

National Marine Sanctuaries  
National Oceanic and Atmospheric Administration



NATIONAL MARINE  
SANCTUARIES



# Condition Report Status & Trends Workshop

## January 14-16, 2020



NOAA Office of National Marine Sanctuaries

*Leaders in Protecting America's Natural and Cultural Heritage*

# 2008 Condition Report

## Olympic Coast

National Marine Sanctuary

## CONDITION REPORT 2008



September 2008



# Framework

Driving Forces-Pressure-State-Ecosystem  
Services-Response (DPSER)



# State of Resources

## 16 Questions

- Human Dimensions
- Water Quality
- Habitat
- Living Resources
- Maritime Heritage Resources



▲ = Improving      — = Not Changing      ▼ = Worsening

? = Undetermined

N/A = Not Applicable



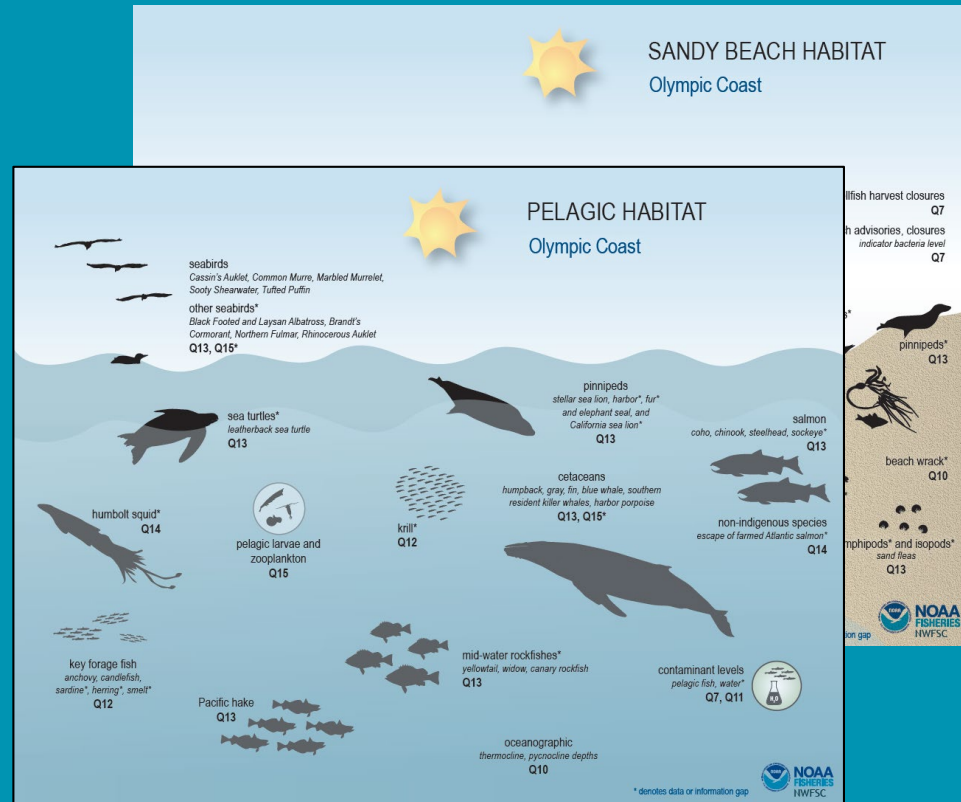
# Materials: Packets & Posters



## Advanced Packets

1. Workshop agenda
2. 16 CR questions
3. Map & descriptions of habitats
4. 8 criteria used to refine ecological indicators
5. 9 ecosystem services

