DRAFT ECOLOGICAL MONITORING SYNTHESIS 2018

Lindsay Aylesworth, Marine Reserves Project Leader

OUTLINING OUR CONVERSATION

1. Why Attempt an Ecological Synthesis Report Now?

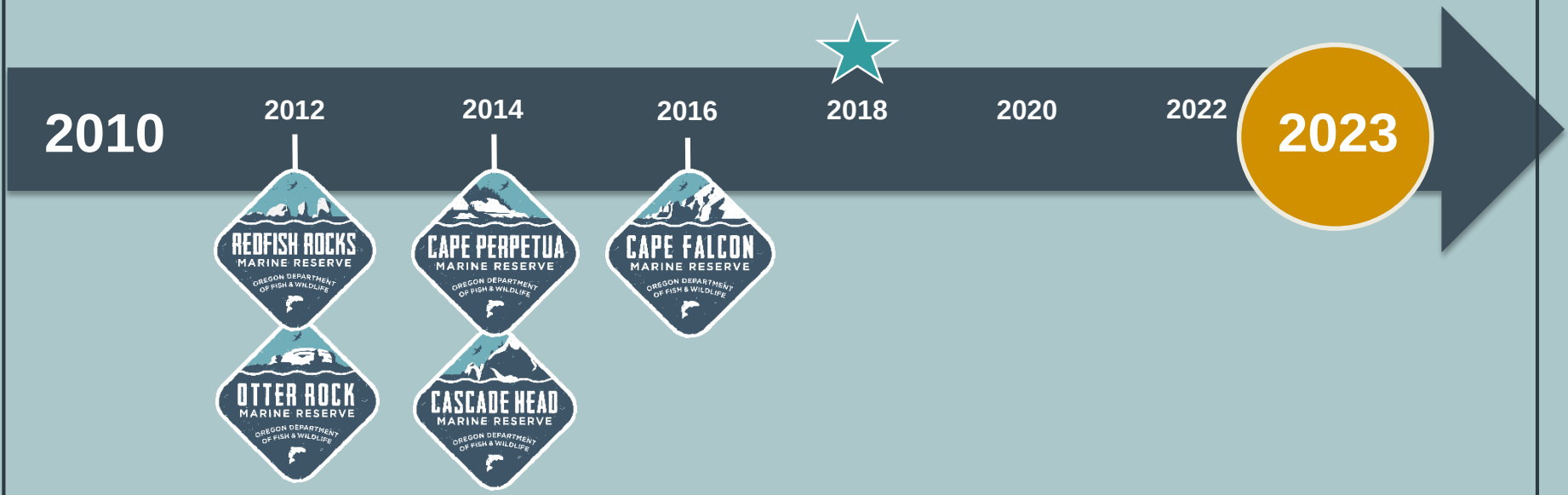
2. Addressing Key Definitions & Focal Species

3. Data Summarization: Invertebrates & Cascade Head

4. Quantifying Trade-offs & Value for $

WHY NOW?


2023


2010
2012
2014
2016
2018
2020
2022
2023
REDFISH ROCKS
MARINE RESERVE
OREGON DEPARTMENT OF FISH & WILDLIFE
OTTER ROCK
MARINE RESERVE
OREGON DEPARTMENT OF FISH & WILDLIFE
CAPE PERPETUA
MARINE RESERVE
OREGON DEPARTMENT OF FISH & WILDLIFE
CASCADE HEAD
MARINE RESERVE
OREGON DEPARTMENT OF FISH & WILDLIFE
CAPE FALCON
MARINE RESERVE
OREGON DEPARTMENT OF FISH & WILDLIFE

WHY NOW?

- Considerations for Review Criteria & 2023 Evaluation
- Identify Data Gaps to Address Between Now and 2023 Evaluation
- Shift Focus to Analyses
  - Characterize Initial Conditions

OREGON'S MARINE RESERVE GOALS

- **Conservation**

  Conserve habitats and biodiversity

- **Research**

  Serve as scientific reference sites to inform marine reserve and nearshore ocean management

- **Communities**

  Avoid significant adverse impacts to ocean users and coastal communities

(OPAC 2008)

ECOLOGICAL OBJECTIVES

- **Assess & Monitor**
  Marine habitats and biodiversity

- **Increase Knowledge**
  Serve as scientific research sites to learn more about Oregon's nearshore marine environments

- **Detect Long-term Change**
  Identifying the effects of marine reserve protection from other large-scale changes

(OPAC 2008)

