Scientific Principles and Governance Framework for Coastal and Marine Spatial Planning

Melissa M Foley & Erin E Prahler
Center for Ocean Solutions

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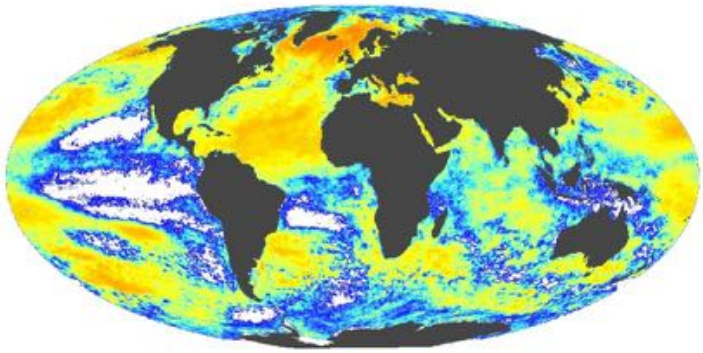
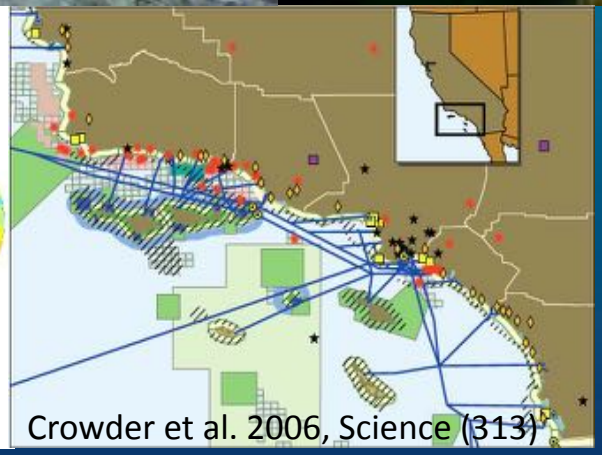
Decline of ocean ecosystems

www.reefkeeping.com

R. Loomis





Crowder et al. 2006, Science (313)

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Coastal and marine spatial planning

"a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas."

Goals of coastal and marine spatial planning

- Healthy ecosystems
- Agency coordination
- Conflict reduction
- Proactive planning

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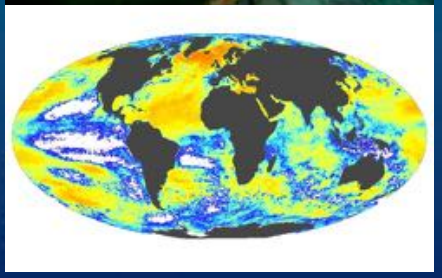
Ecosystem objectives of CMSP



- Proactively manage ocean resources using an ecosystem-based approach
- Develop plans based on sound science and spatial information
- Increase compatibility between users and the ecosystem
- Evaluate alternatives & trade-offs
- Manage for healthy oceans & the sustainable delivery of ecosystem services

Ecological principles for CMSP

1. Maintain native species diversity

- abundance, richness, genetic, functional redundancy

* productivity, vulnerability, stability, resilience

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Foley et al. 2010, Marine Policy (34)

Ecological principles for CMSP

1. Maintain native species diversity

2. Maintain habitat diversity & heterogeneity

- representation, arrangement, dynamic habitats

* diversity, productivity, connectivity, shelter

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Foley et al. 2010, Marine Policy (34)

Ecological principles for CMSP

1. Maintain native species diversity

2. Maintain habitat diversity & heterogeneity

3. Maintain populations of key species

- keystone, foundation, top predators, basal prey

* diversity, stability, resilience, ecosystem engineering

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Ecological principles for CMSP

1. Maintain native species diversity

2. Maintain habitat diversity & heterogeneity

3. Maintain populations of key species

4. Maintain connectivity between populations

- population persistence, flow of subsidies

* diversity, resilience, recovery

Foley et al. 2010, Marine Policy (34)

Ecosystem considerations

- Vulnerability
  - likelihood that a species or habitat will sustain losses due to a disturbance

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Ecosystem considerations

- Vulnerability
  - likelihood that a species or habitat will sustain losses due to a disturbance
- Cumulative impacts
  - the total impact on ecosystems caused by the effects of multiple human activities that co-occur in space and/or time
  - synergism: total impact > A + B + C

