Agenda Item D.3.a
Supplemental Presentation 1
June 2026

Community Resilience Decision

Summary of Progress and Draft Methodology

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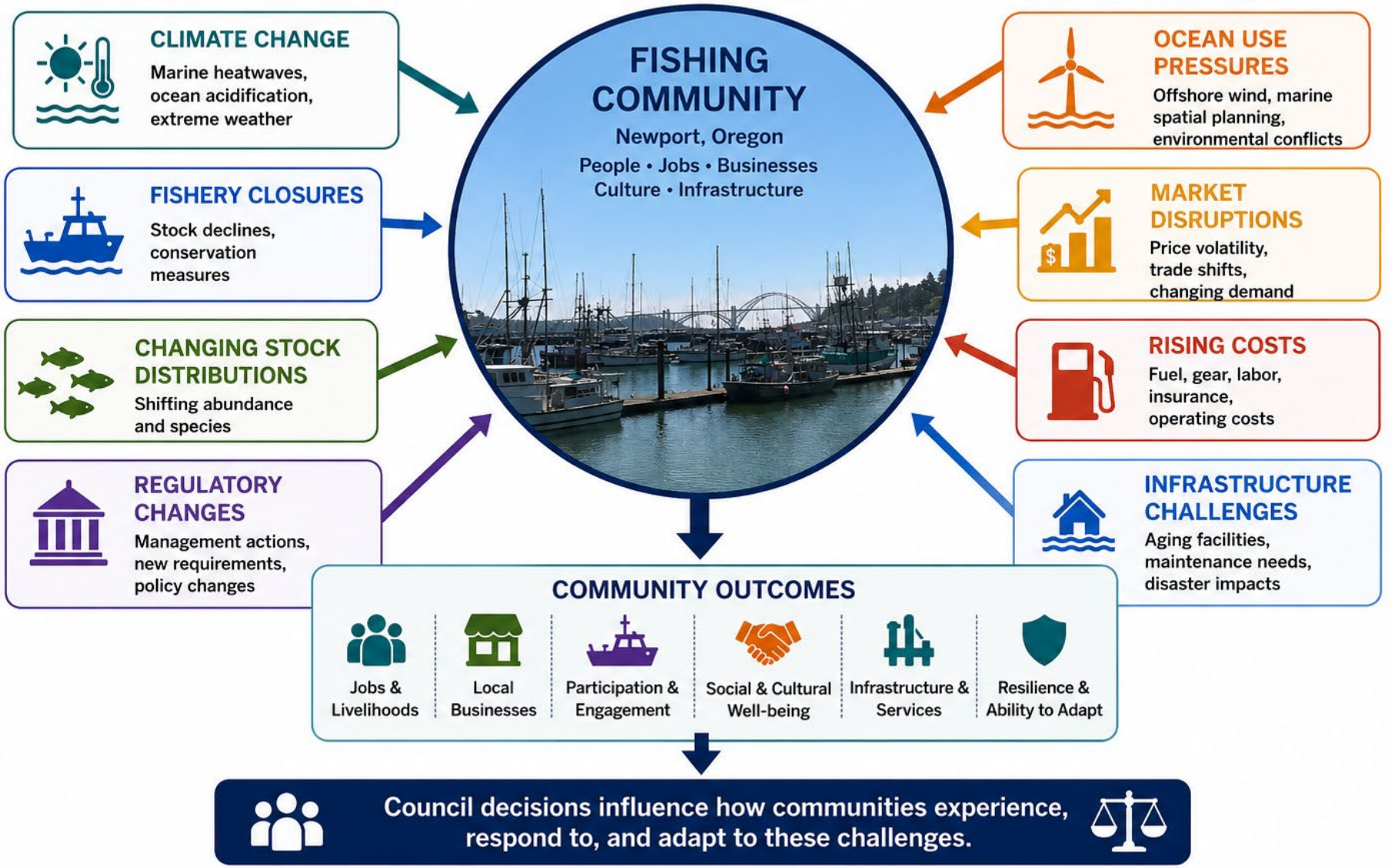
Presented to

The Pacific Fishery Management Council

June 2026

Northern Economics

Motivation


CLIMATE CHANGE
Marine heatwaves, ocean acidification, extreme weather
FISHERY CLOSURES
Stock declines, conservation measures
CHANGING STOCK DISTRIBUTIONS
Shifting abundance and species
REGULATORY CHANGES
Management actions, new requirements, policy changes
FISHING COMMUNITY
Newport, Oregon
People • Jobs • Businesses
Culture • Infrastructure
OCEAN USE PRESSURES
Offshore wind, marine spatial planning, environmental conflicts
MARKET DISRUPTIONS
Price volatility, trade shifts, changing demand
RISING COSTS
Fuel, gear, labor, insurance, operating costs
INFRASTRUCTURE CHALLENGES
Aging facilities, maintenance needs, disaster impacts
COMMUNITY OUTCOMES
Jobs & Livelihoods
Local Businesses
Participation & Engagement
Social & Cultural Well-being
Infrastructure & Services
Resilience & Ability to Adapt
Council decisions influence how communities experience, respond to, and adapt to these challenges.

Goal

Improve the Council's ability to understand how management actions affect fishing community resilience.



Identify Resilience Attributes

Develop a conceptual framework of what makes fishing communities more or less resilient.



Identify Measurable Indicators

Develop practical, measurable indicators to assess community resilience.



Apply Across West Coast Communities

Apply the framework and indicators to all West Coast fishing communities.

What Do we Mean By Resilience?