6 CORE ECOLOGICAL RESEARCH QUESTIONS

- Oceanography
- Habitats
- Algal, Fish & Invertebrates
- Species-Habitat Correlations

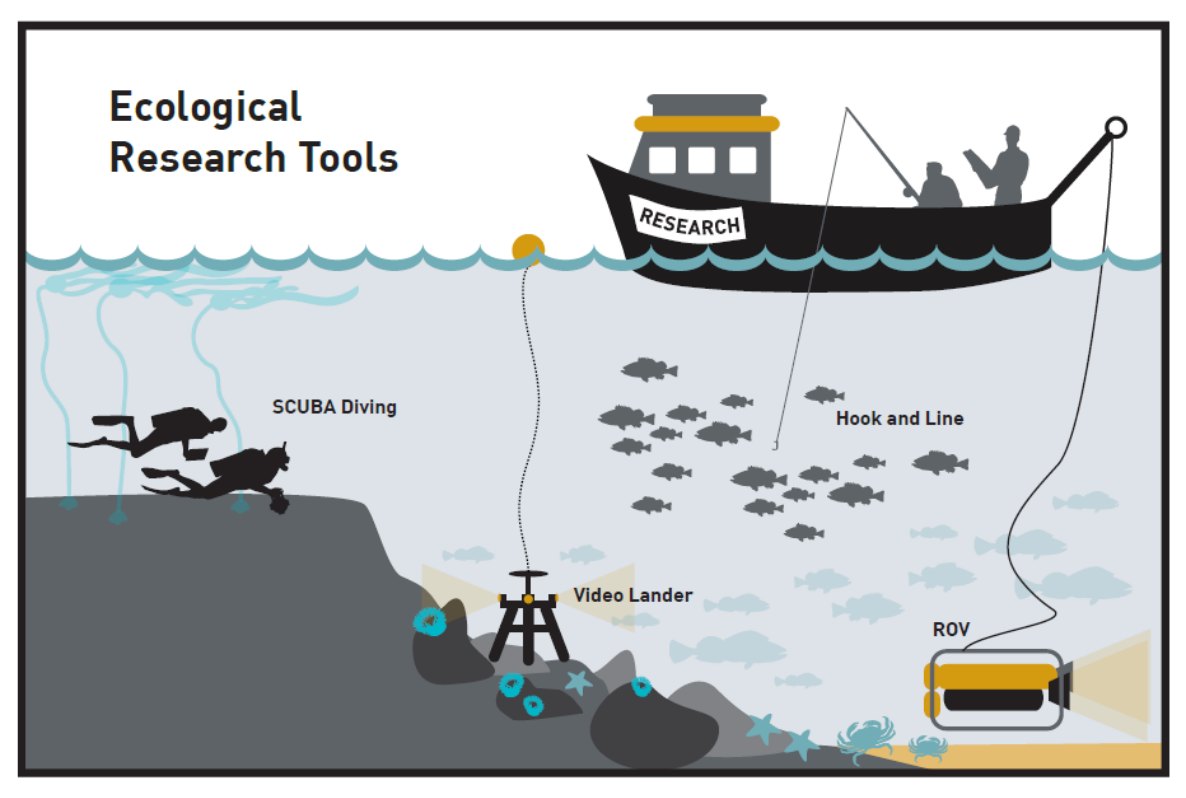
} Change / Time

- Prohibition of Human Activities & Community Structure
- Patterns Consistent Throughout Reserves?

WHERE ARE WE NOW?

- Changes to Comparison Areas
- Trialed West-Coast Gears and Sampling Strategies in OR Nearshore
- Extended the time period to characterize initial conditions from 2 years to 5 years (2015)
  - Validate Comparison Areas
  - Understand Natural Variation in System
  - Biological Change Slow to Occur
  - CA Precedent – 5 years, all post-implementation

CHALLENGES TO DEVELOPING A LONG TERM MONITORING PLAN



- Data Sharing & Compatibility
- Meaningful & Appropriate:
  - Data Collection
  - Management
  - Analyses
- New Expertise to ODFW & Oregon

ANOTHER CHALLENGE – DEFINING KEY CONCEPTS

- Biodiversity
- Community Structure
- Habitat
- Species-Habitat Correlations
- Change Over Time

- What about focal species?

