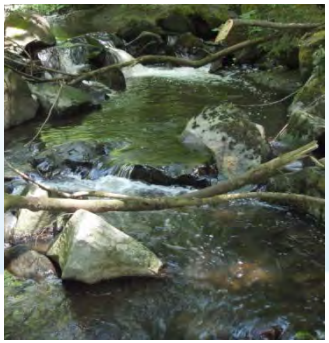
May 2nd, 1:30 PM - 3:00 PM

Applying Ecosystem Services Analysis to the Shellfish Industry

Marlene Meaders
Confluence Environmental Compa, marlene.meaders@confenv.com

CONFLUENCE
ENVIRONMENTAL COMPANY



"Out of intense complexities intense simplicities emerge."
– Winston Churchill

SERVICES

Environmental Project Delivery

Ecosystem Analysis, Mitigation & Restoration

Regulatory Strategy, Compliance & Permitting

Applying Ecosystem Services Analysis to Shellfish Aquaculture

Marlene D. Meaders

May 2, 2014

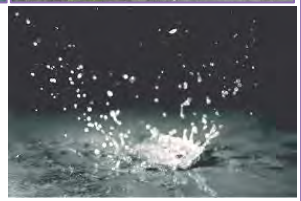
Presentation Outline

- Ecosystem Services Defined
- Concept of No-Net-Loss
- Ecosystem Services as a Management Tool
- Eelgrass and Water Treatment: Supporting and Regulating Services
- Could Shellfish Filtration Be a Driver?
- Cumulative Impacts Analysis
- Summary

Ecosystem Services Defined

Provisioning





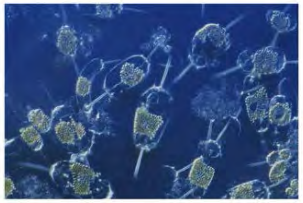
Fish and shellfish harvest
Fresh water
Natural medicines