- Resilience:
  - The ability of a fishing community to withstand, recover from, and adapt to disturbances
  - Applied in the context of National Standard 8, to provide for sustained fishery participation and minimize adverse economic impacts
- Fishing community:
  - Place-based and substantially engaged in or dependent on fisheries

Deliverables

Three main deliverables

1 Community Resilience Evaluation Methodology

- **Synthesis of literature** and availability of existing tools, frameworks, and indicators
- **Set of attributes & indicators** for assessing the resilience of West Coast fishing communities

2 Community Resilience Management Evaluation Framework

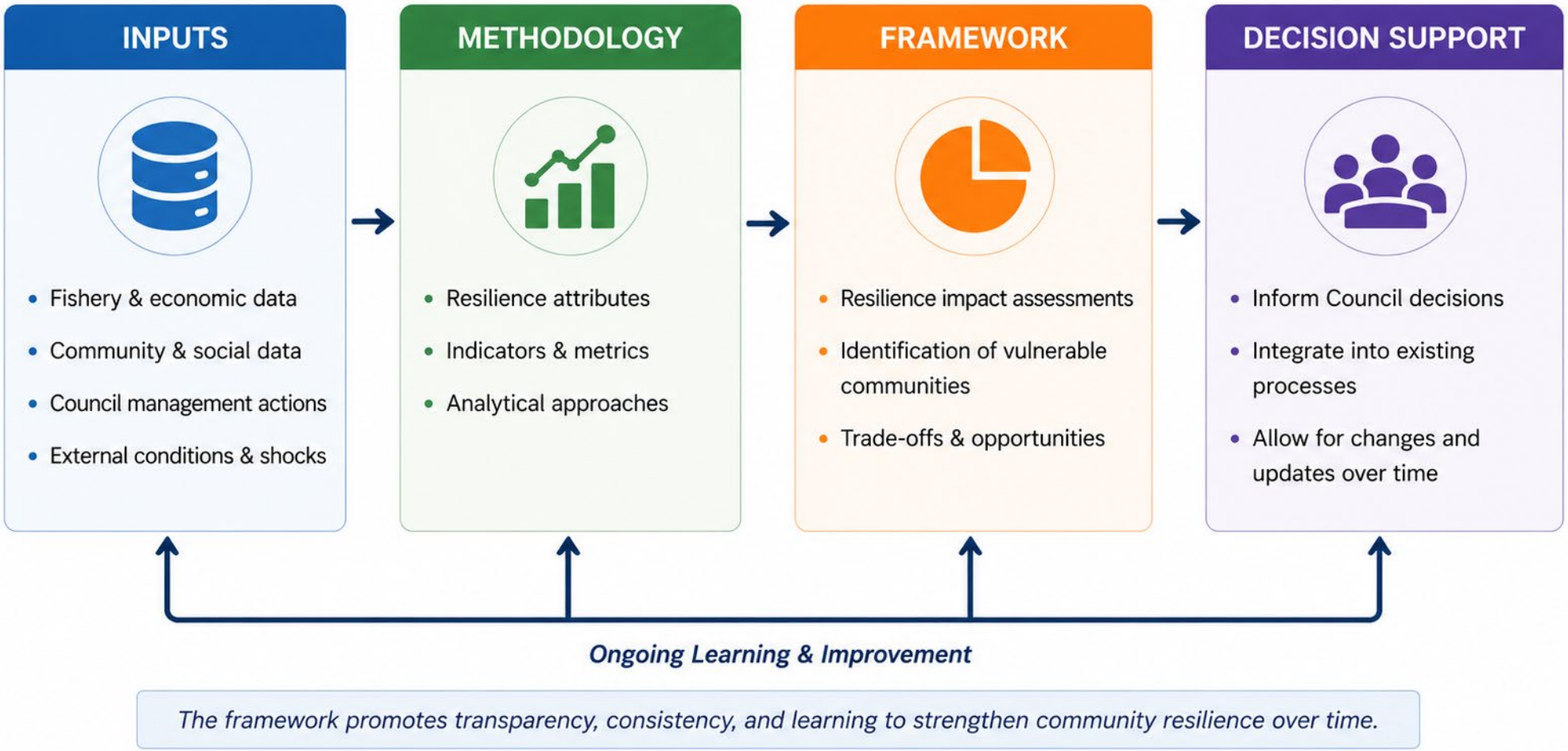
- **How Council actions** affect community resilience
- **Narrative or analytical**, as appropriate

3 Case study of a Council action

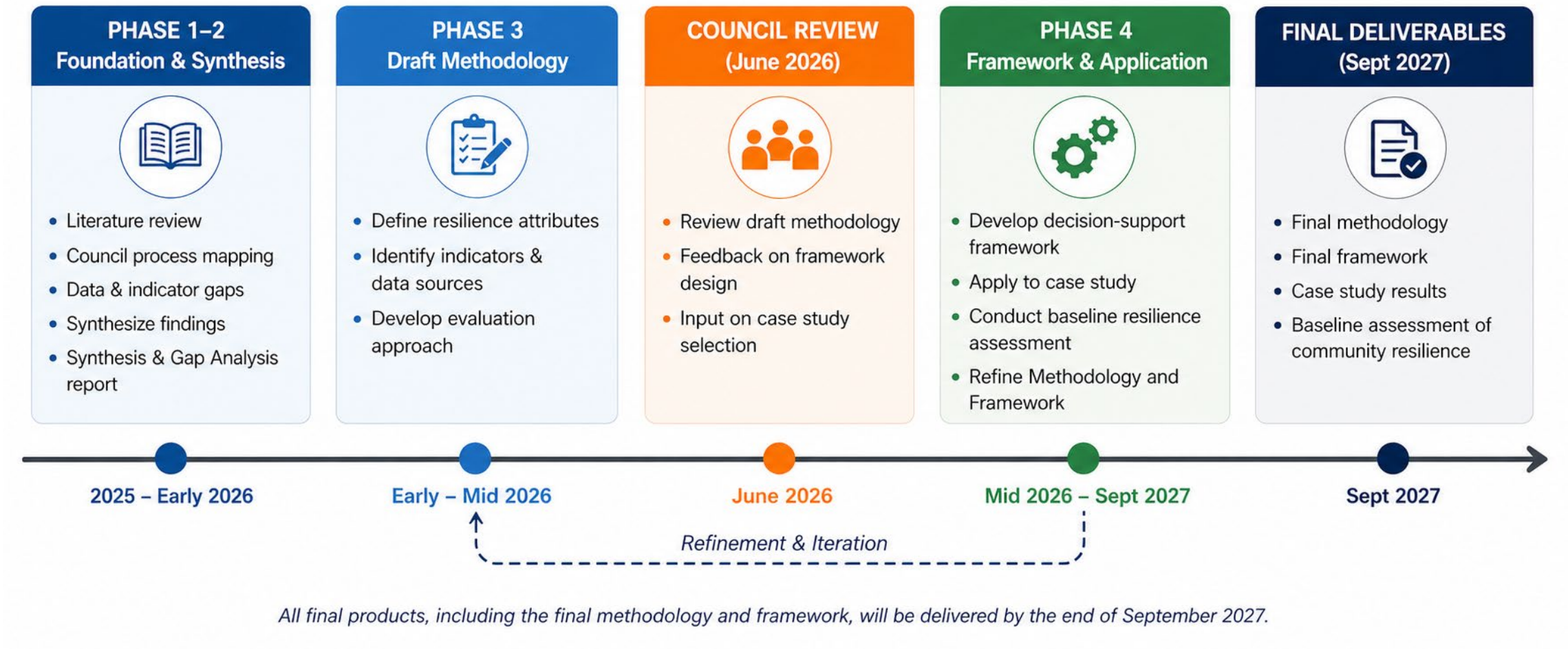
- **Baseline Assessment** of West Coast Fishing Community Resilience
- **Application of framework** to a Council action