BIODIVERSITY – OPAC GUIDELINES

Diversity	OPAC 2008 Definition	Available Data
Species	Variety & abundance of sp. in an ecosystem	Species id, counts & abundance
Ecological	Variety of types of biological communities found on Earth	Species id, counts & abundance by habitat type
Genetic	Genetic variation that occurs among members of the same species	None
Functional	Variety of biological processes or functions of a particular ecosystem	None

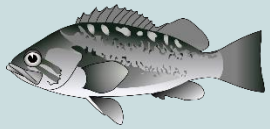
5 BIODIVERSITY MEASURES PROPOSED

- Richness
  - # of species present
- Simpson's Evenness
  - Degree to which individuals are split amongst species
- Berger Parker
  - Abundance most abundant sp.
- Shannon's Diversity
  - Uncertainty in system about identity of unknown individual
- Simpson's Diversity
  - Probability that two randomly chosen individuals belong to dif species

SELECTING FOCAL SPECIES

- Literature Review
- Expert Consultation
- MR Planning Process Documentation
- For Fish:
  - List of Observed Species
  - Evaluate Against Criteria From Lit Review

FISH FOCAL SPECIES: 12 TOP PRIORITIES

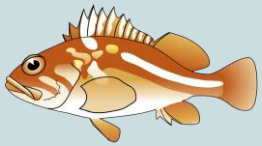


Black Rockfish

Blue Rockfish

Canary Rockfish

China Rockfish



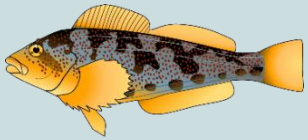
Copper Rockfish

Deacon Rockfish

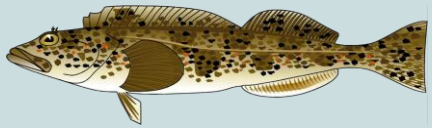
Quillback Rockfish

Yelloweye Rockfish

Striped Surfperch



Kelp Greenling



Lingcod

Cabezon

Art work: Larry Allen CSUN & Oregon Coast Aquarium

ADDITIONAL FOCAL SPECIES CONSIDERATIONS

- Public Interest Species?
- Based Only Off Current Observations

DATA SUMMARIZATION TAKEAWAYS: QUANTITY & QUALITY VARIES

			Year					
Region	Site	Habitat	2012	2013	2014	2015	2016	2017
Cascade Head	Cascade Head MR	Intertidal				O, U	O	O
		Shallow Rocky Subtidal	L	D, L	D, L	-	-	D, L
		Deep Rocky Subtidal	R	R	-	R	-	R
	Cavalier CA	Intertidal	-	-	-	-	-	-
		Shallow Rocky Subtidal	-	-	D	-	-	D
		Deep Rocky Subtidal	-	R	-	R	R	R
	Schooner Creek CA	Intertidal	-	-	-	-	-	-
		Shallow Rocky Subtidal	-	D	-	-	-	D
		Deep Rocky Subtidal	R	-	-	-	R	R
	Cape Foulweather CA	Intertidal	-	-	-	-	-	-
		Shallow Rocky Subtidal	L	-	-	L	-	D, L
		Deep Rocky Subtidal	-	-	-	-	-	-

D = Scuba Diver

L = Lander

R = ROV

O = ODFW Intertidal

U = UCSC Intertidal

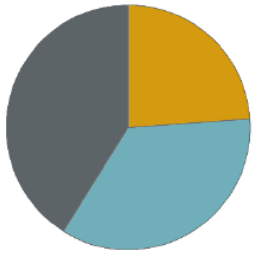
TAKEAWAY: DATA MANAGEMENT, QUALITY & QUANTITY

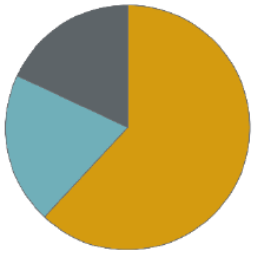
- Intertidal - Unavailable
- Scuba Diver - Unavailable
- Lander
  - 54-44% drops useable
  - Majority drops = 0's
  - 19 sp over 5 years
  - 489 individuals
- Rov (2017 only)
  - 49 sp.
  - 39,340 individuals

