need to investigate the role of other risk management and transfer tools, such as insurance, to help communities weather a crisis. Insurance is a tool that can build economic resilience via risk transfer that could enable fishermen and associated businesses to mitigate financial losses caused by unforeseen and catastrophic events. Risk transfer via insurance is considered the most effective risk management tool for infrequent, severe events. Research shows that those with adequate insurance coverage recover more quickly from disasters than those without insurance (e.g., households with property insurance experience reduced financial burdens following disasters).[4] Yet, no insurance products currently exist to insure production or harvest in wild capture fisheries in the U.S. despite widespread availability of production-based products in the agricultural sector. Insurance in fisheries is not new (e.g., traditional indemnity property insurance for vessels and life insurance for crew members), however products that insure against climate shocks have yet to be rigorously tested or widely marketed for commercial fisheries.

STATE OF INSURANCE FOR WILD CAPTURE FISHERIES

While indemnity insurance is available to fishermen to protect against risks to property and human lives, indemnity insurance policies do not address loss of harvest or revenue from environmental impacts. In the U.S., there are no insurance products for wild capture fisheries that transfer harvest or production risk as can be found in the agricultural sector. Further, as climate change exacerbates threats to wild capture fisheries, such as extreme weather events, heat waves, and altered migration patterns, these dynamic and less predictable impacts make it harder for insurers to assess long-term risk and price policies appropriately. Traditional insurance alone is often inadequate for these climate-driven risks, which has pushed some governments and the insurance industry to explore new financial tools and innovative insurance models like parametric and community-based insurance (See *Insurance Types* section). There are a few pilot projects globally that have tested parametric insurance for wild capture fisheries (see *Pilot Projects* section), but none are available in the U.S.

INSURANCE TYPES

TRADITIONAL INDEMNITY INSURANCE

The most familiar and common type of insurance available to the fishing industry is traditional indemnity insurance, which pays out the full amount of a loss based on physical asset values, deductibles, and policy terms. Payouts are limited to specific property loss and determined by an assessment of actual losses, meaning losses are typically accurately accounted for but can take time to settle. There is usually also a high administrative cost attached to assessing claims. Examples of indemnity-based fisheries insurance include commercial hull insurance (covers physical damage to fishing vessels), gear and equipment insurance (protects fishing equipment such as lines, nets, winches, sonar), protection and indemnity insurance (liability coverage for vessel owners for things like bodily injury to crew, property damage caused by the vessel, pollution liability), workers' compensation (covers medical expenses and lost wages for crew injured on the job), and catch or stock coverage (insures fish caught against spoilage, contamination, or loss due to an insured event).

PARAMETRIC (INDEX-BASED) INSURANCE

Parametric (index-based) insurance is another form of insurance being explored as an innovative solution to transfer risk from environmental disasters and shocks. Instead of indemnifying actual losses, parametric insurance pays out a predetermined amount when a specific trigger event occurs and exceeds some threshold. Parametric insurance offers quick payouts based on pre-defined, metric-based event characteristics or "parameters." For example, payout can be triggered by sustained high wind speeds during a hurricane or prolonged periods of high ocean temperatures. Though not a new concept in the insurance world, the application of parametric insurance for insuring against climate-related events is growing due to the lower administrative costs, faster delivery of payouts, more predictable financial support, transparency for product purchasers, and more flexible use of funds.[5,6] Parametric insurance schemes, however, introduce **basis risk**[7] in which the actual loss experienced by a policyholder may be greater than the predetermined payout, or where payouts occur even when the policyholder does not experience any losses.

PRODUCTION SHORTFALL INSURANCE

Another innovative form of parametric insurance being explored as a way to help cover indirect financial losses caused by unexpected events is production shortfall insurance. This is an emerging type of insurance so does not yet have a widely agreed-upon term or phrase. For the purposes of this report, we will use the term production shortfall insurance to mean a type of insurance that, akin to non-damage business interruption insurance, provides coverage for financial losses that arise when a fishing operation's income is disrupted, even without physical damage to vessels or equipment. Production shortfall insurance is becoming increasingly common in the renewable energy sector, to protect against revenue shortfalls when wind or solar irradiation levels dip too low to profitably generate energy.[8] Unlike traditional business interruption insurance, which typically requires a direct physical inciting event like a fire or storm causing damage to a boat, this type of insurance scheme accounts for a broader range of events. For instance, this type of insurance could cover losses due to regulatory closures of fishing grounds (e.g., for environmental reasons or disease outbreaks), sudden and prolonged adverse weather conditions that prevent safe fishing or supply chain disruptions affecting the ability to sell or process catch.

COMMUNITY-BASED INSURANCE

Another model being explored as a potential solution for fisheries is community-based insurance, particularly for small-scale and artisanal fishing communities that often lack access to traditional commercial insurance. In community-based insurance, members contribute to a common fund, managed by a community group. Fishermen pay a premium and receive a payout from the fund in the event of loss or damage. The policies may be more affordable for fishermen due to a lower premium. The community often plays a major role in designing the insurance product, setting premiums, defining eligible events, and managing claims. Benefits include increased resilience through allowing communities to recover faster from catastrophic events; more community ownership in managing its risks; tailored solutions to meet the specific needs of local fisheries; increased access to loans and investments for businesses by smoothing out income streams; and even incentivized sustainable fishing practices (e.g., lower premiums for those adopting certain practices). Challenges facing community-based insurance include premiums can still be too expensive for low-income fishermen; risk of payout activated by an event not well aligned with actual losses experienced by fishermen; administrative capacity to manage an insurance scheme; and risk of insurance products disincentivizing safe practices or only attracting highest-risk individuals. Non-governmental organizations (NGOs) have been involved in developing and piloting community-based insurance by providing expertise and initial capital, and building capacity for local management of products. Governments also often provide support through subsidies, seed funding, and technical assistance.[9]

PILOT PROJECTS

EXAMPLES OF INNOVATIVE FISHERIES INSURANCE AND RISK SHARING ACROSS THE GLOBE

There are several emerging pilot examples of innovative insurance, typically parametric insurance, and risk sharing mechanisms for wild capture fisheries to cover climate- and weather-related events, summarized below. Most of these products are in early stages of development and are still being tested as economically viable solutions, and are offered here as illustrations of the kinds of designs a West Coast product could be modeled after. Other product designs such as community-based or production shortfall insurance have yet to be thoroughly explored and tested for fisheries. What follows is not an exhaustive list of all risk-sharing mechanisms for wild capture fisheries.

PARAMETRIC INSURANCE IN THE CARIBBEAN

First ever climate risk parametric insurance developed for the fisheries sector in the Caribbean:[10] Led by Caribbean Catastrophe Risk Insurance Facility Segregated Portfolio Company (CCRIF SPC), the Caribbean Oceans and Aquaculture Sustainability Facility (COAST) program was piloted in Grenada and Saint Lucia in 2019/20. COAST employs two independent parametric insurance products. The first provides coverage for losses caused by adverse weather, with triggers based on high waves and occurrence of heavy rainfall for adverse weather. The second parametric product covers direct damages by tropical cyclones to fishing vessels, equipment or infrastructure, and triggers based on tropical cyclone wind and storm surge for tropical cyclones. The policy is purchased by the national government, which then disburses payouts to registered boat owners impacted by the event within 14 days. This product was triggered in 2024, paying out USD $1.066 million (representing 56% of the total damage to the sector) to Grenada following Hurricane Beryl in 2024. The payouts, in the form of direct transfers to the bank accounts of fishing vessel owners whose vessels are registered and who are also registered as fishermen, were used to enable fishermen to resume their fishing operations in the shortest possible time and restore their livelihoods.