* ***Not a dashboard***. *Products including code may be integrated into a dashboard later.*

Vision For the Tool



Phases and Timeline



All final products, including the final methodology and framework, will be delivered by the end of September 2027.

Today

- Foundations of the Methodology
  - Summary of Key Findings
  - Design Principles for the Methodology
- Draft Methodology
  - Overview
  - Core Concepts & Components
- Recommendations and Feedback



Questions?



Foundations of the Methodology

Synthesis Report Components

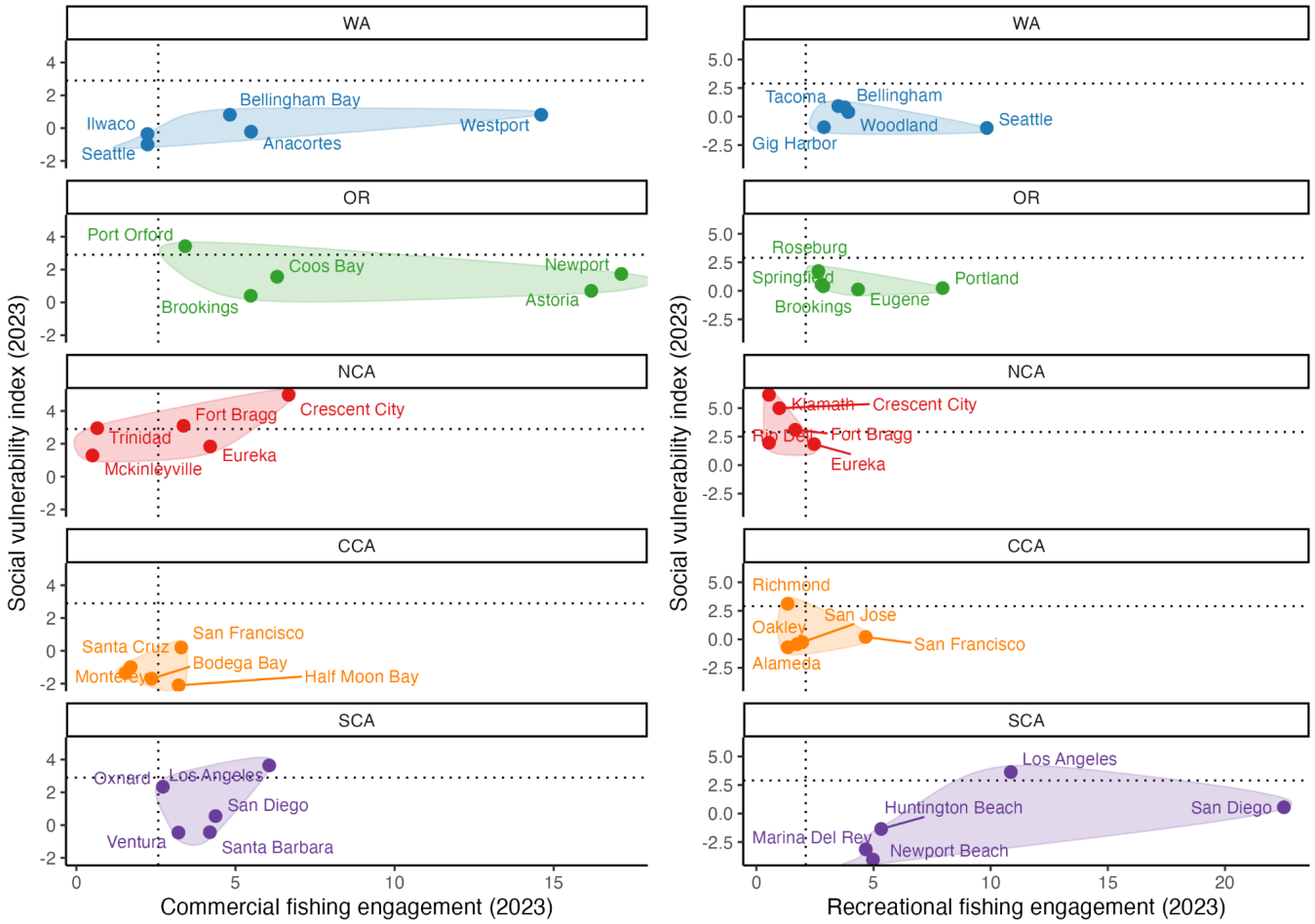
- Literature Review & Interviews
- Quarterly Advisory Team Meetings*
- Overview of Council Processes
- Existing Tools, Metrics, and Indicators
- Existing Resilience Frameworks
- In-Progress Initiatives

*Advisory Team composed of 11 individuals from government, NGO, and academia to provide informal guidance and support throughout the project