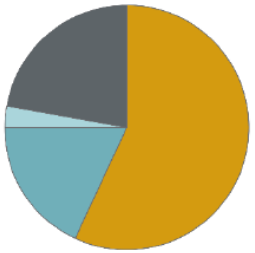
TRIALING PROGRAMMATIC SUMMARY FOR 2023: VALUE FOR $

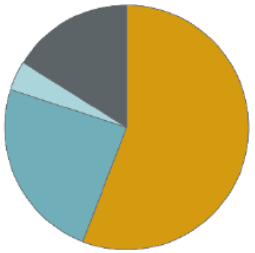
- Varied Budget

	2009 - 2011	2011 - 2013	2013 - 2015	2015 - 2017
Monitoring Budget	**$ 190,305**	**$ 290,537**	**$ 336,519**	**$ 274,107**
	State: $ 127k Grants: $ 64k	State: $ 210k Grants: $ 81k	State: $ 270k Grants: $ 67k	State: $ 258k Grants: $ 16k









PROGRAMMATIC ANALYSIS: VALUE FOR $

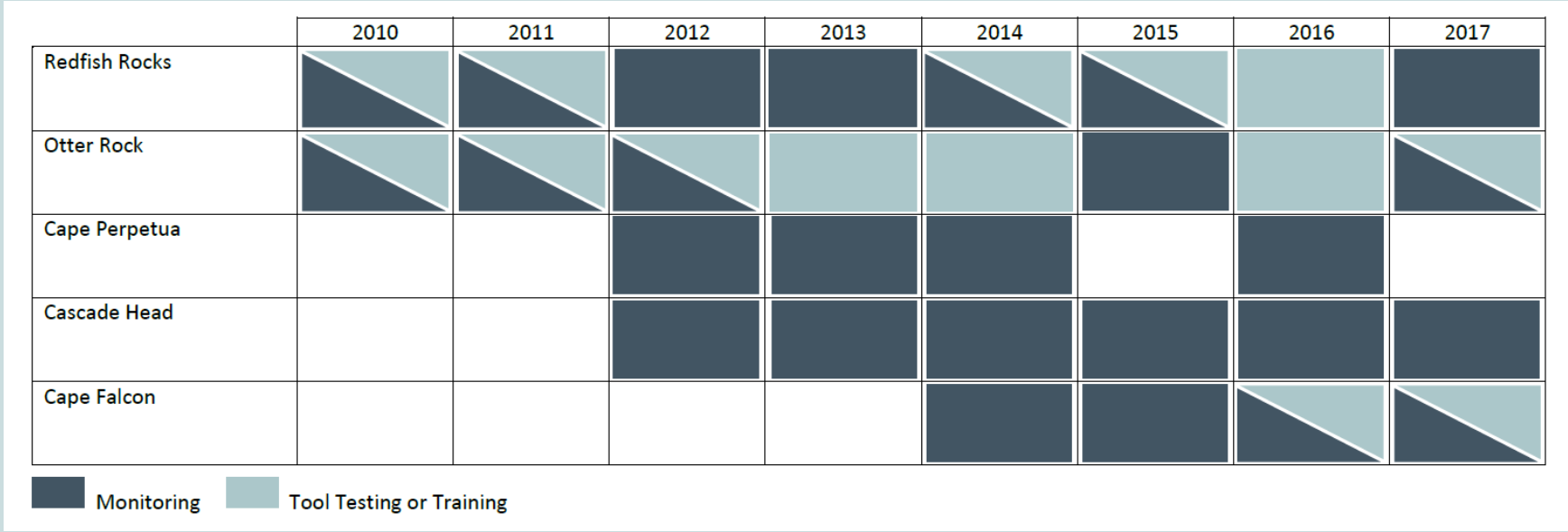
- Varied Staffing

Table C. Ecological Monitoring – Staffing

	2010	2011	2012	2013	2014	2015	2016	2017
ODFW Funded								
Full-time								
Seasonal & Temps								
Post-Grad Fellows								
Student Scholars								
Non-ODFW Funded								
Post-Grad Fellows								
Student Scholars								
TOTAL	**3**	**5**	**5**	**6**	**8**	**7**	**6**	**5**

