

Ocean Acidification Policy: Lessons of Washington, California, and Beyond

Ryan P. Kelly, Ph.D., J.D.
University of Washington
School of Marine and Environmental Affairs

University of Oregon
School of Law
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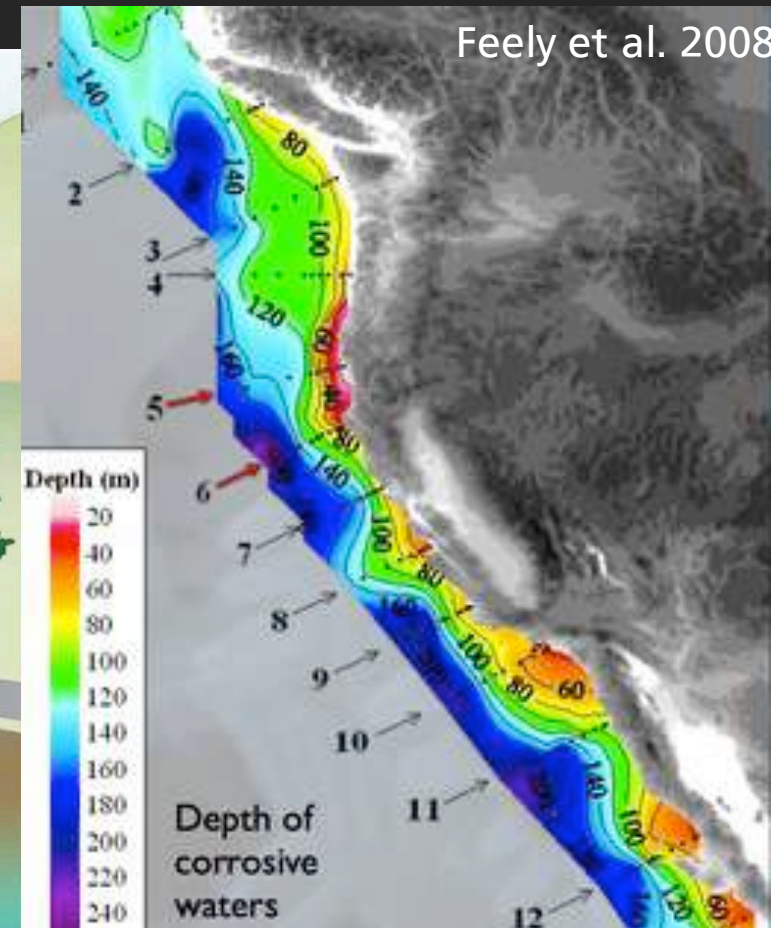
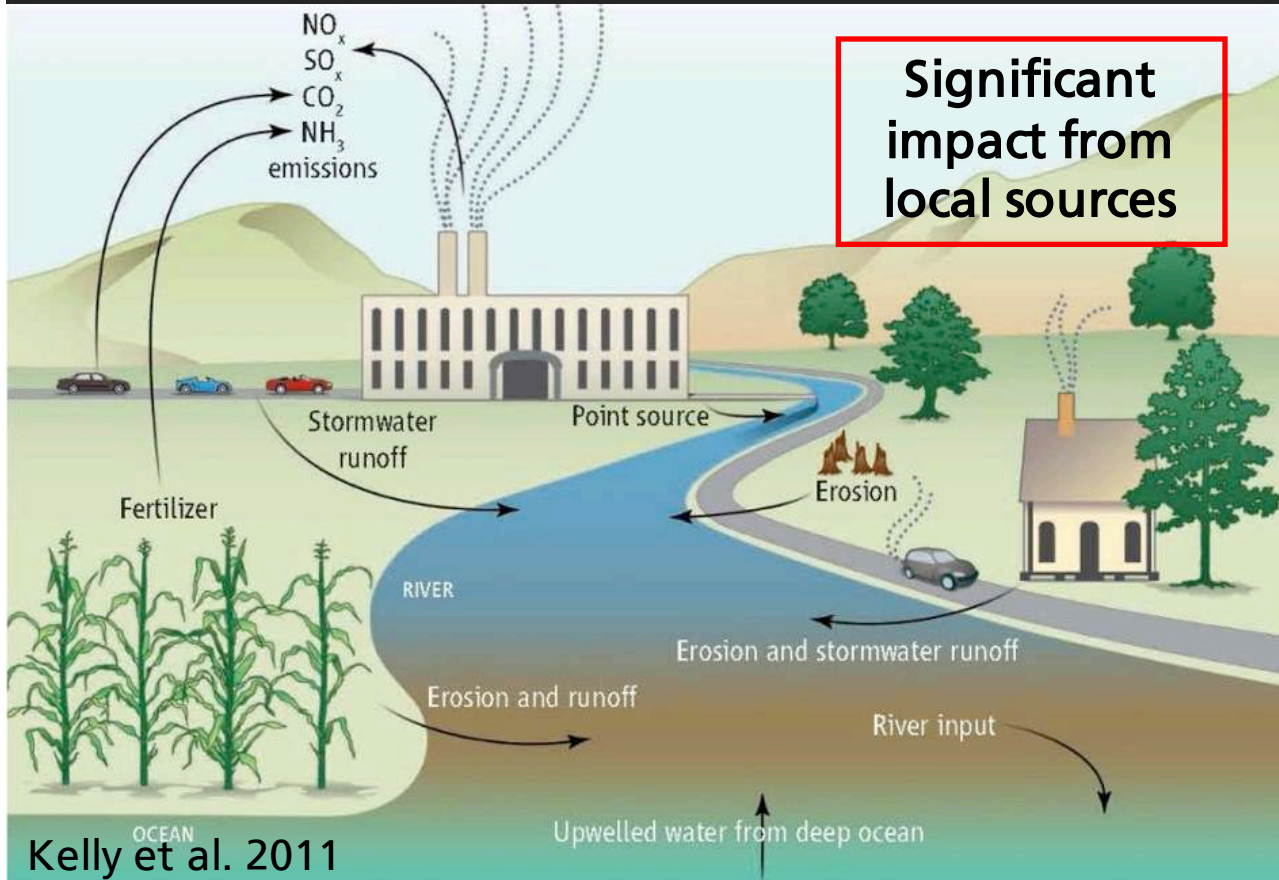
1. Goals
2. Matching Policy Tools with Sources of Acidification
3. Washington and California
4. Current OA/H Policy Landscape