Ecosystem considerations

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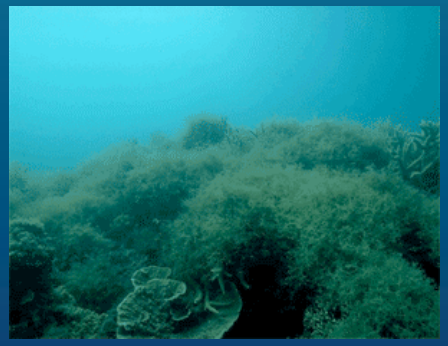
- Climate change
  - impacts from sea level rise, temperature increase, and ocean acidification

Ecosystem considerations



- Vulnerability
  - likelihood that a species or habitat will sustain losses due to a disturbance, natural or human-induced
- Cumulative impacts
  - the overall impact on ecosystems caused by the effects of multiple human activities that co-occur in space and/or time
- Climate change
  - impacts from sea level rise, temperature increase, ocean acidification, and inundation
- Resilience
  - measure of the persistence of ecosystems and their ability to resist change or recover to a similar state following a disturbance

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Bringing it all together…

Comprehensive Ecosystem Assessments

- NOAA's Integrated Ecosystem Assessment
- DFO's Eastern Scotian Shelf Assessment

1. Assess resources, ecosystem components, and human activities/impacts
2. Develop management indicators
3. Evaluate risk and uncertainty

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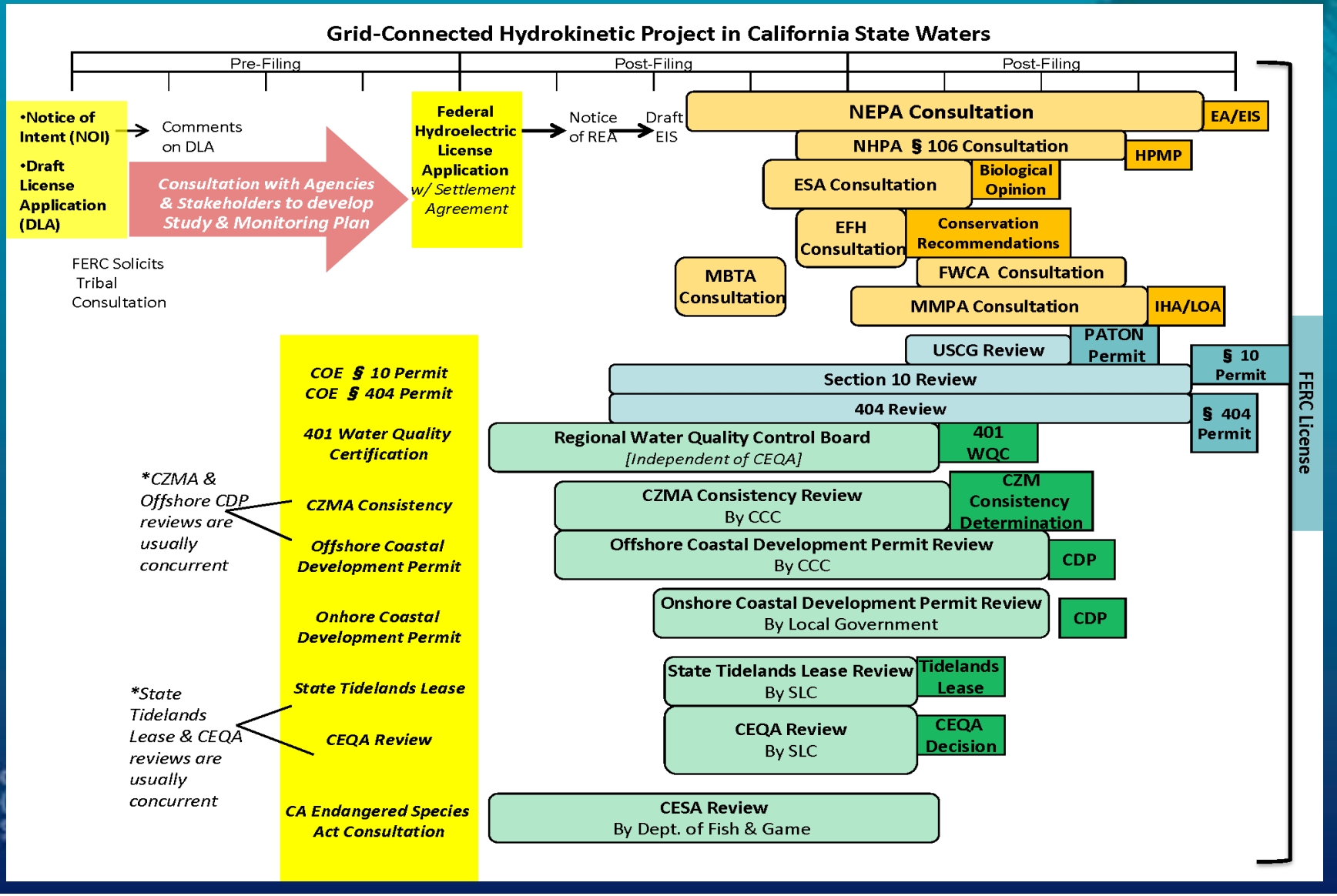
Agency coordination