## Posters



\* May be some differences with presentations

# Materials: Presentations



## Status and Trends Workshop

### Living Resources

### Question 12

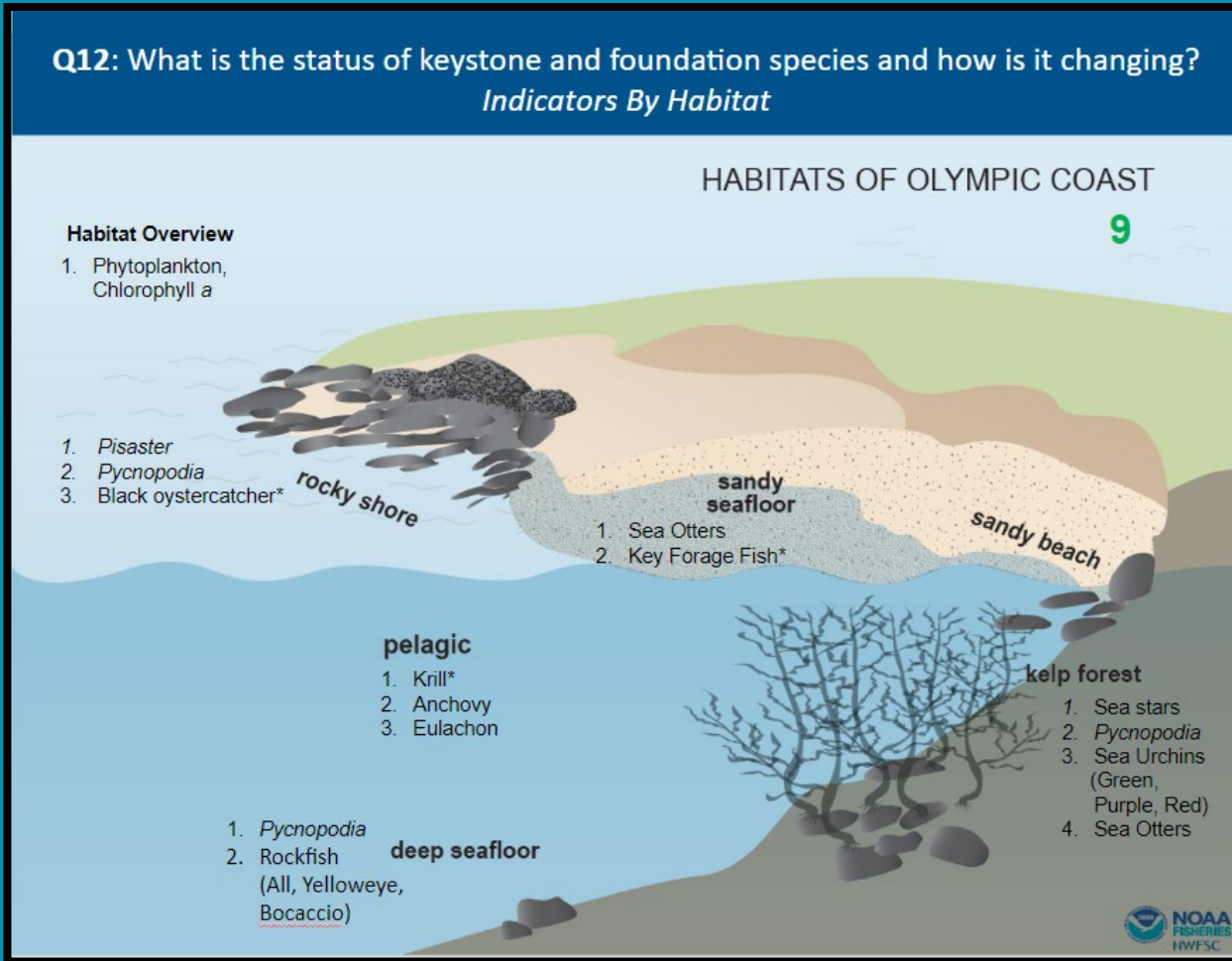
What is the status of keystone and foundation species and how is it changing?

- Present new information for indicators
- 1 presentation for each CR question (except Q1)
- Presentations structured same

# Materials: Presentations



## Q12: What is the status of keystone and foundation species and how is it changing? *Indicators By Habitat*




- Show habitat conceptual model
- List indicators relevant to question



# Materials: Presentations



## Q12: What is the status of keystone and foundation species and how is it changing?

<b>2008 Question</b>	What is the status of key species and how is it changing?
<b>2008 rating</b>	Status =  Trend = Undetermined (?)
<b>2008 rating based on</b>	<ul style="list-style-type: none"> <li>The reduced abundance of selected key species (e.g. sea otters, common murre, rockfish) may inhibit full community development and function</li> </ul>
<b>Good</b>	The status of keystone and foundation species appears to reflect near-pristine conditions and may promote ecological integrity (full community development and function).
<b>Good/Fair</b>	The status of keystone or foundation species may preclude full community development and function, but has not yet led to measurable degradation.
<b>Fair</b>	The status of keystone or foundation species suggests measurable but not severe degradation in some attributes of ecological integrity.
<b>Fair/Poor</b>	The status of keystone and foundation species suggests severe degradation in some but not all attributes of ecological integrity.
<b>Poor</b>	The status of keystone and foundation species suggests severe degradation in most if not all attributes of ecological integrity.