Regulating

Moderation of extreme events
Nutrient/waste-water treatment

Ecosystem Services

Supporting

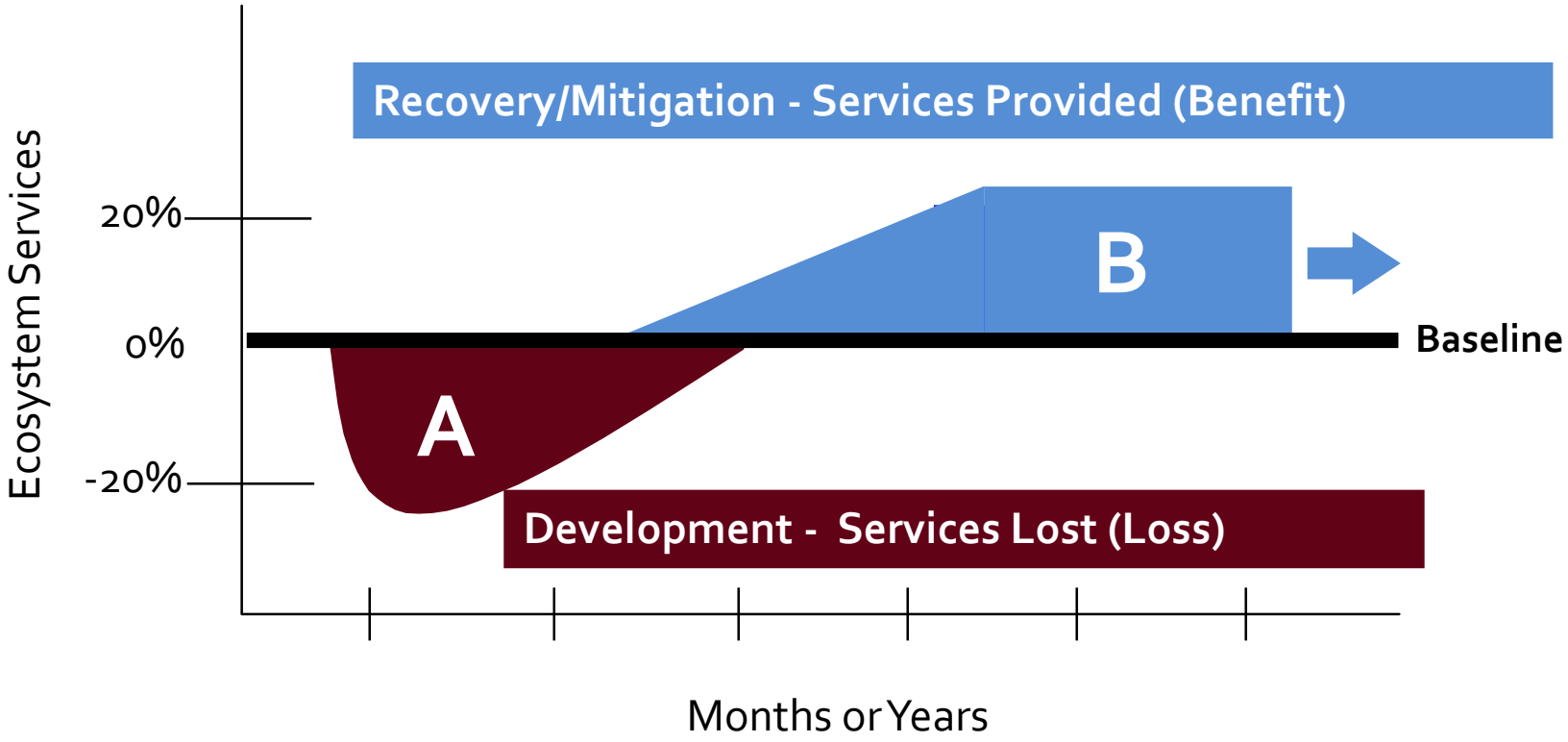



Primary productivity
Biodiversity
Habitat

Cultural


Recreation
Education
Spiritual
Existence value

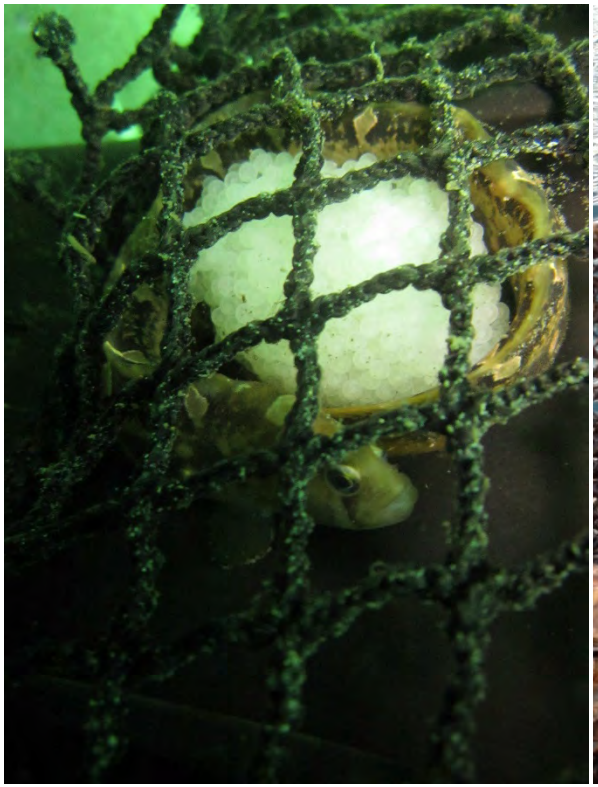
Concept of No-Net-Loss



Goal: To ensure that development projects preserve ecosystem services on which humans are dependent