Conflict reduction

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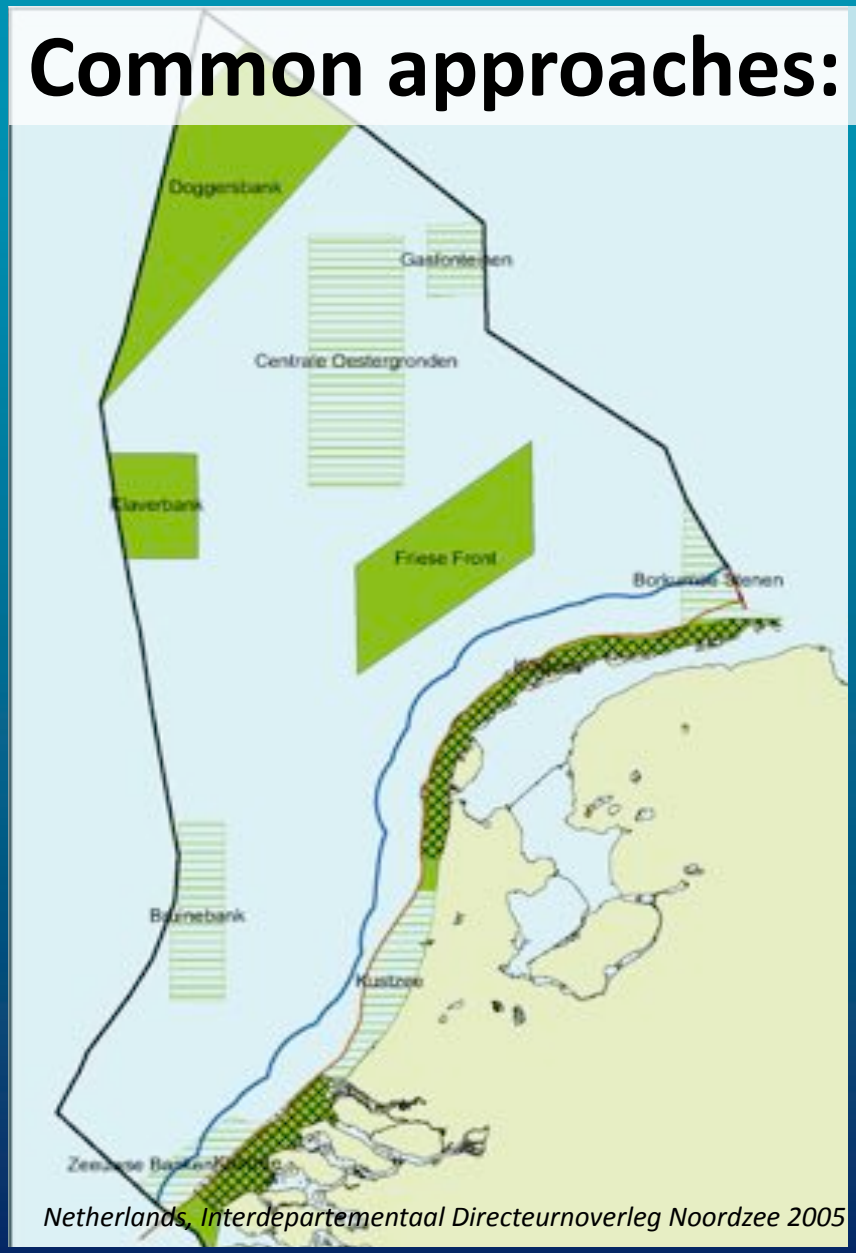