- Rating from 2008 CR
- Justification and definition for rating
- *Note: Not all questions have 1 rating.*

# Materials: Presentations



Q12: What is the status of keystone and foundation species and how is it changing?

1/9

Habitat  
Indicator

Q12: What is the status of keystone and foundation species

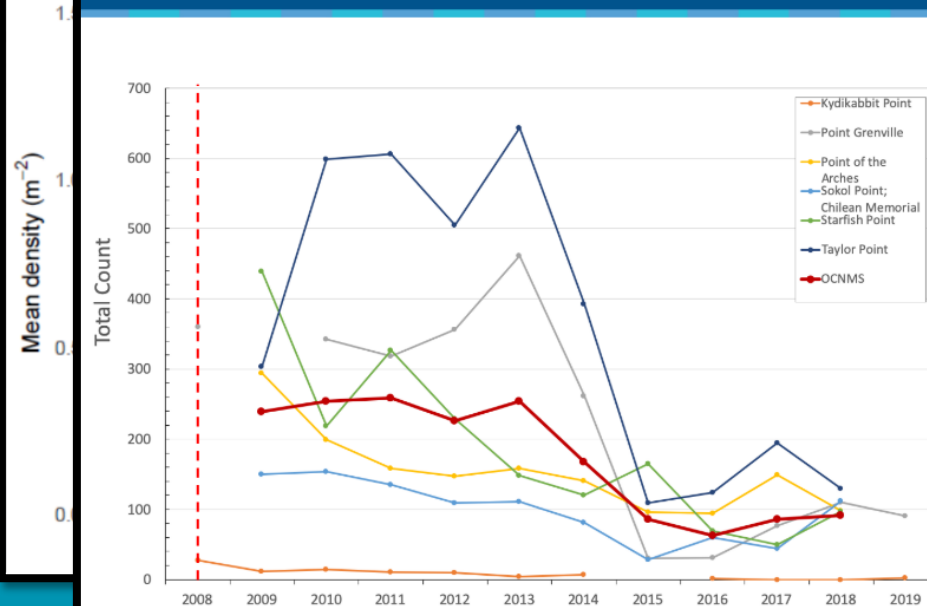
2/9

Q12: What is the status of keystone and foundation species and how is it changing?

**Habitat:** Rocky Shores

**Indicator:** *Pisaster ochraceus*, Ochre Star (Abundance)

3a/9



**Figure:** Abundance of *Pisaster ochraceus* from 2009-2019 inside OCNMS

**Status:**

**Trend:** *P. ochraceus* abundances declined from 2013-2018 due to SSWD and warm water event.

**Data Source:** MARiNe, 2019 (J. Brown)

- Show new information for indicators
- Initial interpretation to start discussion
- Look to you to correct, clarify or fill in gaps
- Capture your input in real time

# Framework: Expert Input



Indicator	Source	Habitat	Data Summary
<b>Sea Otter</b> (Abundance)	WDFW and USFWS; Jefferies et al. 2019	Kelp Forest, Sandy Seafloor	<b>Status:</b> Since 1998, sea otter abundances increased north and south of La Push <b>Trend:</b> Increases smaller north of La Push
<b>Rockfishes - All,</b> Yelloweye, Bocaccio (CPUE)	NOAA NMFS (J. Cope); CCIEA 2019	Deep Seafloor	<b>Status:</b> No change <b>Trend:</b> No trend for all rockfish. Increasing trend for bocaccio. Decreasing trend for yelloweye.
<b>Key Forage Fish,</b> Anchovy (Abundance Anomalies)	Duguid et al. 2019	Pelagic	<b>Status:?</b> <b>Trend:</b> Elevated abundances for anchovies observed in 2005, 2015 and 2016 after warm water events (green bars).
<b>Key Forage Fish,</b> Eulachon (# Spawning Adults)	Langeness et al. 2018	Pelagic	<b>Status:</b> No change <b>Trend:</b> Max number of spawning eulachons observed in 2014-2016 for all rivers.
<b>Black oystercatcher*</b> (Abundance index)	Weinstein et al. 2014. Audubon Christmas Bird Count Data.	Rocky Shore	<b>Status:</b> Black oystercatcher abundances increased from 1966-2006. <b>Trend:?</b>
<b>Data Gaps</b>	Kelp Forest, Sandy Seafloor, Pelagic	(Rocky Shore) Black oystercatcher, (Sandy Seafloor) Key forage fish, (Pelagic) Key Forage Fish (sardines, herring, smelt), Krill	