PARAMETRIC INSURANCE IN THE PHILIPPINES

Weather index-based parametric insurance for small-scale fishermen in the Philippines:[11] This parametric insurance product was developed by Rare (an international environmental conservation nonprofit organization) in collaboration with the insurance group Willis Towers Watson (WTW), specifically designed to support small-scale fishermen in the Philippines. It addresses income losses caused by lost fishing days due to increasingly adverse weather conditions, which are becoming more frequent and severe as a result of climate change.[12] These conditions often prevent fishermen from going out to sea safely, resulting in lost income and an incentive for overfishing during fair weather. The policy's trigger—or index—combines three key weather parameters: wind speed, wave height, and rainfall. These are monitored over a five-day period using the ERA5 dataset from the European Centre for Medium-Range Weather Forecasts, trusted for its historical accuracy, near real-time updates, and international credibility. The Department of Agriculture Bureau of Fisheries and Aquatic Resources (BFAR) holds the policy, which is fully funded through the national budget. The Philippine Crop Insurance Corporation, the state insurer, is responsible for managing payouts to ensure fishermen receive timely compensation. Payments are made automatically when the policy is triggered, with annual payouts capped at the equivalent of a fishermen's average monthly income (USD $100). Fishermen receive the insurance coverage and any resulting payments at no cost, provided they are formally registered. Registration has the potential to strengthen fisheries governance and conservation by incentivizing compliance with national fishing regulations and sustainable fishing practices. Launched as a one-year pilot in 2025, the initiative is expected to benefit up to 18,000 fishermen. Next steps include evaluating the pilot's effectiveness, analyzing payouts, and determining the best path for scaling. Looking ahead, BFAR is exploring options to expand the program beginning in 2026 with continued national budget support. An alternative approach under consideration is a disaggregated model, where fishermen associations could purchase blanket coverage on behalf of their members.

RISK-SHARING IN CHINA

Fishery Mutual Insurance, a risk-sharing agreement for small-scale fishermen:[13] China has cooperative risk pools—Fishery Mutual Insurance (FMI)—for small-scale fisheries where fishermen (classified as owners of fishing vessels, fishermen and fish farms, and other shareholders related to fishery activities) join the association and pay membership fees/a premium to a common pool. These fees depend on factors like type or size of vessels, accident records, and more. Fishermen receive payouts based on losses after an event (e.g., accidents, natural disasters). The national and local government provide subsidies, premiums, reinsurance, and mandate participation. Local mutuals are run by local FMI associations, but reinsurance is provided by the national government's FMI. The FMI program arose to address the issue of **adverse selection**[14] that led to the failure of commercial insurance due to only high-risk individuals joining the pool which led to losses being larger than income from premiums. According to Jiang and Faure 2020[13], these types of risk-sharing agreements may have advantages over controlling risks compared to insurance. Involvement of an orchestrator to launch such a program and subsidized premiums from the government have led to its success. Integration or more collaboration between different FMIs across China could enable a larger scale of coverage. Finally, most fishing boats have not joined an FMI leaving a large protection gap which has sparked discussions about making membership compulsory.

PARAMETRIC INSURANCE IN INDONESIA

Parametric Climate Risk Insurance for small-scale tuna fishermen:[15] A new parametric insurance product is under development that will provide payments to coastal yellowfin tuna fishermen in Indonesia when extraordinary weather events prevent them from safely going to sea. Marine Change, a specialist advisory firm, is developing the product design, with WTW in an advisory role. An Indonesian Marine Stewardship Council-certified sustainable tuna processor and exporter has agreed to test the insurance product in its supply chains. A feasibility study is currently underway.

PARAMETRIC INSURANCE FOR WEST COAST FISHERIES

Study investigating potential fisheries insurance options for West Coast Fisheries:[16] The Nature Conservancy, researchers at UC Santa Barbara, and WTW explored the viability of parametric insurance for U.S. West Coast fisheries. The team designed a conceptual parametric insurance product and developed an example term sheet for an economically important and technically viable species (market squid). The team used a stepwise process to evaluate potential insurable environmental hazards to fisheries, evaluated whether and how parametric insurance could lead to conservation outcomes, and assessed the potential supply and demand for parametric fisheries insurance products. In this study, market squid emerged as a viable, economically important fishery with suitable life history traits (e.g., shorter maturation window and lifecycle, viable for catch within a year) for which a sea surface temperature-linked insurance product could be developed (landings decrease during warm water anomalies and increase during cooler events). The conceptual parametric product index for market squid is triggered at the value at which sea surface temperature anomaly reaches the 20th percentile. Using the term sheet, the team confirmed market interest in underwriting this product, on the condition that there could be an inception date of the policy before El Niño predictions for the year were established to avoid **adverse selection**. On the demand side, the team conducted a willingness-to-pay survey distributed to fishermen and while results were not statistically significant, the survey results suggested that increasing the complexity of an index (or trigger) modestly reduces fishermens' willingness to pay and that the conceptual product would likely need to be subsidized.

WEST COAST FISHERIES (CONT.)

Key takeaways included:

- The U.S. West Coast experiences multiple environmental hazards (such as marine heatwaves and harmful algal blooms). The design of a parametric insurance product requires certain data on environmental hazards; the availability of marine data related to these hazards tends to be increasing over time.
- While it is challenging to link specific environmental variables to a single fishery's interannual productivity (and knowledge gaps still exist on mechanistic linkages between these hazards or environmental variables and fishery production), some promising candidate hazard-fishery combinations emerged—including market squid and high sea surface temperature as well as Dungeness crab and harmful algal blooms and salmon and drought.
- Parametric insurance requires a precise definition of the index that will be used. A dual trigger product structure (two variables instead of one, e.g., sea surface temperature anomaly and landings) may help increase performance, especially for fisheries where there are complex underlying biological and environmental factors.
- Parametric insurance products can be designed to deliver conservation (or sustainability) outcomes through quid pro quo actions. For instance, products can include access requirements or a portion of payouts could be allocated to management improvements.

Given the growing interest in risk management approaches for wild capture fisheries, including risk transfer and financial tools that could increase resilience in coastal communities facing climate shocks, this is a timely opportunity to continue early exploration and testing of insurance as a potential tool in the toolbox for fishing communities against climate shocks. In an effort to begin exploring opportunities for fisheries insurance for the West Coast, we held a workshop to discuss these pilot projects and potential future products.

WORKSHOP SUMMARY

OVERVIEW

California Ocean Science Trust (OST) hosted an in-person workshop on May 2nd, 2025 to explore insurance for West Coast wild capture fisheries and fishing community resilience under a changing climate. The workshop brought together experts and perspectives from academia, fishing communities, state agencies, and the insurance industry to develop a shared understanding of how fisheries insurance may support fishermen and local fishing economies into the future. Through a series of presentations, the group discussed recent research findings, pilot projects, and thinking around fisheries insurance. In the afternoon, workshop participants rolled up their sleeves to brainstorm potential designs and themes emerging for fishery insurance products, and identified science and information gaps needed to advance insurance tools.