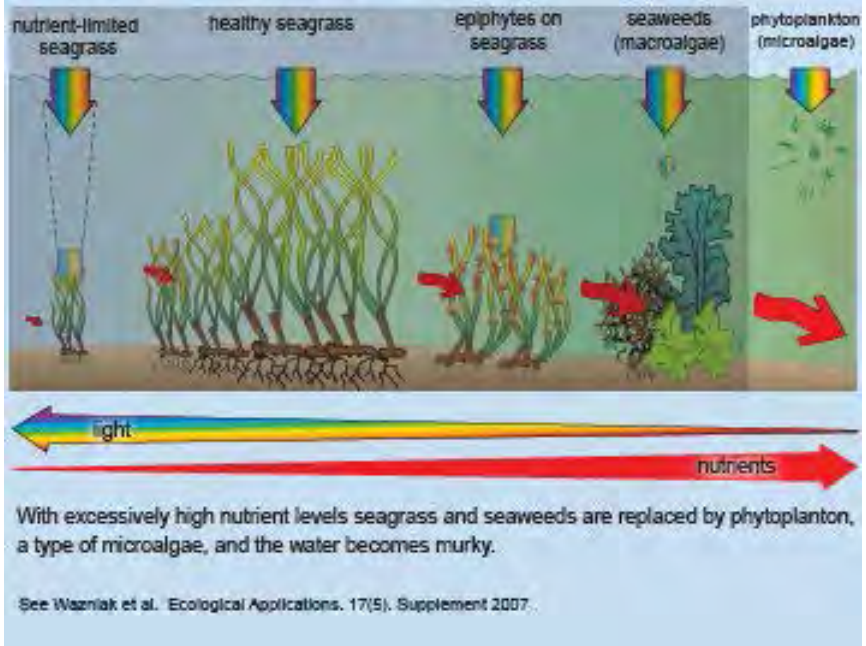
Ecosystem Services as a Management Tool

- Identify potential service losses and benefits


- Identify processes that contribute to <u>final</u> ecosystem services broken down into a flow through time