Goals

1. Learn from WA and CA
2. Evaluate policy landscape
3. Think about strategy going forward

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OA is a Global CO₂ Problem *and* Additional Contributors Cause Local Variability



OA is a Global CO₂ Problem
and
Additional Contributors Cause Local
Variability

Two relevant sets of pollution targets:

- Global CO₂
- Local/Regional Exacerbating Factors

Where to aim?

Pro: The real problem

Con: Massive externalities, politicization, infrastructure



- Global CO₂
- Local/Regional Exacerbating Factors



Pro: Fewer externalities, likely more immediate results

Con: Not the primary problem

Match Policy Tools with Sources of Acidification

Large-Scale

Atmospheric pollutants

CO₂ regulation, cap/trade, etc.

Water pollutants

Water quality criteria

Small-Scale

Atmospheric pollutants

Smart growth, general plan req'ts,

Environ. Impact Statements

Nonpoint source water pollution

Collaborative watershed mgmt, N trading,

Nutrient Management Plans, TMDLs

Point source water pollution

Permitting stringency (NPDES permits)

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Washington (2011-present)

Motivation: Industry, with scientific support

Action: Funding, gov't/sci/public coordination

Forum: stakeholder council (MRAC), research center (WOAC)

Result: Attention, research, no change to ocean inputs

Prognosis: pending ongoing research, future lawsuits,
political appetite

California (2013-present)

Motivation: (government + other) scientists

Action: New legislation (task force, reduction program), coordination

Forum: Ocean Protection Council, Ocean Science Trust, Water Board

Result: Attention, directed research, + TBD

Prognosis: [This is the key question]

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Policy Landscape

- Small OA constituency (but impressive progress).
- Strong statutory authority (esp. in CA).
- Science/policy alignment fairly strong.
- Key scientific unknowns: *how much of a dent can we make, and what will it cost?*

Policy Landscape

- But research and monitoring do not mitigate the problem.
- Link OA/H to other ocean change (warming, HABs) may highlight other constituencies, incentives for action

Conclusion

- Action / attention in CA and elsewhere
- We need a bigger tent
- Focused science/policy iteration ongoing
(but science takes a while)
- Tradeoff: political feasibility vs. efficacy?
- Many open questions for discussion, such as:

Open Questions

- How to align OA action with existing social priorities?
- Administrative vs. legislative targets?
- What are we aiming at, anyway?
- What does social adaptation look like?
- What is minimum set of scientific info?