WORKSHOP GOALS

- Provide a high level background on the use of insurance as a risk transfer tool, and how it can be applied for fisheries using examples (e.g., existing insurance products in a fisheries context, lessons learned from other sectors)

- Establish a shared understanding of the need to explore, and use for, risk transfer/ insurance products for fisheries production

- Identify potential ideas, designs, converging principles, and conditions that would be conducive to a fisheries insurance product

- Identify knowledge gaps and other barriers to the development of fisheries insurance programs and, potentially, recommendations on how to start addressing them

- Gauge interest in pursuing a fisheries insurance program and other future opportunities on the West Coast

MAJOR THEMES AND KNOWLEDGE GAPS

Following discussions and collaborative exercises during the workshop, we identified several knowledge gaps and themes for advancing fisheries insurance on the West Coast. Addressing the following gaps will increase our collective understanding and be crucial to actualize an insurance product. This section details essential areas that require further investigation and development.

MAJOR THEMES

Several themes emerged when exploring the challenges and opportunities surrounding the development of insurance and financial tools for the fisheries sector at the workshop:

Insurance could potentially reduce financial loss impacts for fishing communities after disaster events. Workshop participants were interested in exploring options, such as insurance or insurance-like products (e.g., cooperatives, risk pools), to mitigate economic impacts from catastrophic events. There was interest in exploring how insurance products could be used to reduce reliance on requests for disaster assistance. Participants discussed how insurance could serve as a complementary economic tool, offering fishermen another vital resource to navigate challenging periods. At the conclusion of the workshop, participants indicated a strong desire to pursue developing a pilot fisheries insurance program, viewing it as a promising avenue for further exploration on the West Coast. Having discussed initial ideas at the workshop, participants agreed there is a need to have a dedicated working group for conversations between an interested insurance company, fishermen (individuals and fishing collaboratives), researchers, and other relevant partners to co-create a pilot insurance product for California fisheries (See Multisectoral Working Group section).

Though wild capture fisheries are too complex and variable to model after crop insurance, there are growing demonstrations of applying parametric products like those widely used in the agricultural industry, in fisheries. While agricultural insurance products benefit from handling correlated losses, requiring fewer data inputs, and offering quick payouts based on verifiable indices tightly linked to farm profits fisheries present a more complex picture. The inherent dynamics of fish populations, complex management regimes, stochastic growth patterns, and a weaker link between environmental triggers and production make direct adaptation of agricultural models challenging. However, workshop participants noted that certain fisheries those exhibiting characteristics akin to "crops"—such as a clear environmental impact on growth and production, simple life histories, and rapid recovery after an environmental shock—might offer the most promising avenues for developing parametric insurance products.

A group- or community-based insurance scheme (parametric or production shortfall insurance) activated due to management decisions is a potential insurance scheme for fisheries on the West Coast. After learning about community-based insurance (e.g., City of Isleton community-based flood insurance[17]), workshop participants brainstormed how it could be adapted for fishery contexts. The group discussed having a pool (potentially statewide) in which a fishermen's association group serves as the policyholder and the payouts activate upon a fishery closure. Collective approaches could better address the shared risks and provide more effective and equitable support to fishing communities. There are still questions around whether a fishery closure, mandated by a management decision, is independent and non-manipulatable, and thereby potentially viable to prompt payouts from the perspective of insurance companies.

Parametric insurance, in which payouts are based on a predefined index or "trigger," is another option worth continuing to explore. Parametric insurance is appealing for catastrophes because it offers faster payouts than traditional indemnity-based insurance, with the intention of not covering all losses but providing a quick infusion of capital to sustain communities. There are some existing parametric fisheries insurance products outside the U.S. and research modeling parametric products for West Coast fisheries (See *Pilot Project* section). The discussions at the workshop focused on characteristics of fisheries and hazards that lend well to parametric products. The group highlighted that non-environmental triggers, such as closures, delays, or days off the water, might present fewer immediate knowledge gaps for developing a pilot product, but need to be verified as acceptable to insurance groups.

Natural catastrophes generally satisfy insurability criteria from the insurance industry but insurance products for catastrophes need to be designed carefully. The workshop explored what constitutes an "insurable" event in the eyes of the insurance industry using key criteria including the need to prove insurable interest (i.e. the insured entity would face financial hardship if what is being insured is damaged or lost) and a clear relationship between an event's severity and associated damages. Ideal characteristics for insuring a loss involve the damaging event happening independently and by chance, being definite and measurable, and having sufficient data available to assess the probability of the loss. Crucially, the losses should not be catastrophic across the entire insured portfolio. While natural catastrophes often fit many of these criteria, the degree of losses can vary significantly based on event severity. From an insurance perspective, natural catastrophes can be insurable but must be designed carefully, leaving room for the creation of a product for fisheries.

Other financial tools for fishing communities should be explored to complement resilience mechanisms such as insurance and federal fishery disaster relief assistance. Some financial mechanisms may not strictly qualify as traditional insurance under current laws but could still offer vital economic relief to fishermen (e.g., loss endowment funds, derivatives, self insurance cooperatives, or anticipatory tools similar to those used in the cattle industry). Other resiliency strategies (e.g., nature-based solutions for risk reduction, management improvements) and financial tools (e.g., catastrophe bonds) should continue to be explored. The unique nature of fisheries might necessitate additional creative solutions beyond conventional insurance frameworks.

KNOWLEDGE GAPS

Several knowledge gaps and science needs were identified at the workshop that are central to advancing the design and development of fisheries insurance products for climate shocks on the West Coast. While these knowledge gaps are broad and were informed by participants from different sectors at the workshop, this list may not be comprehensive of all knowledge gaps around the development of fisheries insurance for the West Coast.

Table 1.
Knowledge gaps identified at the workshop around assessing risk in fisheries and building a fisheries insurance product under a changing climate.

Knowledge Gap	Description/Unanswered Questions
Management decisions (e.g., closures) included in a parametric index	Can fishery closures or season delays that are mandated by fisheries managers be a viable trigger for a parametric insurance product? An affirmative answer would pave the way for management decisions to serve as legitimate triggers for parametric insurance, offering a direct response to economic impacts caused by regulatory actions rather than purely environmental ones.
Delays or successive disasters	How can insurance models or insurance products account for lags between an environmental event or disaster and the resulting economic impacts for an affected fishery? Due to ocean dynamics and life histories of fish species, an environmental event, like a heatwave, may have delayed effects on production/catch. How can an insurance model account for the compounding effects of successive disasters?
Relationship between an event and damage	In order to reduce basis risk for parametric products, there needs to be a clear relationship between an insurable event and the damage. For fisheries this means understanding, via data analysis, the correlation between an environmental trigger (event) and a fishery outcome like decreased landings/harvest (damage). The challenge lies in fisheries being highly dynamic and complex, and therefore narrowing a fishery production outcome down to one environmental variable is difficult or may not be possible.[18] It is worth exploring using a composite variable, potentially developed using machine learning.
Calculating economic loss	Calculating/quantifying the full economic loss of an event for fishing communities, extending beyond production loss to encompass impacts throughout the market chain, could potentially help inform other innovative insurance products to insure other groups beyond fishermen such as processors or sellers, given the fishing industry is an interconnected value chain. This requires developing multiplication factors to extrapolate

Table 1 Cont.