Key Finding #1

Existing approaches provide a strong foundation

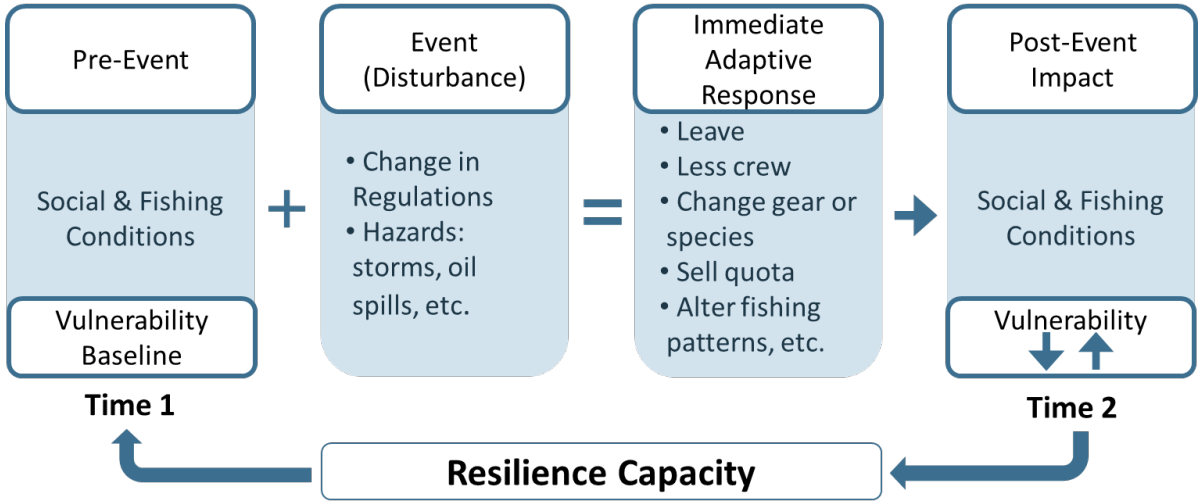
- Community Social Vulnerability Index*
- Fishing Engagement and Reliance Indicators
- Diversification Measures
- Other metrics from the CC ESR



* The project team is tracking NMFS updates to CSVI, as well as other related in-progress work at the NWFSC.

Key Finding #2

- Most Council decisions require forward-looking analyses
  - Council processes evaluate impacts before they occur
- Resilience frameworks often are retrospective
- Therefore, vulnerability framing is useful



From *climate.gov*

Key Finding #3

Adaptive Capacity is Important- but is difficult to measure

- The ability to respond and adjust to impacts
- Literature outlines that some aspects may be easier to measure:
  - Flexibility, assets
- While others are challenging:
  - Organization, learning, agency

Key Themes from Interviews

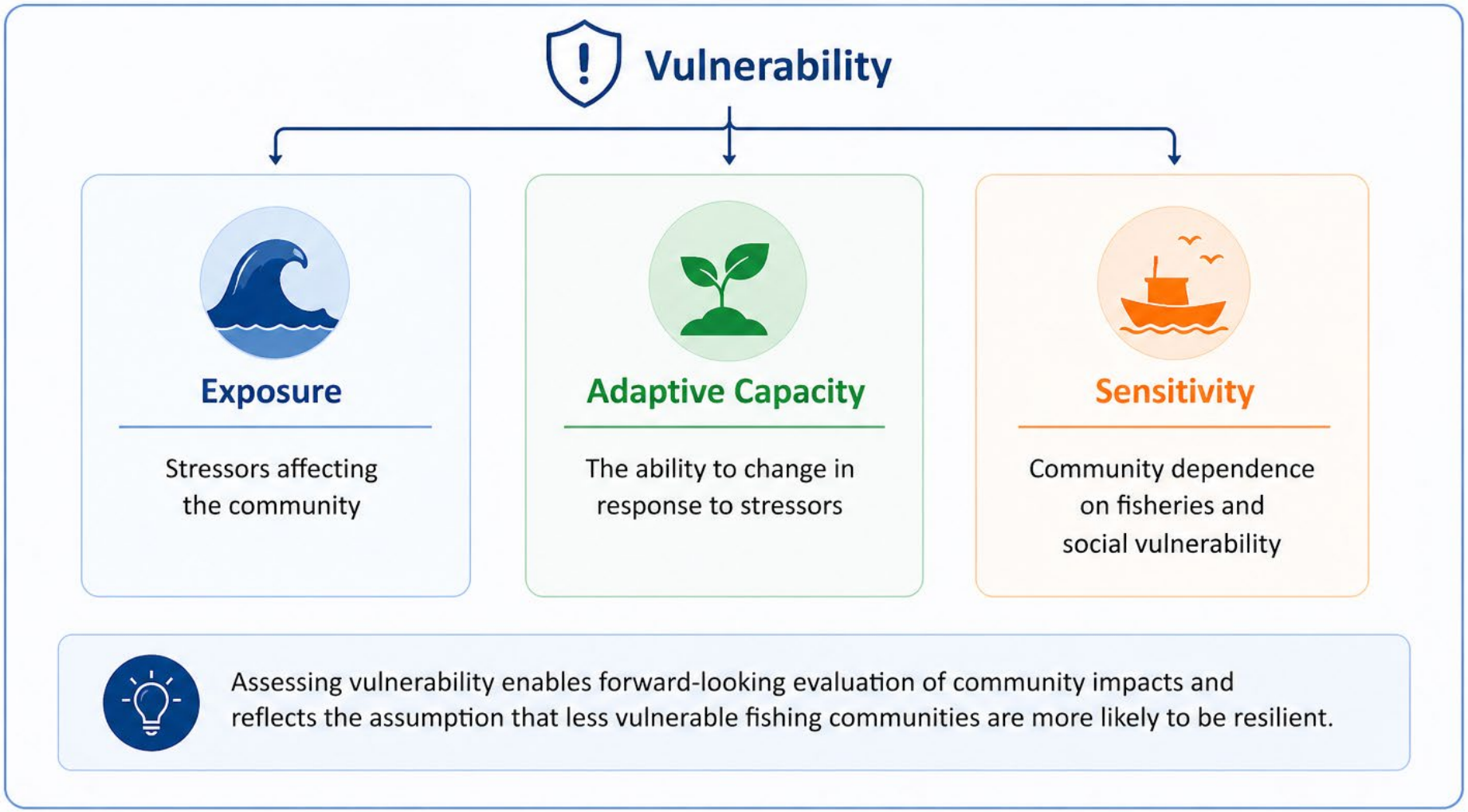
- Infrastructure is important, but data limited
- Cumulative stressors matter
- Fishing communities are diverse and may require unique considerations
- Additional research and/or data collection would support a more complete view of community resilience, including social capital