Thanks.

Extra slides

The U.S. Legal Landscape: The Available Tools

Major environmental laws:

Law	Funding/Source	Implementation
Clean Water Act	Federal	State and Local
Clean Air Act	Federal	State and Local
NEPA and Equiv	Federal and State	Federal and State
Coastal Zone Management Act	Federal	State and Local
TSCA?	Federal	Federal
[Insert Creativity Here]	Various	Various

OA-Specific Law:

Federal Ocean Acidification and Monitoring Act (2009)
(Research, Coordination, Monitoring)

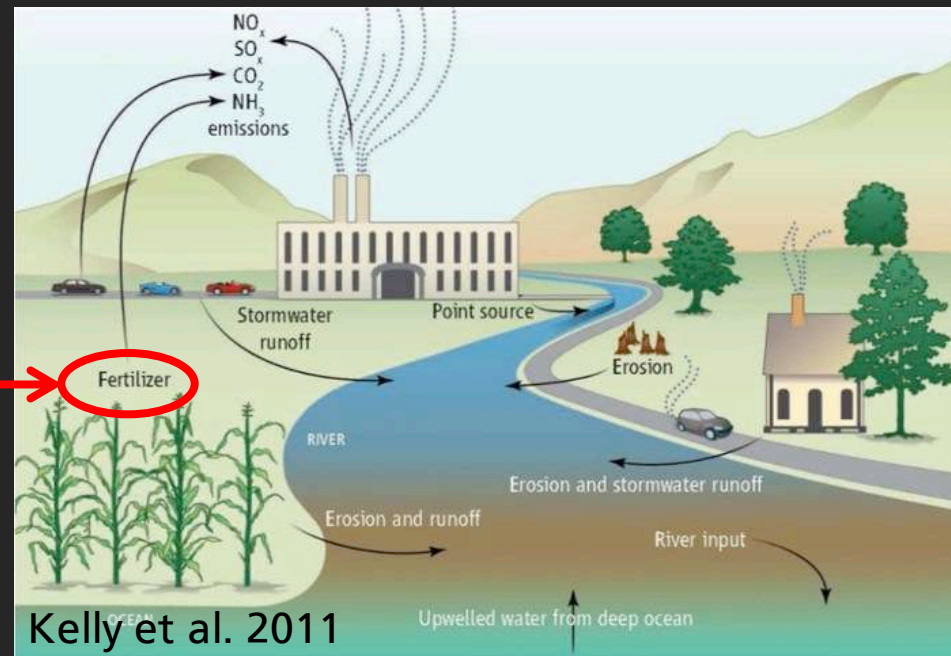
Matching Policy Tools with Sources of Acidification