Knowledge gaps identified at the workshop around assessing risk in fisheries and building a fisheries insurance product under a changing climate.

Knowledge Gap	Description/Unanswered Questions
Calculating economic loss (Continued)	broader community and ancillary fishing business losses from landings data. Existing models like IMPLAN[19] examine such factors, but updates and revisions are needed for the West Coast and specific fisheries.
Subsidies	Subsidies for fisheries insurance warrant careful consideration and further exploration. Discussions about fisheries insurance often reference government subsidies for crop insurance as a potential analog for the fisheries sector. However, there are concerns that over-reliance on federal government subsidies for crop insurance may lead to unintended consequences such as maladaptive activity and lack of long-term financial sustainability. There is a need to scope where funds for a fisheries insurance subsidy could come from. Given current budget constraints in California, it is unlikely that the State would be able to support a subsidy. However, other ideas were raised at the workshop such as using some fishery disaster relief funds or potential mitigation funds from offshore oil or wind energy development to subsidize premiums for fishermen. Research should also consider the unintended consequences of subsidies such as promoting continuation in a fishery instead of exiting, increased maladaptive behaviors (e.g., overfishing, reduced incentive for sustainable practices, becoming overly reliant on subsidy, delaying necessary structural changes), and whether there are ways to mitigate these effects.
Risk profile of fisheries across the state	There is a need to develop risk profiles for specific West Coast fisheries and geographical locations to better understand the vulnerability of communities to specific climate-related risks. This is necessary for informing underwriting (e.g., accurate risk assessment, pricing, defining coverage including defining what perils can and should be covered in policies), product development (e.g., addressing specific vulnerabilities for geographic locations or fisheries), and risk management (e.g., incentivizing safe practices, supporting community resilience). Understanding fisheries risk profiles is limited by significant data gaps as described below.

Table 1 Cont.

Knowledge gaps identified at the workshop around assessing risk in fisheries and building a fisheries insurance product under a changing climate.

Knowledge Gap	Description/Unanswered Questions
Data and modeling	Gaps in fisheries data, particularly a lack of consistency and granularity of landing data, coupled with infrequent and potentially inaccurate stock assessments, present considerable hurdles. Though general availability of data is improving, there is a notable dearth of comprehensive economic data for fisheries beyond basic fish tickets, especially concerning the rest of the market chain. Also lacking is a robust collection of socioeconomic data that can be used to understand the vulnerability of different fishing communities and businesses to climate-related shocks. Data sets like PacFIN can be used to assess fishery revenues as a trusted, reliable and independent source for insurance analyses. For innovative insurance products aimed at insuring beyond fishermen (e.g., processors), insurance groups will likely need data on economic losses affecting the value chain.

POTENTIAL PRODUCT DESIGNS

Participants at the workshop identified a few innovative insurance product designs that warrant further investigation. The opportunities and challenges of each product type discussed are listed below. These product ideas were developed through collaborative breakout groups lasting 1-2 hours (see Appendix I for more details on breakout group structure) so the conceptualized products described represent initial thinking and group brainstorming, and should not be considered fully-developed products or endorsements.

Table 2.
Potential opportunities and challenges associated with product designs of interest identified at the workshop.

Potential Insurance Product Design	Potential Opportunities	Potential Challenges
Parametric insurance built on an environmental trigger	+ Lower administrative costs, faster delivery of payouts, more predictable financial support, transparent, flexible use of funds + Products could be designed to address the increasing frequency/ severity of climate-related hazards + Well-designed products have the potential to incentivize sustainable or adaptive practices via quid pro quo or payout based structures + Quality and quantity of environmental and marine data is increasing over time and could be used to build products	– The need for a strong correlation between an environmental trigger and expected losses (i.e., low basis risk) may require one or multiple environmental hazard variables, which may have tenuous or lagged impacts on fishery production – Linkage and lag between environmental factors and fisheries production are difficult to detect and can change – Life history traits can impact lags between environmental events and fisheries impacts and will need to be analyzed – Marine ecosystems are dynamic systems with multiple interacting factors, which can complicate defining an environmental trigger – Environmental hazard datasets need to be from a trusted, reliable, independent source with the appropriate spatial scale and time steps, over a long timespan, and near real-time

Table 2 Cont.

Potential opportunities and challenges associated with product designs of interest identified at the workshop.

Potential Insurance Product Design	Potential Opportunities	Potential Challenges
Production shortfall insurance (e.g., fishery closure)	+ Does not require the development of complex environmental triggers + Fishery closure is a direct connection to economic loss + Could be developed as a parametric product for fast payouts (potentially with a management decision, like closure that interrupts harvesting, as a trigger)	– Potential concerns from insurance industry on whether a management decision is a suitable independent trigger – Difficulty accounting for natural environmental shifts vs. management decisions
Community-based mutual insurance / community-based insurance	+ Decisions are made by the community of fishermen who best know their needs + Group accountability of fishing behaviors and practices (reducing moral hazard[20] and adverse selection) + Potentially increased access and affordability + Integrates local knowledge of fisheries risks, and community needs + Allows for development of "insurance-like" tools (e.g., endowment funds or anticipatory tools)	– Capital to fund coverage of potential losses can be difficult to establish and maintain – May require a lot of upfront capacity and support to initiate and design, and manage over time – Need for strong management and governance to manage a program / administrative costs at the cooperative organization level – Potential regulatory hurdles in operating within traditional insurance regulatory frameworks

NEXT STEPS AND KEY PLAYERS

BUILDING A FISHERIES INSURANCE PRODUCT FOR WEST COAST FISHERIES

West Coast fisheries are increasingly exposed to environmental shocks, leading to economic vulnerability. Building resilience in West Coast fisheries amidst ongoing environmental change requires a multi-faceted and collaborative approach, weaving together diverse lines of effort from key players across sectors. While various tools exist to support fisheries in adapting to evolving environmental and economic pressures, we focus here on insurance as a helpful addition to the economic resilience "toolbox" for fishing communities. Insurance could serve as a powerful complementary mechanism—not a replacement—to other vital mechanisms, including federal fishery disaster assistance. The following section outlines steps that could be involved to develop an insurance product for West Coast fisheries, including phases of an insurance product creation, key partners and their roles, and a multisectoral working group.

PHASES OF DEVELOPING A FISHERIES INSURANCE PRODUCT FOR THE WEST COAST

Developing a fisheries insurance product for the West Coast is a multifaceted process that will require collaboration, careful design, testing, and continuous refinement. We endeavor to summarize next steps that could be taken to develop such a product (Figure 1). These potential phases are described by Ocean Science Trust and predicated on the workshop participants' interest in pursuing such an innovative insurance product. However, the phases were not a subject of discussion during the workshop.