Design Principles for the Methodology

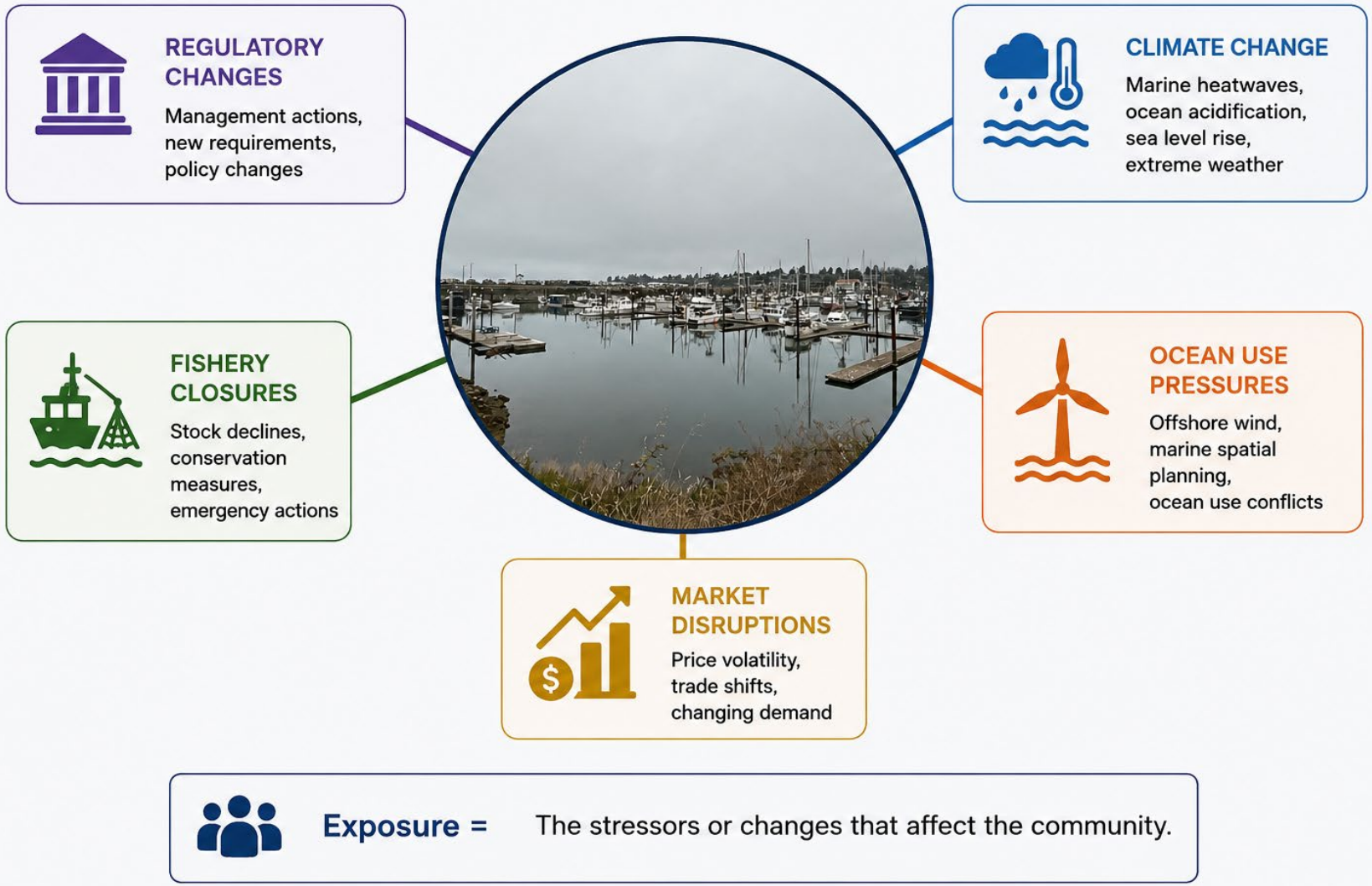
- Build from existing approaches
- Prioritize practical application
- Support forward-looking analysis
- Incorporate adaptive capacity where feasible
- Maintain flexibility to adapt to new data, unique considerations of fisheries
- Acknowledge uncertainty