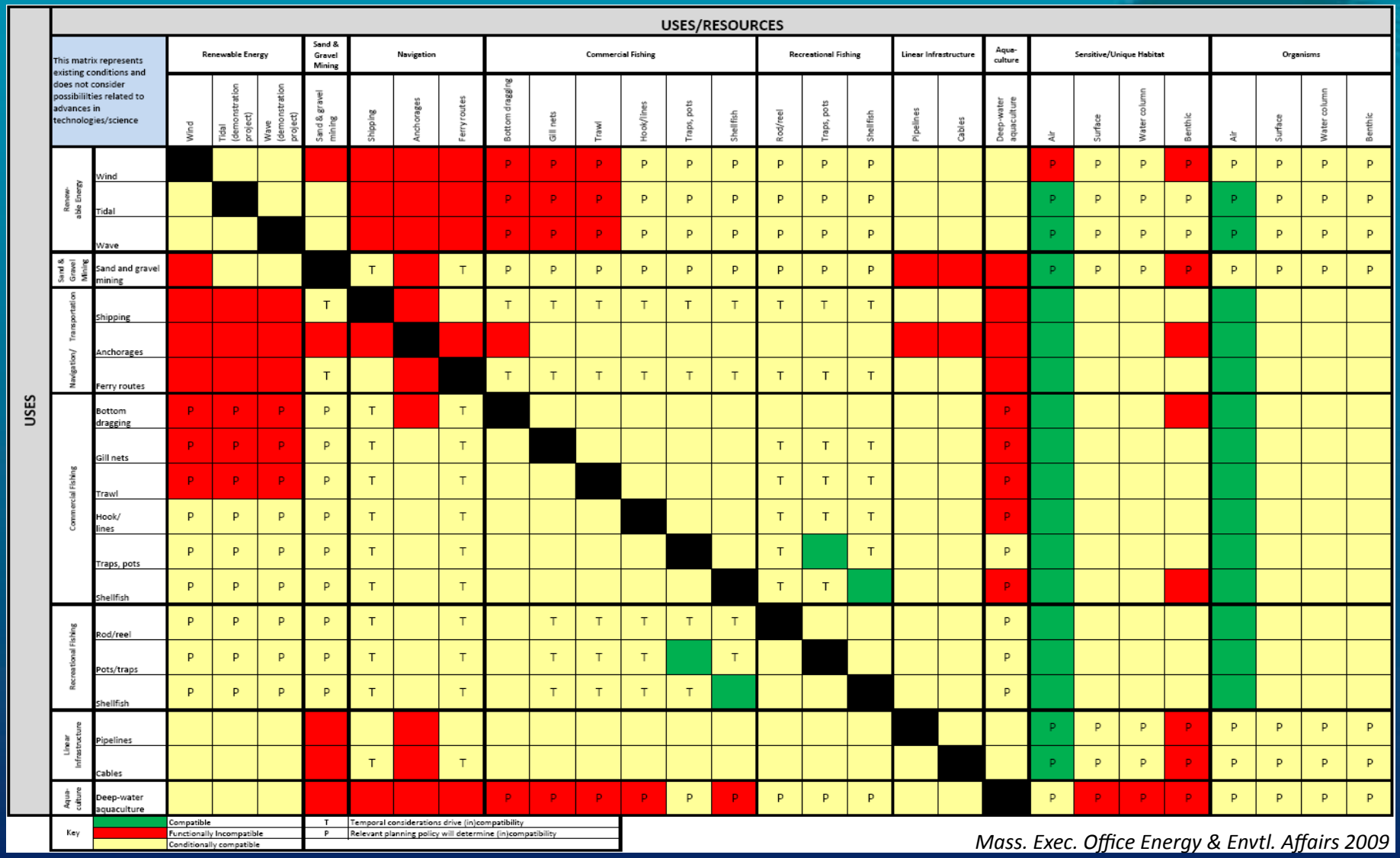
Common approaches: locate features of value