PHASE 1: RESEARCH AND ASSESSMENT OF NEEDS

A first step is to understand the landscape and state of the field of fisheries insurance. While initial discussions from the OST-hosted workshop alongside previous research has provided a strong starting point, additional work may be needed to establish a comprehensive understanding for fishing communities, managers, and insurers. The goal of this stage would be to review learnings from the workshop, current literature, and pilot projects, as well as conduct additional research to understand the current risk landscape, existing resilience and coping mechanisms, and the needs and perceptions of the West Coast fishing communities regarding insurance. An entity or group of entities would need to step forward to lead this phase. Naturally, academic researchers would be suited to conduct additional analyses, but a multisectoral working group (see *Multisectoral Working Group* section below) could also tackle compiling information.

Stakeholder mapping and engagement: Identify and engage (e.g., through 1:1 consultations/interviews, workshops, surveys) key stakeholders (e.g., commercial fishing industry, academic institutions, government bodies, non-profits and the insurance industry) to understand risks facing fisheries current climate resilience and financial coping strategies, perceptions of insurance, and interest in different insurance types.

Risk assessment: Conduct in-depth analyses of the various risks impacting West Coast fisheries including environmental risks (e.g., marine heatwaves, harmful algal blooms), economic risks (e.g., supply chain disruptions), and regulatory risks (e.g., closures, quota changes) to understand the correlation between risk factors and fishery impacts. Project future climate-related risks to West Coast fisheries and identify the most vulnerable fisheries regions, or fishery-related businesses to these environmental and economic shocks.

Review existing insurance models and lessons learned: Examine successful and unsuccessful insurance models from other sectors (e.g., agriculture, disaster relief) and other fisheries regions globally. Analyze their structures, triggers, payout mechanisms, and identify lessons learned regarding implementation and unintended consequences. Also examine the U.S. context, including existing traditional insurance options for fisheries and any informal risk-sharing mechanisms to identify gaps left that innovative insurance models could fill.

PHASE 2: PRODUCT DESIGN AND FEASIBILITY

This phase aims to translate insights from research and examples into one or more tangible product designs. The desired outcome of this phase is to develop pilot products and assess feasibility for West Coast fisheries. The insurance sector would lead the design and production of products, while ideally consulting experts and fishing community representatives from a multisectoral working group to assure the products are meeting the needs of the insured fishing community, creating a market and willingness to pay.

Convene a cross-sectoral working group: (see *Multisectoral Working Group* section for a more detailed description) Convene a working group to co-produce an innovative insurance product, to ensure buy-in and practical relevance. This working group would comprise expertise across several key groups including the insurance and fishing sectors and academic researchers and economists. This group could help 1) provide expert advice and co-design a pilot insurance product, tailored to West Coast fisheries 2) address knowledge gaps, and 3) provide specific recommendations on increasing fishery resilience through financial innovations.

Define and refine potential product(s) designs: Conduct feasibility studies to determine which insurance model(s) to pursue, and tease out design aspects (e.g., triggers, payout structures) depending on the type of insurance. For example, for a parametric insurance product, define clear, objective, and independently verifiable environmental or operational metrics that will trigger payouts. For a community-based insurance product—either by itself or blended with a parametric design—define risk pooling or mutual funds (e.g., where fishing communities collectively contribute, who/what entity holds the funds), community governance structure, and capacity building (e.g., training and support). For production shortfall insurance, covered perils/triggers, methods for calculating loss, and the duration of payouts following a covered interruption event would need to be defined.

Analysis and pricing: Model using available data to estimate the frequency and severity of losses in order to calculate premiums. In this step, insurance companies would also likely assess the economic feasibility of proposed premiums to the fishing communities in an affordability analysis. The Multisectoral Working Group members could also explore ways to enhance affordability (e.g., subsidies, cost-sharing models).

Secure funding and partnerships: Obtain funding (e.g., from government, grants, private investment, etc.) and develop partnerships to support the pilot's implementation and evaluation.

PHASE 3: PILOT AND MONITORING

In this phase, a developed product would be piloted on the West Coast, potentially in a few select communities depending on the product and kinds of perils covered. The goal of this phase is to test the selected insurance product(s) in real-world conditions, monitor and learn from implementation challenges and success, and refine the product(s) for broader adoption. This phase would be largely led by the insurance company piloting the product(s), with participation from an interested fishing community(ies), and potential continued support from other groups represented in the Multisectoral Working Group.

Select pilot fisheries and communities: Based on feasibility studies and stakeholder input, choose specific fisheries and/or geographic communities on the West Coast that represent a range of risks and community characteristics for initial piloting.

Implement pilot program: Launch the insurance product(s) in the selected pilot areas. Conducting outreach within pilot communities to educate fishermen about the product may help ensure enrollment.

Monitoring and fishermen involvement: Continuously monitor the performance of the insurance product during the pilot(s), including effectiveness of parametric triggers in aligning with actual losses, speed and transparency of payouts, policyholder satisfaction and understanding, and impact on resilience and recovery. Maintain continuous communication with fishing industry experts and participants during the pilot to provide feedback and ensure the product continues to align with their evolving needs, perceptions, and willingness to pay.

PHASE 4: SCALING AND INTEGRATING SUCCESSFUL PRODUCT(S)

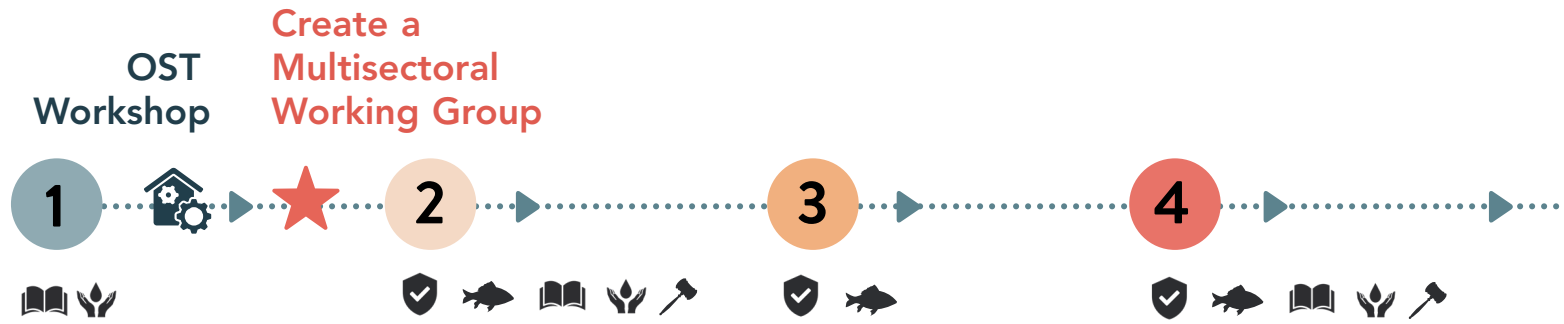
If successful, the pilot program can be expanded and offered to a broader range of fisheries and regions, as well as potentially embedding insurance as a tool for broader fisheries resilience. The goal of this phase would be to expand a successful pilot product(s) to a wider range of fisheries fishing communities, or geographic locations. The insurance industry would lead on refining their product(s), and pricing and valuation analyses for expanding a product. The Multisectoral Working Group could explore long-term funding schemes, such as collaborations between the fishing industry and NGOs. Researchers could evaluate the effects of insurance on social and economic resilience of fisheries and fishing communities and conduct other studies to improve the effectiveness of the insurance product.