Community Resilience Methodology Approach



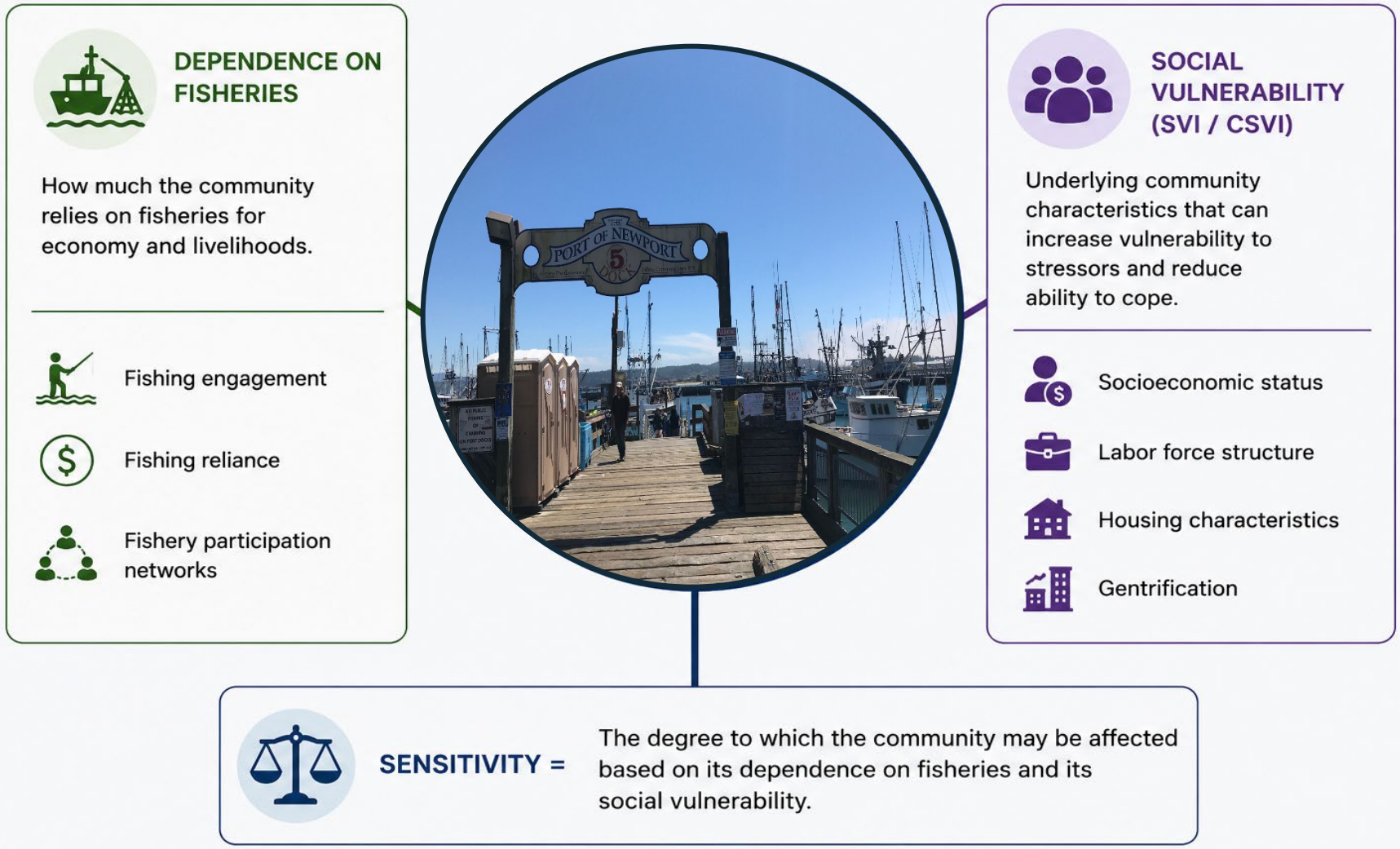
Exposure

- What stressors affect the community?



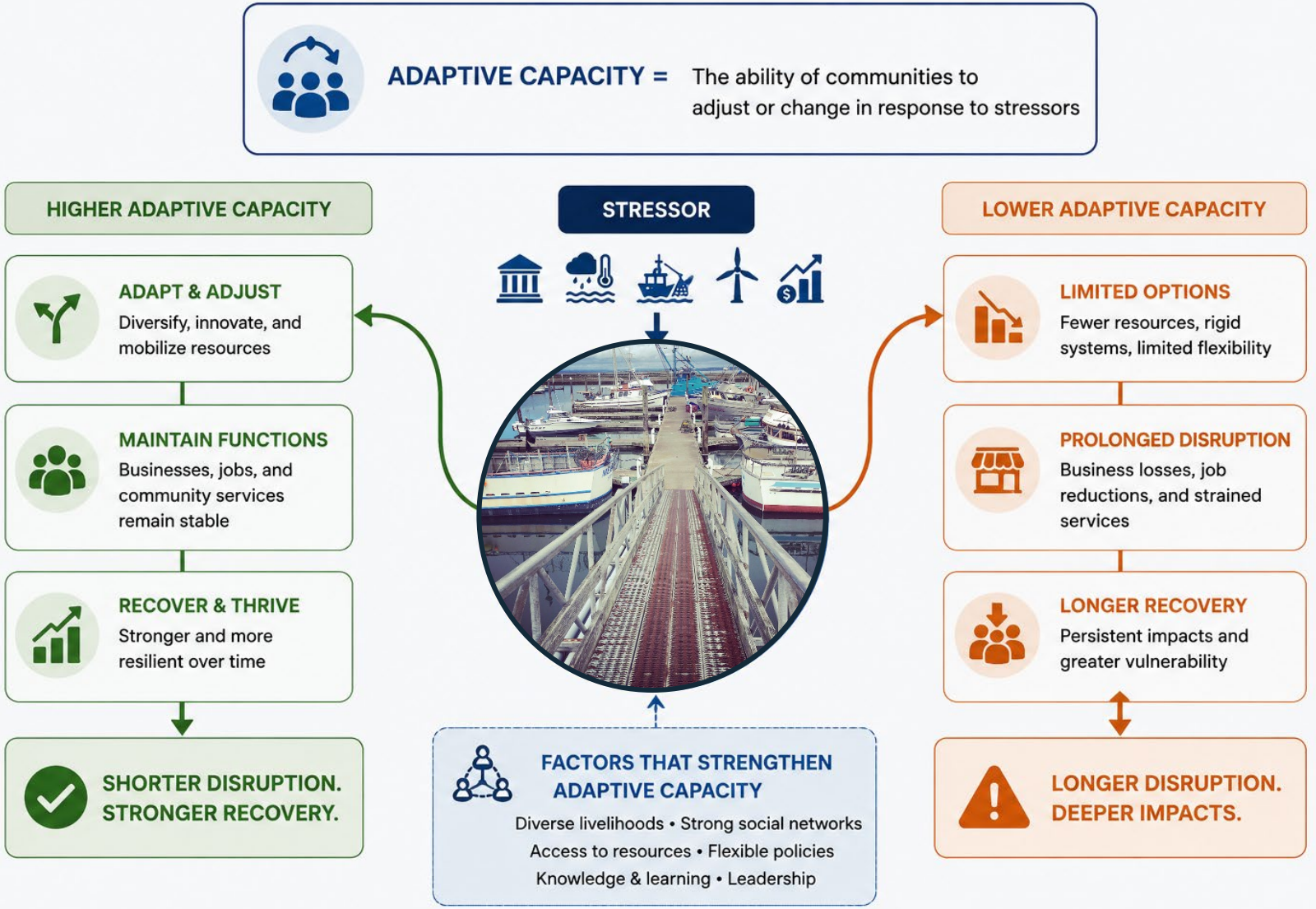
Sensitivity

- How likely is the community to experience impacts?
  - Dependence on fisheries
  - Social vulnerability