Netherlands, Interdepartementaal Directeurnoverleg Noordzee 2005

Mass. Exec. Office Energy & Envtl. Affairs 2009

Common approaches: assess compatibility



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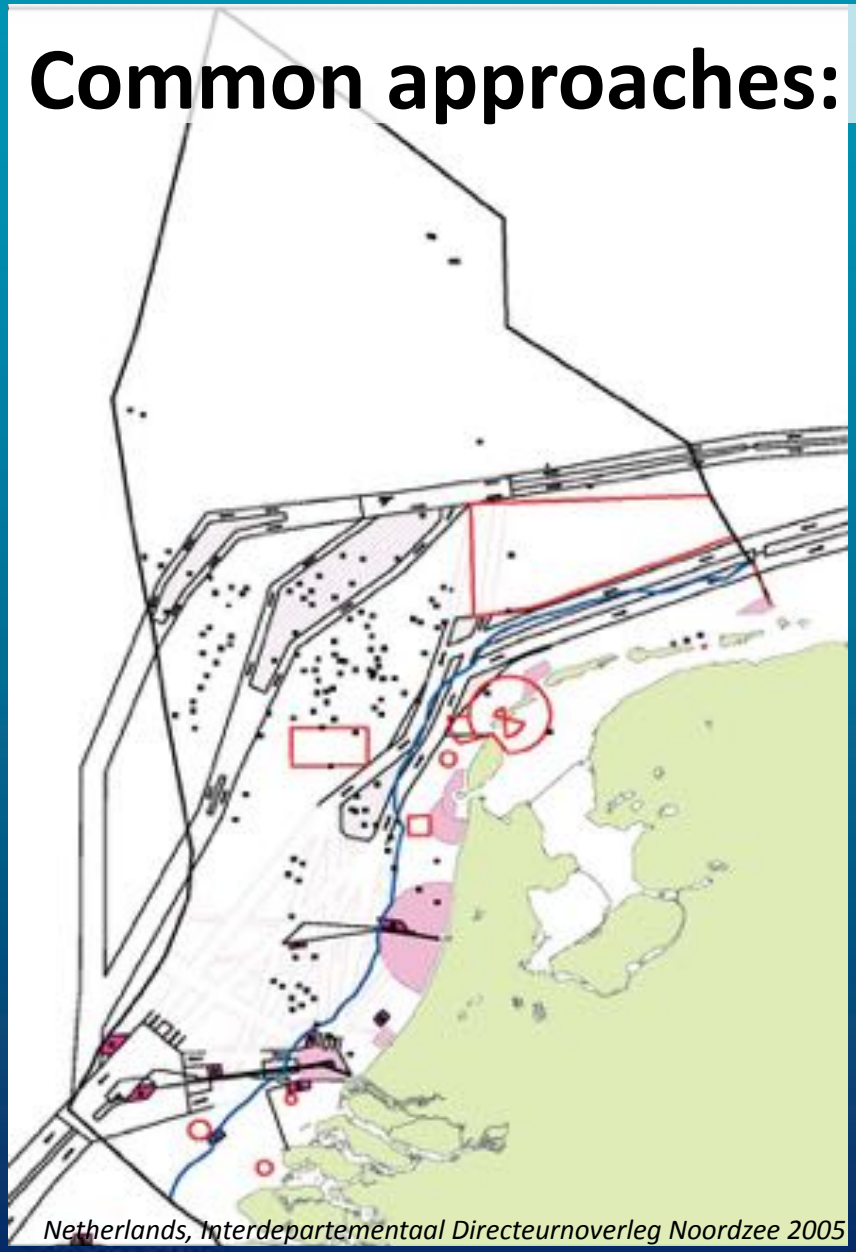
Common approaches: determine constraints