Refine and replicate: In this phase, insurance industry entities could refine broader adoption based on pilot learnings and modifying products, develop a rollout strategy, and work with regulatory agencies to officially recognize the insurance product. There is room in this phase for researchers to also evaluate the impacts of the product(s) on economic and social resilience of fishing communities in the face of disasters.

Policy integration and long-term funding: Explore policy mechanisms to incentivize participation and identify long-term funding models for the fisheries insurance product(s). Position fisheries insurance as a proactive form of disaster preparedness and resilience-building for wider integration.

Continued research and development: Given the dynamism of risk in a changing environment, it will be important to continue monitoring the effectiveness of the insurance product, investing in ongoing research to improve understanding of climate impacts on fisheries and refining predictive models, adapting to new challenges (e.g., emerging climate impacts, market shifts), and exploring further innovations (e.g., blockchain for transparent claims) to ensure long-term relevance and sustainability.

PHASES OF DEVELOPING A FISHERIES INSURANCE PRODUCT



RESEARCH & ASSESSMENT OF NEEDS

Stakeholder mapping and engagement, risk assessment, and review of existing insurance models and lessons learned.

PRODUCT DESIGN & FEASIBILITY

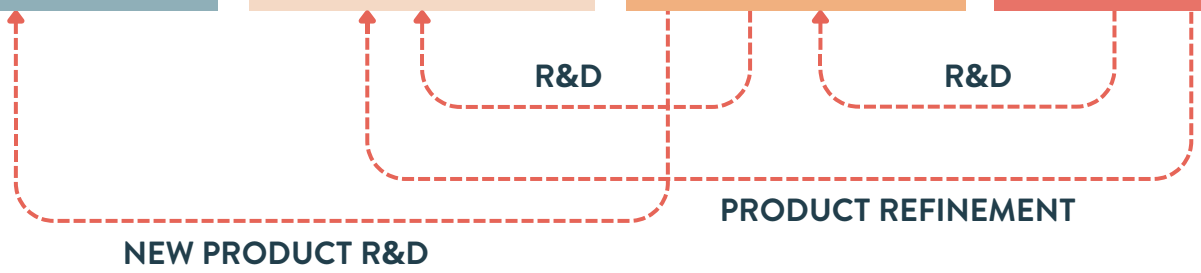
Convene a multisectoral working group to co-produce an insurance product. Define and define potential product designs, and conduct analysis and pricing.

PILOT & MONITORING

Pilot the product in a few select communities, including outreach to educate fishermen about the product. Monitor outcomes and effectiveness.

SCALING & INTEGRATING SUCCESSFUL PRODUCT(S)

Refine product(s) and develop a rollout strategy. Identify policy mechanisms and long-term funding models.



SECTORS INVOLVED IN THE WORKING GROUP

Main leads identified for each phase above

- Research & Academia
- Government Agencies
- Insurance Industry
- Fishing Industry
- Nonprofits & NGOs

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Figure 1.

Phases of developing an innovative fisheries insurance product for the West Coast.

Phase 1: Research and Assessment of Needs focuses on understanding the current fisheries insurance landscape through stakeholder engagement, risk assessment, and reviewing existing insurance models.

Phase 2: Product Design and Feasibility convenes a multisectoral working group to co-produce an insurance product. Define and refine potential product designs, conduct analysis and pricing, and secure funding and partnerships.

Phase 3: Pilot and Monitoring would test the developed product in real-world conditions within select West Coast fishing communities, with continuous monitoring and feedback from fishermen.

Phase 4: Scaling and Integrating Successful Product(s) aims to expand successful pilot programs to a broader range of fisheries and regions, exploring long-term funding and integration. Icons indicate sectors (insurance industry, fishing industry, research and academia, relevant nonprofits and NGOs, and state government and agencies with jurisdiction in fisheries management and insurance regulations) that could play roles in each phase.

Phase 1 could be led by researchers from academia and NGOs/nonprofits, Phase 2 would be led by the insurance industry, Phase 3 testing and monitoring would be led by the insurance company and involve a participating fishing community(ies), and the insurance industry would continue to lead the scaling of successful product(s) in Phase 4, with other roles supporting integration shared by the other sectors.

An icon indicates where the OST workshop occurred between Phases 1 and 2. The star icon indicates where the creation of the Multisectoral Working Group could occur between Phases 1 and 2, to support collaboration among all of these sectors throughout the development and testing of a product. Arrows pointing backwards from phases indicate where this process could be iterative, including product refinement occurring before scaling (Phase 4) and feeding back into product design (Phase 2), iterative research and development (R&D) resulting from pilot testing (Phase 3) to identify and address research needs (Phase 2) as well as R&D needs that may arise from scaling (Phase 4) to inform piloting (Phase 3), and new product R&D and innovation that may result from the testing phase (Phase 3).

PARTNERS AND ROLES

To develop a fisheries insurance product for the West Coast, a collaborative approach across multiple sectors will help ensure that the fisheries insurance product is scientifically sound, financially viable, relevant to the needs of the fishing community, and effectively regulated, thereby offering a viable solution to address growing climate-related risks to fisheries. We outline below some of the roles different sectors could play to advance insurance for commercial fisheries on the West Coast.

RESEARCH AND ACADEMIA

Risk management and fisheries insurance in the context of mitigating environmental risk has been discussed in the literature for over a decade (e.g., Watson et al. 2023[21], Sethi 2010[22], Mumford et al. 2009[23], Herrmann et al. 2004[24]). As we advance from theory to practice, academia and research can play a critical role in contributing expertise across various disciplines at all stages of developing, testing, and eventually adopting a fisheries insurance product. For risk assessment and modeling, researchers can analyze complex ecological, environmental, and socio-economic data, including historical catch records, stock assessments, oceanographic conditions (e.g., temperature anomalies, harmful algal bloom occurrences), and economic indicators. Working with insurance companies, academics and researchers could help quantify specific risks faced by different fisheries and geographical locations, moving beyond anecdotal evidence to create robust, probabilistic models of loss. Additionally, moving forward, researchers could work together with state agencies to fill gaps in landing, stock assessment, and market chain data. This group could also help address, in collaboration with insurance groups, some of the knowledge gaps identified in our workshop, including: determining how to adjust for natural variation in insurance products, building empirical evidence for relationships between an event and damage for parametric trigger development, calculating economic losses from an event, and developing risk profile of fisheries across the West Coast. There is also a role for social scientists to assess the vulnerability of different fishing communities and businesses to risks to help design equitable and effective insurance. Research advancement would help contribute to more robust economic models, and ultimately, likely more sound insurance models with better pricing as products get refined.

GOVERNMENT AGENCIES

State agencies and other government bodies could act as facilitators, regulators, data managers and providers, and potential financial supporters in advancing the development of fisheries insurance products. State insurance regulatory agencies, such as the California Department of Insurance (CDI), could use its data expertise to establish basic principles and guidance, monitor market practices and trends, and potentially help provide relevant information that could build public understanding of the potential of this emerging marketplace and actuarial data standards to be used in the future.