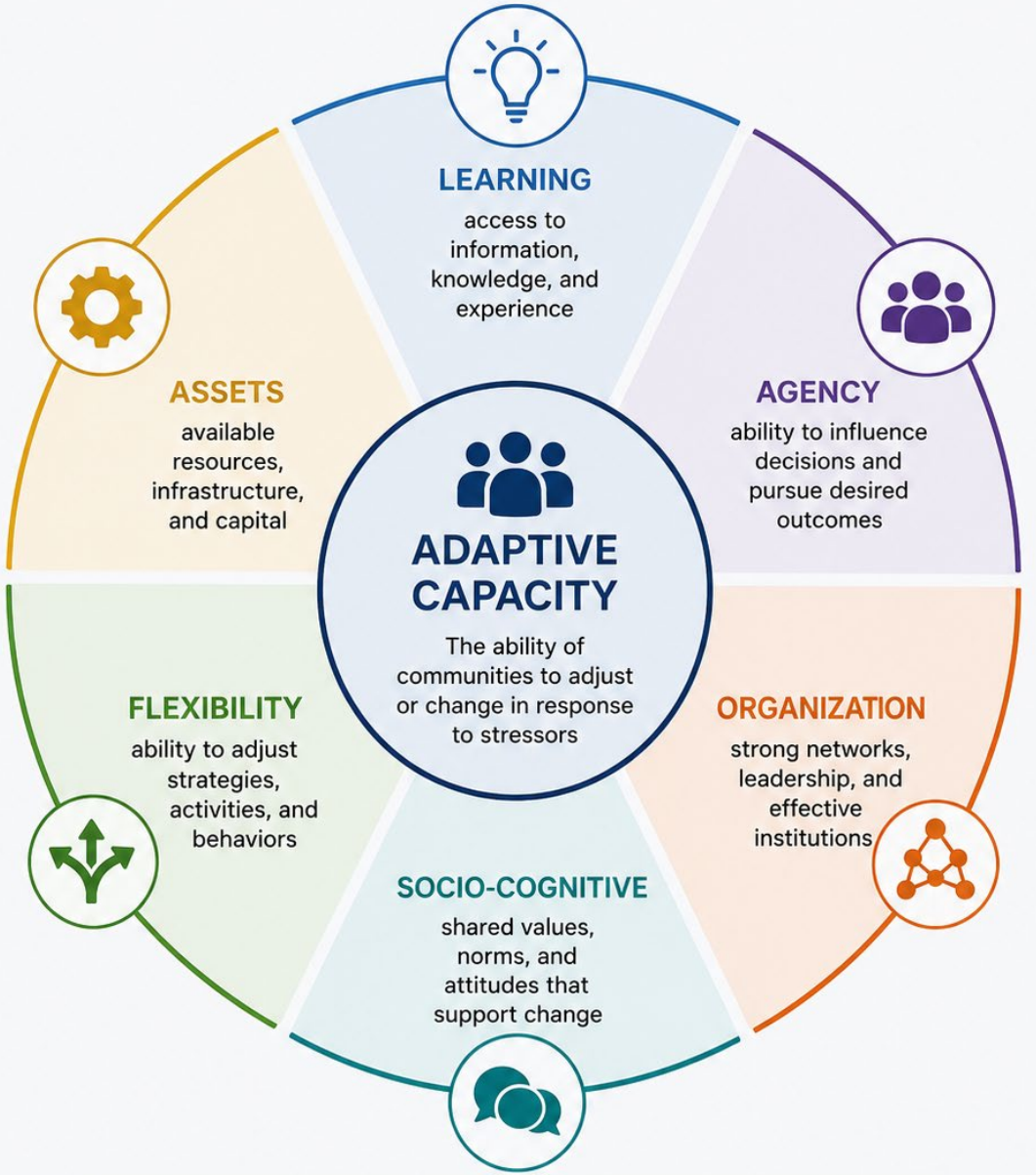
Adaptive Capacity

- How able is the community to adjust?



Adaptive Capacity

- How able is the community to adjust?
  - Six domains
- Assets and flexibility currently the most feasible to construct indicators of



Example Indicators

Component	Example Questions	Example Indicators
Exposure	What affects the community?	Climate Vulnerability Assessments (CVAs), management changes
Sensitivity	How dependent is the community?	Reliance, engagement, CSVI, fishery participation networks
Adaptive Capacity	How able is the community to adapt?	Fishery and industrial diversification

How This Could be Applied in the Framework

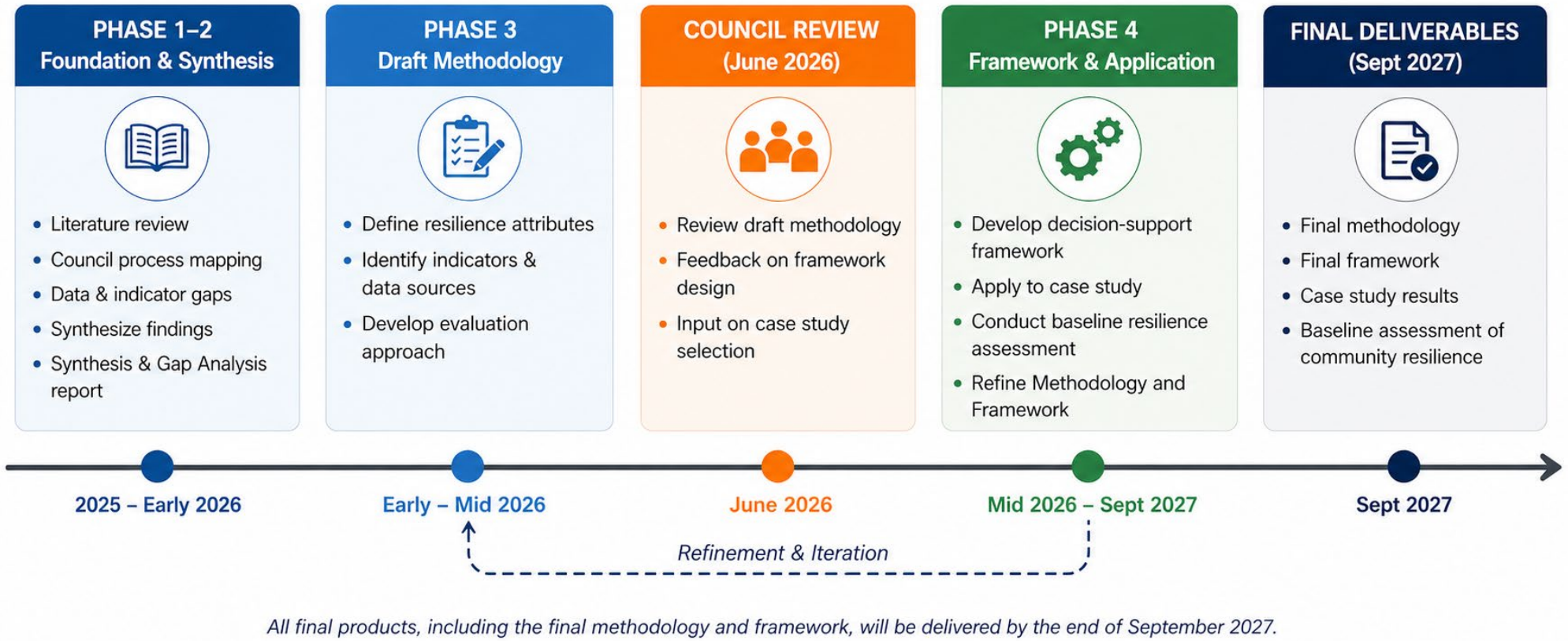
- Identify affected communities
- Assess exposure
- Evaluate sensitivity
- Consider adaptive capacity
- Compare alternatives

Challenges for Developing the Framework

- Missing indicators- CVAs, domains of adaptive capacity
- Confidentiality
- Fishing Community Scale
- Maintaining flexibility while providing something that can be consistently applied

Next Steps

- Incorporate any revisions or changes into the draft methodology
- Draft framework, case study, and baseline assessment for Review next June



All final products, including the final methodology and framework, will be delivered by the end of September 2027.