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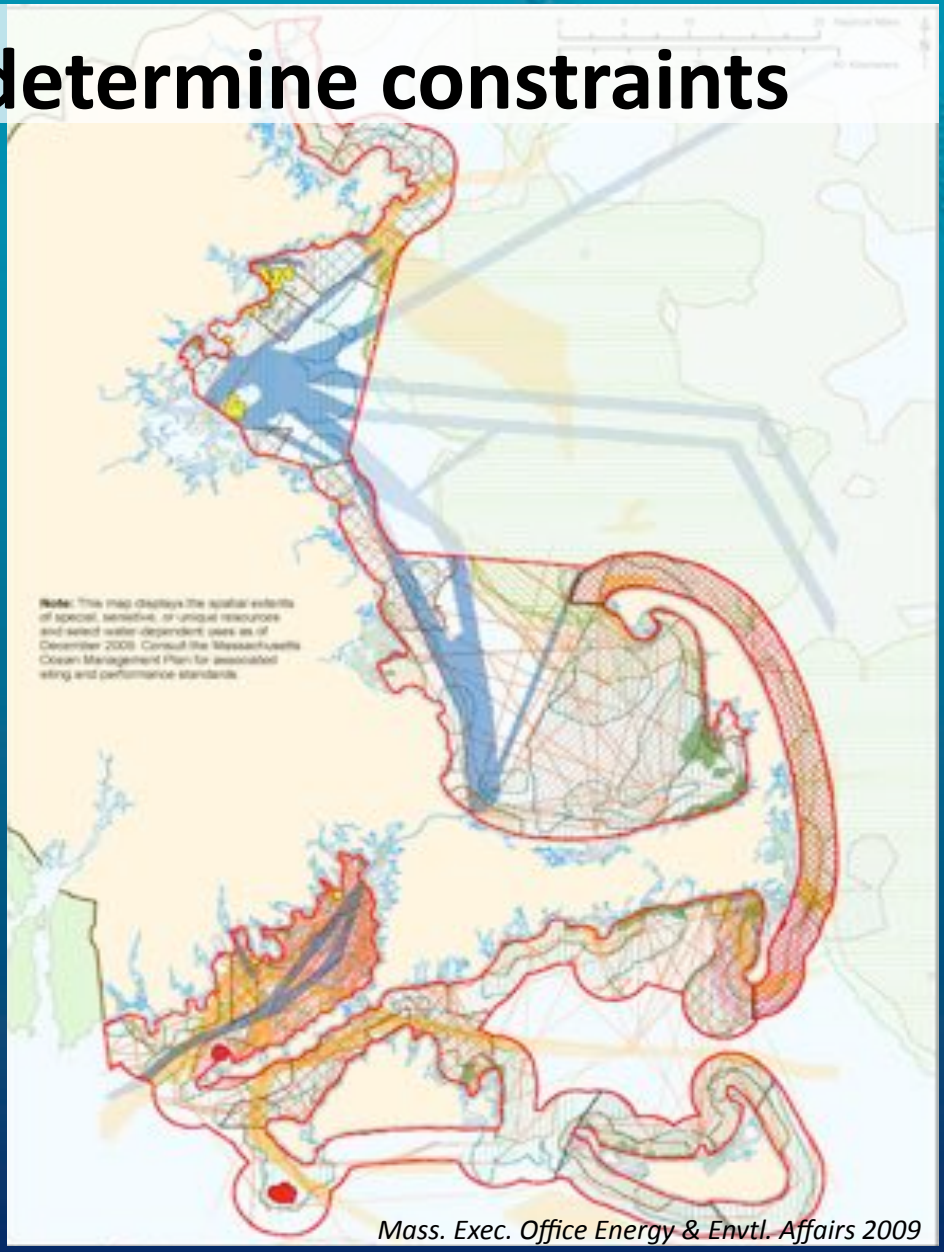