Aside from continued efforts to improve adaptive fishery management under a changing climate, other state agencies involved in fisheries management such as the California Department of Fish and Wildlife (CDFW) could work closely with researchers to fill gaps in landing data, stock assessment data, and market chain data. CDFW is a crucial data provider because data can be used to develop accurate risk assessment and insurance models. CDFW could also serve as a policy enforcer if management decisions act as triggers for insurance payouts.

State agencies or other government bodies also play a key role in convening and funding. A state agency could potentially lead and fund the below proposed Multisectoral Working Group to ensure state involvement in fisheries insurance product pilot testing. While the long-term goal would be a self-sustaining insurance market, state, regional, or federal governments could explore mechanisms like partial premium subsidies, reinsurance support, or seed funding for insurance models, especially during initial pilot phases or for vulnerable fishing segments. Subsidies or other support could help overcome initial affordability barriers and encourage adoption, mirroring approaches seen in federal crop insurance programs.

INSURANCE INDUSTRY

The insurance industry has been engaged in developing innovative insurance products for nature and for disasters including testing and piloting products, especially parametric products. In the fisheries context, some insurance companies—in collaboration with nonprofits academics, and other entities—have developed pilot insurance products summarized earlier in this report, mostly for small-scale fisheries with weather-based triggers for parametric products. The insurance industry's involvement and expertise are key to translate theoretical risk management into the development of an innovative insurance product for West Coast fisheries. Their role spans from spearheading initial design of a product to ongoing implementation and

financial sustainability. The insurance industry would provide the needed catastrophe modeling expertise, actuarial knowledge, underwriting skills and product development knowledge to build a new insurance product. Catastrophe modelers would provide critical information on perils and exposure useful to actuarial pricing models. This would include analyzing complex fisheries data (e.g., historical catches, environmental conditions, economic losses) to model probabilities of various perils and calculating appropriate premiums to protect the new policy in force. Insurance underwriters and actuaries understand how to structure insurance products (e.g., parametric, indemnity-based) to manage risk effectively for both the insurer and the insured, defining triggers, payout mechanisms, and policy language that are clear, enforceable, and financially viable. Industry actuaries can build complex statistical models for pricing and strategy company wide, and underwriters can use these models to determine coverage and price individual policies. Additionally, insurance companies develop the systems and processes for policy enrollment, premium collection, and efficient and fair claims assessment and disbursement. This operational expertise is crucial for building trust with fishing communities, who need confidence that payouts will be timely and reliable when a covered event occurs. The insurance industry would be responsible for trialing, evaluating, and iterating on a fisheries insurance product.

FISHING INDUSTRY

Historically, fishermen have weathered the boom and bust nature of the fishing industry via individual actions such as diversifying fishing portfolios, seeking land-based jobs during disaster events, or changing their fishing location or gear type within management regulations.[25] Fishermen are important to engage when developing a product as not only the end-users but also as co-designers, data contributors, and champions of any successful initiative. Fishermen will need to be consulted to ensure a product is created to meet the risks and needs on the ground to increase willingness-to-pay. This group can contribute experiential knowledge about fishing grounds, weather patterns, stock behavior, and historical events that may not be captured in formal datasets. For an insurance product to gain widespread acceptance and willingness to pay, it must be developed collaboratively with the fishing community such as through the Multisectoral Working Group. Their direct involvement in shaping the product's structure, scale, and payment mechanisms ensures it aligns with their operational realities and financial capacities. This collaborative process builds trust and ownership, overcoming skepticism that might otherwise hinder uptake. Fishermen can also be a crucial sounding board for refinement of a product.

NONPROFITS / NGOS

In past pilot projects, nonprofits and NGOs have served as funders, researchers, connectors to fishing communities and their needs, and experts providing technical assistance and advice especially in feasibility studies and pilot product development. This group can continue to engage in this capacity while also serving as a bridge between other sectors and the real-world challenges faced by fishermen, ensuring that any proposed insurance product is tailored to practical realities. Some NGOs and nonprofits can also advocate for fishing community interests in policy discussions by pushing for supportive regulatory frameworks and financial mechanisms. Nonprofits and NGOs may play a role in conducting applied research and monitoring and to fill critical data gaps (e.g., data on fishing effort, bycatch, environmental changes) directly relevant to insurance product design and trigger development for parametric insurance. They are skilled at translating complex scientific and insurance concepts into understandable language for fishing communities. These entities can also secure philanthropic funding to test novel insurance concepts, acting as incubators for pilot programs that demonstrate feasibility and gather crucial lessons learned before broader scaling. Finally, a nonprofit or NGO, particularly one with institutional experience facilitating cross-sectoral collaborations, may also be uniquely positioned to convene a multisectoral working group like the one proposed below.

MULTISECTORAL WORKING GROUP

There was consensus among participants on the need to convene a Multisectoral Working Group ("Working Group") as a next step to collaboratively design and pilot an insurance product tailored to the unique challenges faced by West Coast fishing communities. Given the important roles of the various sectors outlined above in developing and testing fisheries insurance, a Working Group could provide the essential platform for collaboration, translating ideas into tangible products that could enhance the financial resilience of the fishing industry. Potential Working Group structure, membership, goals, and topics that the group could explore are outlined below.

WORKING GROUP MEMBERSHIP AND STRUCTURE

The Working Group could comprise of expertise and affiliations across sectors including:

- **Fishing Cooperatives or Associations** to ensure that the product meets the real-world needs of fishermen and fishing communities. The workshop participants, including those from the fishing industry, indicated interest in co-developing solutions.
- **Insurance Industry** to bring catastrophe modeling expertise, actuarial knowledge, underwriting skills, product development knowledge, and an understanding of market viability.
- **Researchers** to provide data analysis, modeling capabilities, insights into economic impacts and risk assessment, and to fill knowledge gaps.
- **Regulatory Agencies (State and Federal)** to offer guidance on relevant policies, data access, and more. State agencies that might be included could be the California Department of Insurance and California Department of Fish and Wildlife, or the equivalents in other West Coast states.
- **Non-Governmental Organizations** to contribute perspectives on conservation, community engagement, ecosystem resilience, and technical advice.

Success of the Working Group would benefit from a lead entity or co-leadership of entities that can act as an honest broker by all sectors, facilitate complex discussions, convene diverse and sometimes competing perspectives, secure and manage funding for the working group, and has a commitment to the development and implementation of a usable product. As discussed above, an NGO or state entity are two potential groups that could lead and facilitate this multisectoral working group.

POTENTIAL OBJECTIVE

Move beyond conceptual discussions and actively build and pilot an insurance product for West Coast fisheries.