Eelgrass and Water Treatment: Supporting and Regulating Services



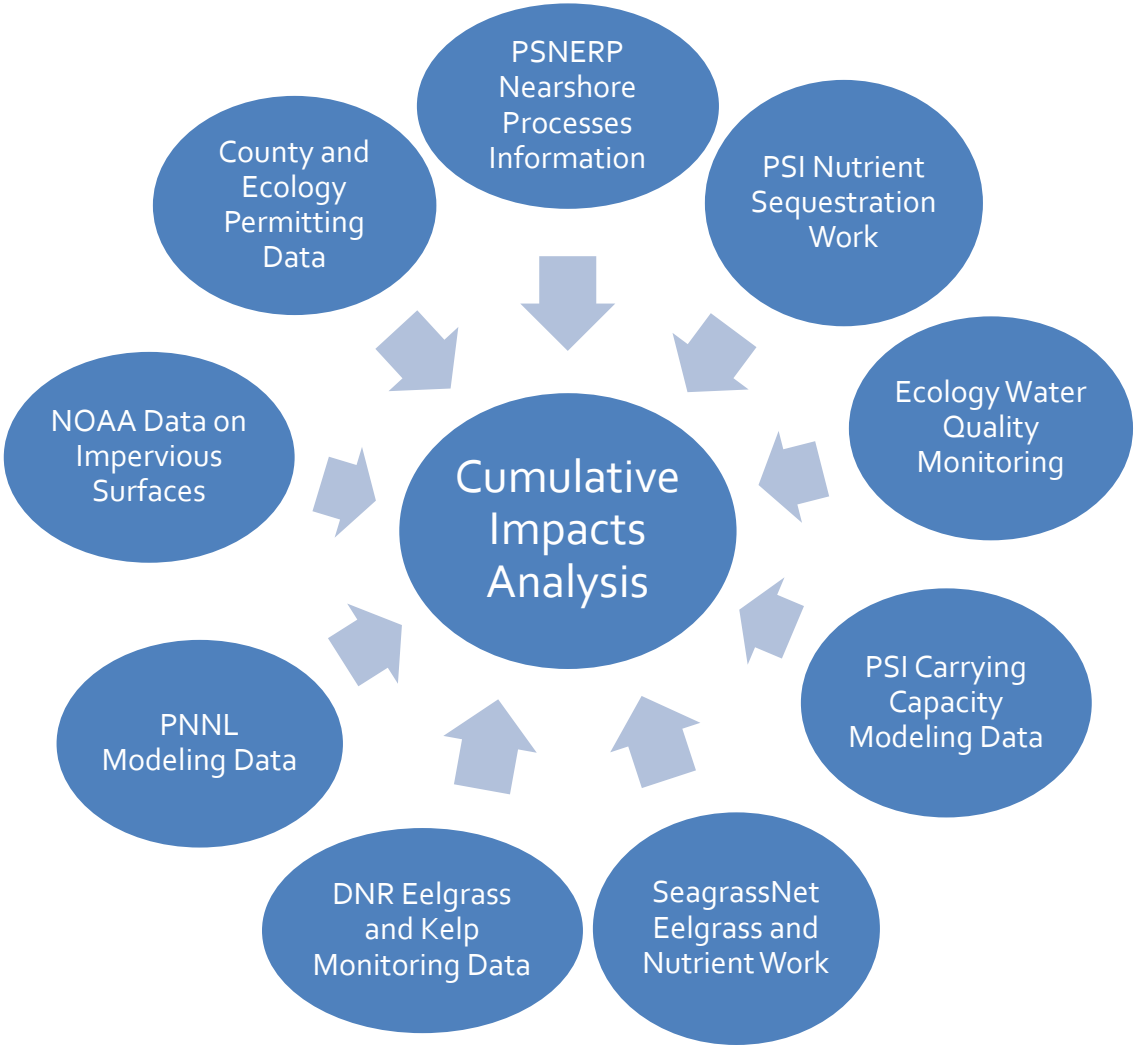
- Presence of shellfish culture can improve water quality by removing anthropogenic sources of nutrients through filtration
- Shellfish feeding can modulate phytoplankton blooms and associated nutrient cycling

Could Shellfish Filtration be a Driver?

- King County South Treatment Plant:
  - Average monthly flow = 288 million L/day
  - Maximum average monthly flow = 503 million L/day
- Fredonia Generating Station in Skagit County:
  - Maximum daily flow = 140,060 L/day

Species	Feeding Rate	
	Individual (L/oyster/day)	**Culture Density** (L/acre/day)
Pacific Oyster	70	100 million (cluster) 20 million (single)
Geoduck Clam	100	4.6 million
Eastern Oyster	55	
Olympia Oyster	45	

Cumulative Impacts Analysis

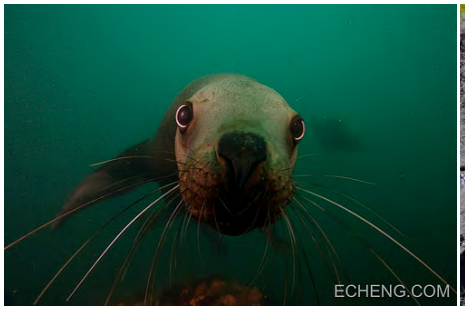


Summary

- Ecosystem services is a potentially powerful tool to understand the environmental trade-offs in different management decisions.

- What we are trying to understand primarily is what are the services losses and benefits, and even more importantly, what are the drivers in the ecosystem.

- There is an increasing need to provide this science to create sustainable management decisions for shoreline development. Let's work together to create creative solutions that both protect and provide these services.




Questions?

Marlene D. Meaders

Senior Marine Biologist

marlene.meaders@confenv.com

CONFLUENCE
ENVIRONMENTAL COMPANY