PROGRAMMATIC ANALYSIS: VALUE FOR $

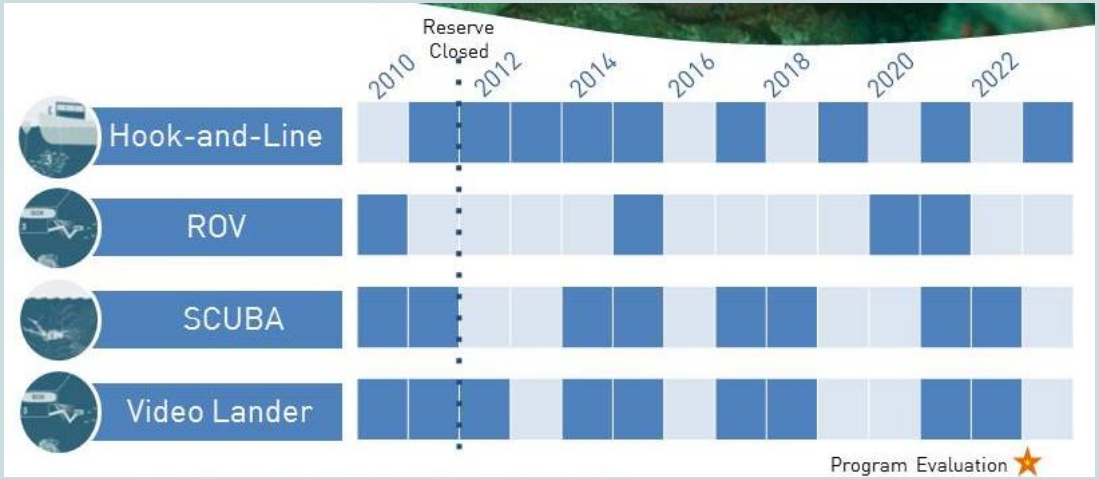
- Tools Testing & Monitoring At the Same Time



FINITE RESOURCES = TRADE-OFFS

- Phased in harvest restrictions

- Not all sites / yr
- Intervals vary



FINITE RESOURCES = TRADE-OFFS

- Focus on 4 Core Research Tools
- Monitoring Rocky Habitats Only

- Rely on Research Partners to Expand Monitoring Efforts

- Volunteer Scientific Scuba Divers

PROGRAMMATIC ANALYSIS: VALUE FOR $

- What Would it Take to Monitor Every Site Every year?

  - An Extra ~ $500,000 Per Biennium (Staff + Operating Costs)

PROGRAMMATIC ANALYSIS: VALUE FOR $

- MR Monitoring Collaborations
  - SMURFs
  - Rocky Intertidal Biodiversity
  - Sea Star Wasting
  - Rocky Reef Scuba Surveys
- Nearshore Research Collaborations
  - Lingcod Biomarker (U of O)
  - Harbor Seal Foraging
  - Telemetry Nearshore Rockfish
  - Nereocystis Genetics

PROGRAMMATIC ANALYSIS: VALUE FOR $

- Local Contributions
  - 34 Local Vessel Contracts
  - Port Orford Air Fill Station
- Intellectual Contributions
  - 2 Journal Articles
  - 3 Internal Reports
- Academic Contributions
  - 30,000 in Graduate Student Scholarships
  - Joint OSU – ODFW Fellowship Program

34
Vessel Contracts
$ 555 k

Fishing Vessel Contracts 2010 - 2017		No. Contracts
Garibaldi	$ 44,605	3
Depoe Bay	$ 95,702	6
Newport	$ 169,963	8
Port Orford	$ 186,124	13
Gold Beach	$ 58,644	4
TOTAL	$ 555,038	34