Questions?

Recommendations and Feedback



Case Study Options

- We will apply the methodology and framework in a case study of a Council decision.
- Type of case study has different tradeoffs:
  - Specifications Action:
    - The most common and routine application
    - Less likely to have long term consequences or considerations (e.g., exposure to climate threats)
  - Fishery Amendment:
    - May have opportunity to explore interaction with longer term impacts
    - CRDT may be less often used if unique, ad-hoc impact analysis methods are applied
  - Retrospective Analysis
    - More types of actions, allows comparison to previous approaches
  - Current Action
    - Requires coordination with ongoing impact analysis efforts, limits options

Desired Areas for Feedback

- Type of case study
  - Specifications or amendment
  - Retrospective or current action
- Recommendations to ensure the methodology and framework are useful for decision-making
  - Suggestions for other data, metrics, or indicators to consider
  - Feedback on types of outputs

Thank you!

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Extra Slides

Key Terms

- Fishing community:
  - Place-based and substantially engaged in or dependent on fisheries (MSA definition)
- Resilience:
  - The ability of a fishing community to withstand, recover from, and adapt to disturbances (here fishery management decisions)
  - Defined in the context of National Standard 8, to provide for the sustained community participation and minimize adverse economic impacts
- Vulnerability:
  - Pre-disturbance condition, inversely related to resilience
- Adaptive Capacity:
  - A component of resilience, the ability of a fishing community to adjust to disturbances

Exposure Indicators

Potential Exposure Indicators	Possible Source
Landings/effort in fishery in quest	Fish ticket data
Vessels/Anglers Exposed	Fish ticket and permit data
Species Climate Vulnerability	NOAA Fisheries' CVAs (McClure et al. 2023)
Sea Level Rise Index	CSVI (Jepson and Colburn 2013)
Storm Surge Index	CSVI (Jepson and Colburn 2013)
Relative Stability Index	Speir et al. 2023

Table 3

Sensitivity Indicators

Potential Sensitivity Indicators	Possible Sources
Commercial/recreational fishing engage	Colburn et al. 2017
Commercial/recreational fishing reliance	Colburn et al. 2017
Node strength	Participation networks (Fuller et al. 2017; Fisher et al. 2021)
Proportion of community revenue, participation, permits, and/or landings attributable to the fishery or species in question	PacFIN, federal and state permit data
Social Vulnerability	CSVI (Jepson and Colburn 2013, Harvey et al. 2021); SVI (Mamula et al. 2025)

Table 4

Adaptive Capacity Illustrative Indicators

Domain[1]	Attribute[2]	Possible Indicator (source)
Assets	Wealth and reserves	City budgets (US Census, Municipal Research and Services Center),; Self-reported incomes (West Coast Fishery Participation Survey)
	Economic diversity	Fisheries diversification (PacFIN), industrial diversification (Census and or BLS data)
Flexibility	Flexible and agile infrastructure	Number of species (or types of species) at processors (Processed Products Survey), temporal and species diversification
	Access to economic opportunity	Public transportation availability ,(National Transportation Atlas Database), non-fishery incomes (West Coast Fishery Participation Survey), industrial diversification (Census and or BLS data)
	Mobility	Harvester permit diversification (permit data)
	Place/livelihood attachment	Job/livelihood satisfaction measures (Holland, et al. 2020 – West Coast Fishery Participation Survey data)
Organization	Social capital	Number of active participants in community programs (compared to population), social capital measures by community (West Coast Fisheries Participation survey data)
	Technology advancement, adoption, and transfer	Age of vessels and/or equipment on boats, age of infrastructure
	Modular and open infrastructure	Ease/capacity of processor adaptation to novel species
Learning	Diversity of knowledge sources	Diversity of levels of education available, diversity in fields/industries, diversity in lived experiences
	Access to knowledge	Internet access, diversity of educational institutions, ease of access to relevant information sources
Agency	Agency	Measures of management process participation
Socio-Cognitive	Psychological and Cultural Capabilities	Place attachment, resilience mindset

Adaptive Capacity Realistic Indicators

Measure	Description	Citation	Source/data requirements	notes
Fishery diversification	Shannon diversity index of fisheries revenue landed in a given community across species/fishery groups	Holland and Kasperski 2016	CC ESR, fishticket data from PacFIN	Ex-post measure, but most readily accessible
Temporal diversification (harves	Shannon diversity index of revenue	Abbott et al 2023	Fishticket data from PacFIN	Ex-post measure, developed and investigated at the level of WC harvesters
Industrial diversification / econo stability	Shannon diversity index of employment growth in a community	Kim and Reimer 2025	Census or BLS employment data (vary in terms of scale and detail)	Developed at level of community in AK but equivalent employment data are not available on the WC, requiring tradeoffs
Fishing permit diversity (community)	Simpson diversity index of active fishing permits	Sethi, Reimer, and Knapp 2014	NMFS WCR federal permit data, state permit data (ODFW, CDFW, WDFW)	Ex-ante and developed at level of community in AK
Fishing permit diversity (harves	Shannon diversity index of permits held	Sakai, Abbott and Holland (2025)	NMFS WCR federal permit data, state permit data (ODFW, CDFW, WDFW)	Ex-ante developed for WC but at the level of individuals
Income diversification (harveste	Shannon diversity index of fishery and non-fishery income sources	Treakle, Abbott, and Holland (2023)	West coast fishery participation survey	Ex-post developed for WC harvesters

Table 6