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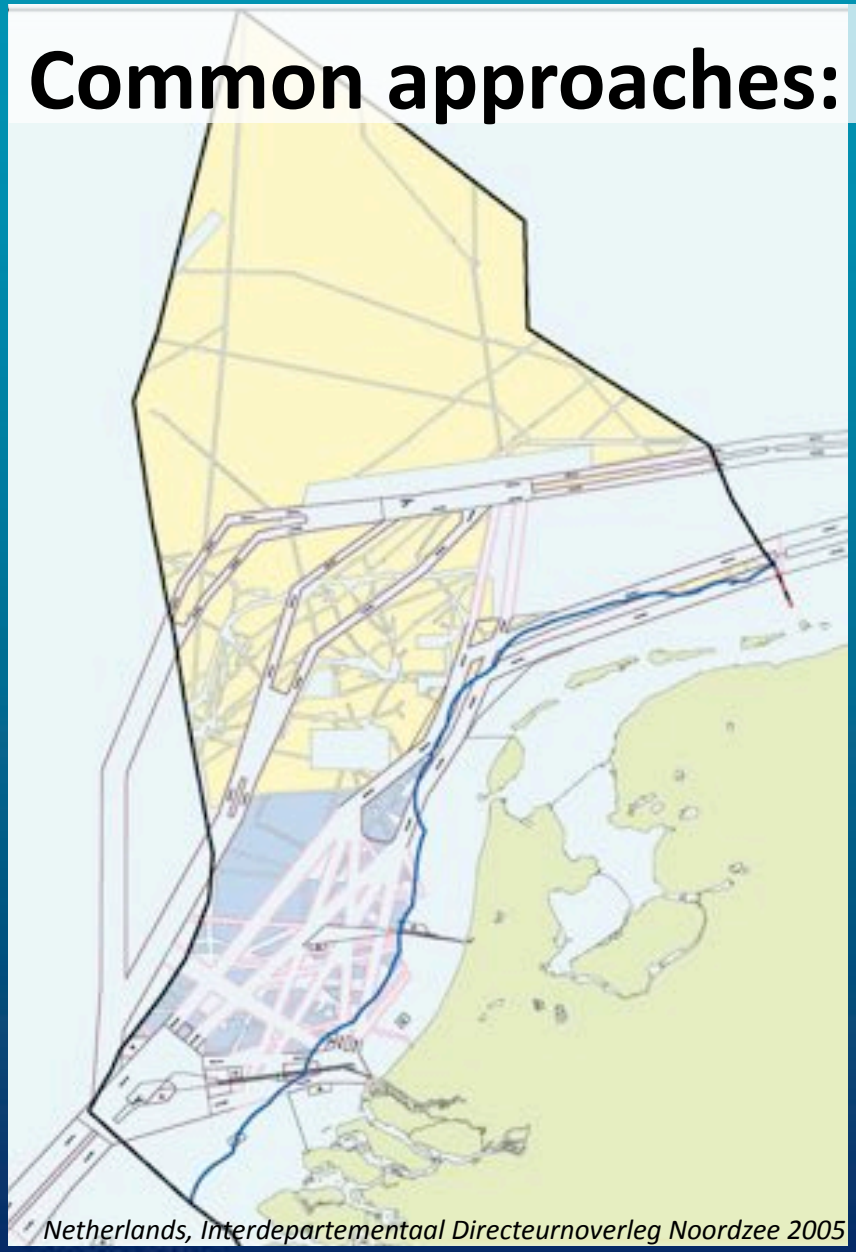
Common approaches: identify opportunities



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Enabling proactive planning

1. Strong and clear legal mandate

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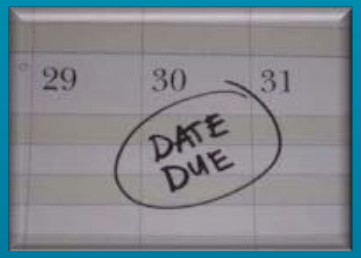

4. Firm deadlines

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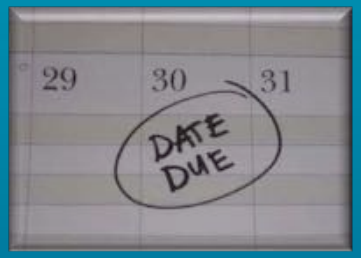

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5. Willingness and capacity of civil society to engage

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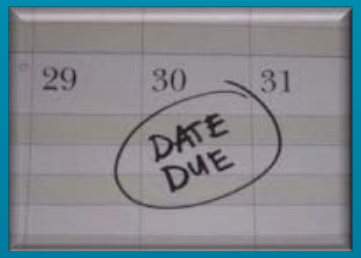

4. Firm deadlines

5. Willingness and capacity of civil society to engage

6. Transparent process design and structure

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Take away points

- CMSP should be ecosystem based
- Plans should incorporate vulnerability, cumulative impacts, climate change, & resilience
- CMSP should facilitate agency coordination, reduce conflicts, and enable proactive planning

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mmfoley@stanford.edu **eprahler@stanford.edu**

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