POTENTIAL GOALS

The Working Group could tackle some or all of the following goals:

- Co-design a pilot insurance product, tailored to West Coast fisheries
- Address knowledge gaps necessary to fill to build a product
- Provide specific recommendations on increasing fishery resilience through financial innovations

POTENTIAL TOPICS: PHASES

To achieve its objective and goals, the Working Group could delve into a range of critical topics shaped by the knowledge gaps and themes illuminated at the workshop:

Information Gathering and Gap Analysis

- Compile existing data and research
- Assess stakeholder needs and specific risk scenarios that insurance could cover
- Preliminary market scan by insurance industry in the working group, identifying common challenges and opportunities for fisheries insurance

Product Design

- Scale: Determine the appropriate scale for the product - individual fisherman, group/fleet associations, state or federal government, or sovereign level
- Structure: Explore and determine product structure, such as parametric, production shortfall, or mutual insurance products
- Triggers: Identify appropriate triggers for production including whether management decisions are viable triggers for insurance companies
- Addressing complexities: Consider how to address challenges like delays between an environmental event and economic loss to the fishery
- Payments: Investigate who will pay premiums and if there is a role for subsidies
- Reinsurance: Explore options for reinsurance to manage risk to primary insurer

Data Availability and Needs

- Identify existing reliable data sources
- Determine what additional data is required for accurate risk assessment and product development

Careful consideration of the Multisectoral Working Group's composition, leadership, and sustained support mechanisms for its activities will be paramount to its success. A deliberate approach is crucial to ensure the Working Group would provide a platform to translate innovative concepts into concrete, impactful solutions that could contribute toward financia resilience of West Coast fishing communities.

CONCLUSION

The growing vulnerability of West Coast fisheries to intensifying climate-related shocks necessitates a proactive and adaptive approach to risk management for the survival and sustainability of fishing industries and the communities that depend on them. As highlighted throughout the workshop discussions and this report, traditional disaster relief mechanisms, while vital, are often insufficient by themselves to provide the timely and comprehensive support needed for enduring losses and building long-term resilience. Therefore, the continued exploration and development of innovative insurance products, tailored specifically to the unique dynamics of wild capture fisheries, is imperative. OST's workshop in May 2025 initiated a dialogue among fishery stakeholders, government agencies, NGOs, insurance industry representatives, and community members. The workshop fostered a shared understanding of the need for innovative insurance to enhance the resilience of West Coast fisheries. A crucial next step involves building and piloting an insurance product tailored to the region's unique needs, through a co-creation process among key stakeholders, perhaps best achieved via formation of a Multisectoral Working Group. Continued research and collaborative efforts will build upon these discussions, ultimately informing policymakers and stakeholders of effective ways to ensure the future resilience of fisheries and fishing communities.

ENDNOTES

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APPENDIX I: WORKSHOP AGENDA

Workshop: Risk Management in West Coast Fisheries

Exploring fisheries insurance for fishing community resiliency under a changing climate

May 2, 2025 9:00 am - 4:00 pm

University of California Santa Barbara

Description and Goals

Commercial fisheries provide critical sources of food, livelihoods, and underpin the economies and cultures of coastal communities. With the increasing threat of climate-related economic loss for the fishing industry, there is a need to investigate the role of other risk management and transfer tools, such as insurance, to help communities weather a crisis. Innovations in the climate insurance space (e.g., parametric insurance) have spurred new thinking on financial tools for fisheries' climate adaptation, but there is much work to be done before these ideas can be translated from theory to practice. Given the growing interest in risk management approaches for wild capture fisheries, including risk-transfer and financial tools that could increase resilience in coastal communities facing climate shocks, this is a timely opportunity to support early exploration phases of developing and assessing novel applications.

California Ocean Science Trust (OST) will host an in-person workshop to bring together experts with diverse perspectives (i.e., scientific experts, fishing community members, relevant decision makers, insurance experts) to develop a shared understanding of how fisheries insurance may support fishermen and local fishing economies into the future. The group will discuss recent findings, pilot projects, and thinking around fisheries insurance, brainstorm potential designs and guiding principles for fishery insurance products, and identify science and information gaps needed to advance these tools. Discussions at this workshop will help inform a "roadmap" for fisheries insurance tentatively discussing the state of the field, some potential guiding principles of a fisheries insurance program for the West Coast, and major science needs and knowledge gaps.

Agenda

8:30 am - **Coffee and Breakfast**
9:00 am - **Welcome**
9:30 am - **Risks in Wild Capture Fisheries - Panel and Q&A**

Panelists will discuss the climate-related risks faced by commercial wild capture fisheries, the primary process for mitigating risk currently (e.g. federal fishery disaster relief), and the need

for exploring other options to buffer fishing communities from economic loss due to climate related events.

Panelists: Craig Shuman, Marine Regional Manager, California Department of Fish and Wildlife; Lisa Damrosch, Executive Director, Pacific Coast Federation of Fishermen's Associations; Chris Anderson, Professor, School of Aquatic and Fishery Sciences and Center for Sustaining Seafood, University of Washington

9:50 am - **Insurance 101 - Panel and Q&A**

To establish common language and a shared understanding of insurance for disaster risk transfer, panelists will provide background on innovation in the insurance and climate risk space. This panel will provide an overview of the creative role insurance can play in the economic resilience of communities and explore potential product schemes, such as parametric insurance, that could translate to the fisheries sector.

Panelists: Deborah Halberstadt, Special Advisor to the Commissioner on Biodiversity and Inclusive Insurance, California Department of Insurance; Victoria Yanco, Lead Climate and Sustainability Risk Analyst, Liberty Mutual Insurance

10:30 am - **Case Studies and Innovations in Fisheries Insurance - Panel and Q&A**

In this session, speakers will showcase advances in fisheries insurance including recent research, feasibility studies, and pilot projects. The panel will discuss how pilot products are structured, any associated sustainability outcomes, and lessons learned.

Panelists: Chris Costello, Distinguished Professor and emLab Research Director, University of California Santa Barbara; Chief Economist, Environmental Defense Fund; Michael Hofmann, Director, Innovative Finance, Rare; James Watson, Associate Professor, College of Earth, Ocean and Atmospheric Sciences, Oregon State University; Elizabeth Emanuel, Head, CCRIF Technical Assistance Manager and Development and Corporate Communications Manager Teams; Kate Kauer, Fisheries Strategy Lead and Associate Director, Oceans Program, The Nature Conservancy

11:30 am - **Catered Lunch**

12:30 pm - **Breakout and Roundtable Discussions: Designing a Potential Model for Fisheries Insurance**

Time to roll up your sleeves! The second half of the day will be structured around a series of breakout sessions to brainstorm elements of potential fishery insurance products for the West Coast. We will explore topics including: what is insurable, fishery characteristics that would be conducive to an insurance product and associated data needs, and explore design and scope of an insurance product. Throughout the breakout and roundtable discussions, we'll identify key information or science gaps and converging principles for developing a fisheries insurance product in California.

4:00 pm - **Wrap Up and Close**

APPENDIX II: WORKSHOP PARTICIPANTS

Project Team	
Heidi Waite	Ocean Science Trust
Monica LeFlore	Ocean Science Trust

Participants Affiliations
California FarmLink
CCRIF The Caribbean Oceans and Aquaculture Sustainability Facility
Liberty Mutual
California Department of Fish and Wildlife
California Department of Insurance
Commercial Fishermen of Santa Barbara
Pacific Coast Federation of Fishermen's Associations
Ocean Conservancy
Rare
The Nature Conservancy
Oregon State University
University of California Santa Barbara
University of California Santa Cruz
University of Washington
Walton Family Foundation