Clean Air Act

Coastal Zone Management Act

Local land use laws & policies

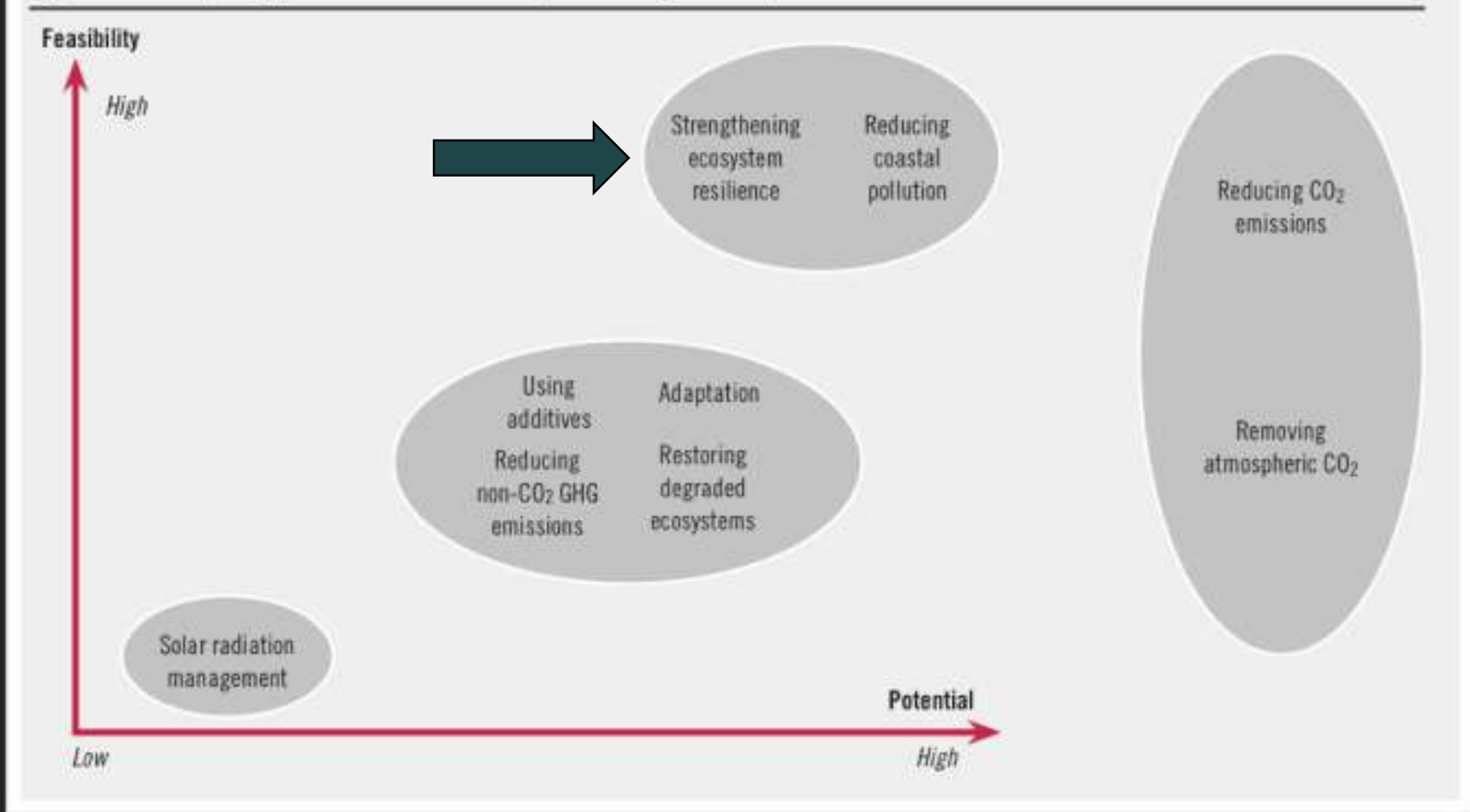
Clean Water Act



Matching Policy Tools with Sources of

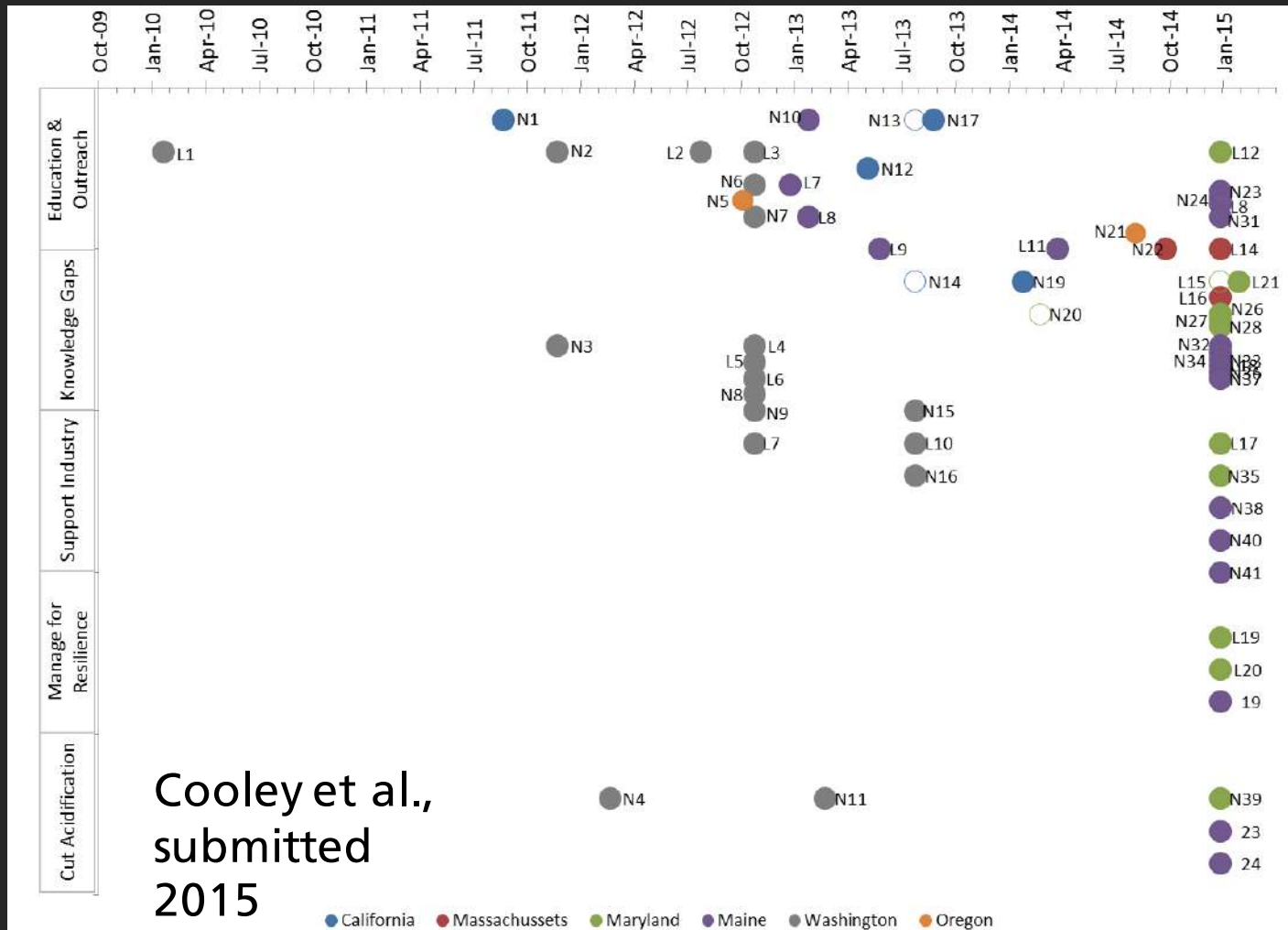
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Figure 1. Comparing potential and feasibility of management options



Billé et al., Fig 1

1. Litigation-driven : WA, OR
2. Industry-driven : WA, OR, ME
3. Manager-driven : Great Barrier Reef (Australia)
4. Scientist-driven : WA, OR, CA, MD, MA, FL, others