4 QUESTIONS TO KEEP IN MIND

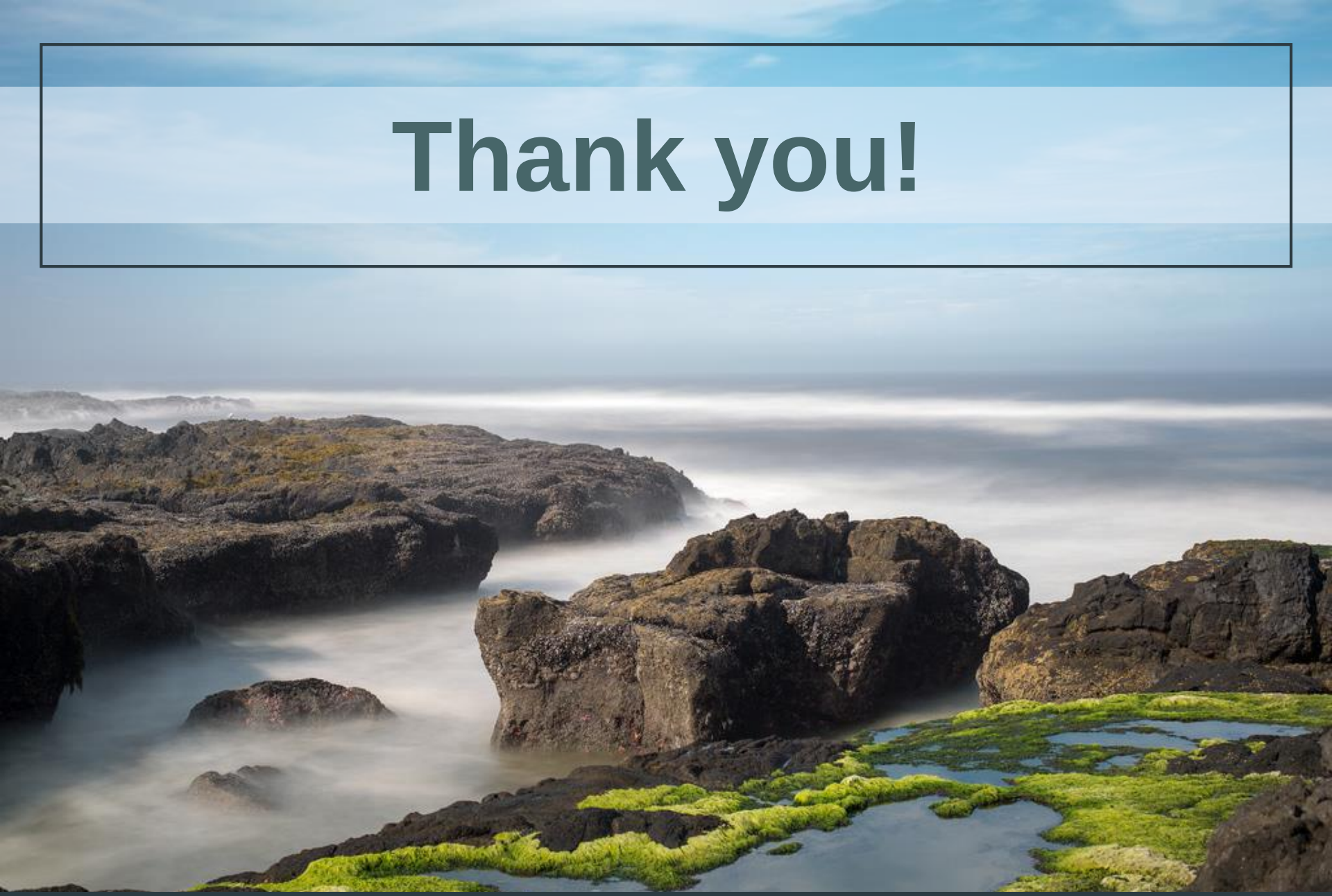
1. Do you Agree with Definitions & List of Focal Species?

2. What are Critical Data Gaps that Need to be Addressed by 2023?

3. Feedback on Key Trade-offs and Value for $?

4. The Path Forward for Program Evaluation
   - 200 + page report? short 4 page summaries?

Thank you!



OREGON MARINE RESERVES

Lindsay.X.Aylesworth@state.or.us

POTENTIAL FOCAL SPECIES

Habitat / Macroalgae		Invertebrates		Fish	
Intertidal	Subtidal	Intertidal	Subtidal	Tier 1	Tier 2
Saccharina (Brown Kelp)	*Nereocystis* (Bull Kelp)	*Mytilus californianus* (California Mussel)	Anemones	Kelp Greenling	Pile Perch
Bossiella plumose (Erect Coralline Algae)	*Pterygophora* (Northern Sea Palm)	*Pollicepes polymerus* (Gooseneck Barnacle)	Urchins	Lingcod	Tiger Rockfish
Pelvetiopsis limitata (Fucoid, Brown Algae)	*Pleurophycus* (Broad-Rib Kelp)	Pisaster (Ochre Sea Star)	Sea Stars	Striped Surfperch	Vermilion Rockfish
Postelsia (Sea Palm)	*L.setchelli/S.groenlandic* (Split-Blade Kelp)	*Katharina tunicata* (Black Chiton)	Abalone	Black Rockfish	Widow Rockfish
Phyllospadix (Surf Grass)	*Laminaria longipes*		Rock Scallop	Blue Rockfish	Yellowtail Rockfish
	Costaria (Five-Rib Kelp)		Sponges	Canary Rockfish	Buffalo Sculpin
	Desmarestia (Acid Weed)		Yellow Boring Sponge	China Rockfish	Red Irish Lord
	Alaria Sp. (Ribbon Kelp)		Gorgonians	Copper Rockfish	
			Sea Pens	Deacon Rockfish	
			Basket stars	Quillback Rockfish	
			Bryozoans	Yelloweye Rockfish	
			Tunicates	Cabezon	
			Tube-worms		