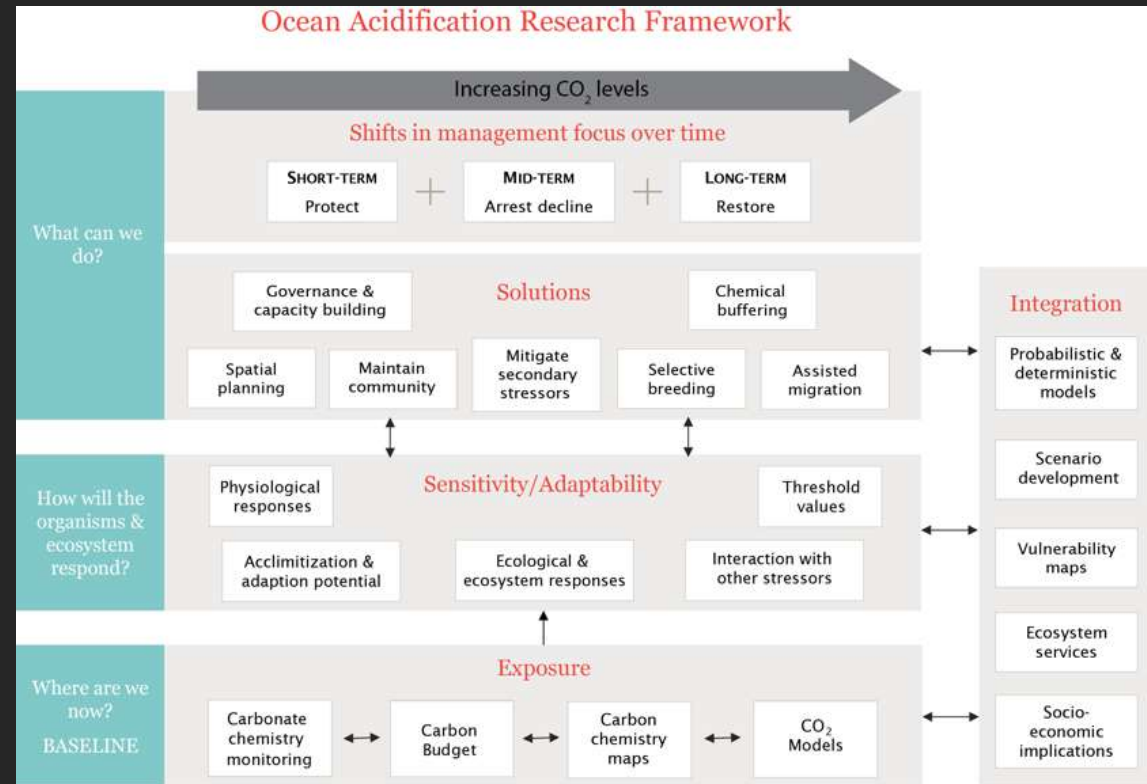
Washington

- Litigation over § 303(d)
- Industry at risk
- Blue Ribbon Panel
 - OA research at UW
 - Marine Resources Advisory Council
 - Support for recommendations
- No substantive legal change, but increased awareness



Great Barrier Reef

- Co-management, not litigation
- Broad authority
- Best-case
- Likely to prioritize:
Water quality, connectivity



Barriers to Implementation

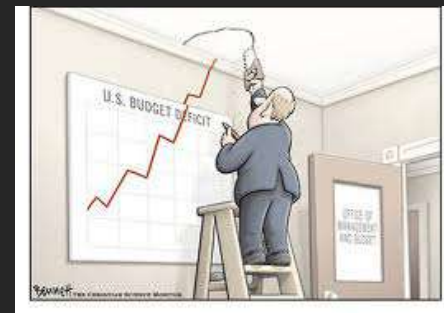
Externalities



Discount Rate



Vested Interests



Surmounting Barriers to Implementation

Externalities

Eased when spatial scale of harm matches jurisdictional scale
Hence, nutrients likely easier to fix than CO₂

Discount Rate

Circumscribed analysis (e.g., Puget Sound) increases data density
Source budget is critical
Reduces uncertainty by increasing information
Discount rate decreases

Vested Interests

Blue Ribbon Panel as example of mobilizing aligned interests
Leverage existing politics, public concern with Puget
Sound

Budget Priorities

OA actions consistent with existing environmental
priorities

Washington's Blue Ribbon Panel

42 Recommendations in 6 Categories
(Some prioritized)

Summary:

- Reduce CO₂ emissions
- Reduce land-based contributors
- Increase ability to adapt/mitigate
- Improved monitoring and research
- Education/Outreach

Response from Governor:

Funding, Directions to Implement, OA center at UW

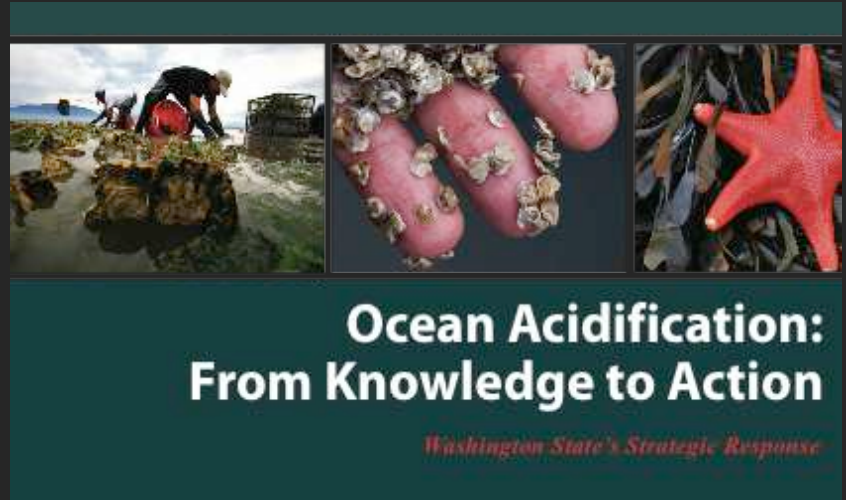


Table S-1. Blue Ribbon Panel Recommendations: Key Early Actions

<i>Reduce Carbon Dioxide Emissions</i>	Work with international, national, and regional partners to advocate for a comprehensive strategy to reduce carbon dioxide emissions. <i>(Action 4.1.1)</i>	<i>Invest in Washington's Ability to Monitor and Investigate the Effects of Ocean Acidification</i>	Establish an expanded and sustained ocean acidification monitoring network to measure trends in local acidification conditions and related biological responses. <i>(Action 7.1.1)</i>
	Enlist key leaders and policymakers to act as ambassadors advocating for carbon dioxide emissions reductions and protection of Washington's marine resources from acidification. <i>(Action 4.1.4)</i>		Quantify key natural and human-influenced processes that contribute to acidification based on estimates of sources, sinks, and transfer rates for carbon and nitrogen. <i>(Action 7.2.1)</i>
<i>Reduce Local Land-Based Contributions</i>	Implement effective nutrient and organic carbon reduction programs in locations where these pollutants are causing or contributing to multiple water quality problems. <i>(Action 5.1.1)</i>		Determine the association between water and sediment chemistry and shellfish production in hatcheries and in the natural environment. <i>(Action 7.3.1)</i>
	Support and reinforce current planning efforts and programs that address the impacts of nutrients and organic carbon. <i>(Action 5.1.2)</i>		Conduct laboratory studies to assess the direct effects of ocean acidification, alone and in combination with other stressors, on local species and ecosystems. <i>(Action 7.3.2)</i>
<i>Increase Our Ability to Adapt to and Remediate the Impacts of Ocean Acidification</i>	Develop vegetation-based systems of remediation for use in upland habitats and in shellfish areas. <i>(Action 6.1.1)</i>		Establish the ability to make short-term forecasts of corrosive conditions for application to shellfish hatcheries, growing areas, and other areas of concern. <i>(Action 7.4.1)</i>
	Ensure continued water quality monitoring at the six existing shellfish hatcheries and rearing areas to enable real-time management of hatcheries under changing pH conditions. <i>(Action 6.2.1)</i>		Identify key findings for use by the Governor, Panel members, and others who will act as ambassadors on ocean acidification. <i>(Action 8.1.1)</i>
	Investigate and develop commercial-scale water treatment methods or hatchery designs to protect larvae from corrosive seawater. <i>(Action 6.2.3)</i>		Increase understanding of ocean acidification among key stakeholders, target audiences, and local communities to help implement the Panel's recommendations. <i>(Action 8.1.2)</i>
	Identify, protect, and manage refuges for organisms vulnerable to ocean acidification and other stressors. <i>(Action 6.3.2)</i>		Provide a forum for agricultural, business, and other stakeholders to engage with coastal resource users and managers in developing and implementing solutions. <i>(Action 8.1.4)</i>
		<i>Inform, Educate, and Engage Stakeholders, the Public, and Decision Makers in Addressing Ocean Acidification</i>	
		<i>Maintain a Sustainable and Coordinated Focus on Ocean Acidification</i>	Charge, by gubernatorial action, a person in the Governor's Office or an existing or new organization to coordinate implementation of the Panel's recommendations with other ocean and coastal actions. <i>(Action 9.1.1)</i>
			Create an ocean acidification science coordination team to promote scientific collaboration across agencies and organizations and connect ocean acidification science to adaptation and policy needs. <i>(Action 9.1.2)</i>