- Summary of status/trend for each indicator

1. Prepopulated to start
2. Ask to confirm and add to
3. Opportunity to edit

- *Note:* Indicator with changes presented first

# Framework: Expert Input



## Q12: What is the status of keystone and foundation species and how is it changing?

<b>2008 Question</b>	• What is the status of key species and how is it changing?
<b>2008 rating</b>	Status = <span style="color: yellow;">●</span> Trend = Undetermined (?)
<b>2008 rating based on</b>	• The reduced abundance of selected key species (e.g. sea otters, common murre, rockfish) may inhibit full community development and function
<b>Key NEW Information</b> (Presented here)	• Updated information on chlorophyll <i>a</i> , sea stars ( <i>Pisaster</i> , <i>Pycnopodia</i> , All), black oystercatchers, urchins (green, red, purple, all), rockfish (boccacio, yelloweye, all), anchovy, eulachon, pacific hake, sea otters

<b>2018 Status &amp; Trend</b>	<b>Status:</b>
	<b>Trend:</b>
<b>Good</b>	The status of keystone and foundation species appears to reflect near-pristine conditions and may promote ecological integrity (full community development and function).
<b>Good/Fair</b>	The status of keystone or foundation species may preclude full community development and function, but has not yet led to measurable degradation.
<b>Fair</b>	The status of keystone or foundation species suggests measurable but not severe degradation in some attributes of ecological integrity.
<b>Fair/Poor</b>	The status of keystone and foundation species suggests severe degradation in some but not all attributes of ecological integrity.
<b>Poor</b>	The status of keystone and foundation species suggests severe degradation in most if not all attributes of ecological integrity.
<b>Key Data Gaps for Next CR</b>	

- Determine new rating for question

- New rating based on:

1. Rating definitions\*
2. Synthesis of status/trends for indicators (summary table)
3. Expert input

\* Definitions different for each CR question

# Framework: Expert Input



## Capturing Expert 'Confidence'

- Determine confidence associated with new status/trend
- Facilitators help guide discussions for ratings
- Discuss in more detail when get to this point

Question	NEW Rating	Evidence (limited, medium, or robust)	Agreement (low, medium, or high)	Confidence (very low, low, medium, high, or very high)	Comments
Question <span style="background-color: yellow;"> </span>	Status:				
	Trend:				

### 1. Rate Evidence

Consider three categories of evidence typically used to make status or trend ratings: *data, published information, and personal experience*.

Limited	Medium	Robust
Limited data or published information, and little or no substantive personal experience	Data available, some peer reviewed published information, or direct personal experience	Considerable data, extensive record of publications, or extensive personal experience.

### 2. Rate Agreement

Among those participating in determining the status and trend rating, or if possible, within the broader scientific community. Levels of agreement can be characterized as **"low," "medium,"** or **"high."**

### 3. Rate Confidence

	<b>"Medium"</b> High agreement Limited evidence	<b>"High"</b> High agreement Medium evidence	<b>"Very High"</b> High agreement Robust evidence
	<b>"Low"</b> Medium agreement Limited evidence	<b>"Medium"</b> Medium agreement Medium evidence	<b>"High"</b> Medium agreement Robust evidence
	<b>"Very Low"</b> Low agreement Limited evidence	<b>"Low"</b> Low agreement Medium evidence	<b>"Medium"</b> Low agreement Robust evidence

Evidence (type, amount, quality, consistency) →



Questions			2008 Rating	Questions		2019 Rating					
						Status	Confidence	Trend	Confidence		
Human Dimensions				Human Dimensions							
	N/A	N/A		1	Influential Drivers						
4	Human Activities & WQ	—		2	Human Activities & WQ						
8	Human Activities & Habitat	▲		3	Human Activities & Habitat						
14	Human Activities & LR	▲		4	Human Activities & LR						
17	Human Activities & MAR	?		5	Human Activities & MHR						
Water Quality				Water Quality (WQ)							
2	Eutrophic Condition	—		6	Eutrophic Condition						
3	Human Health Risks	—		7	Human Health Risks						
1	Multiple Stressors (including climate)	?		8	Climate Drivers						
				9	Other Stressors						
Habitat				Habitat							
5/6	Major/Biologically-structured	—	?	10	Integrity of Major Habitats						
7	Contaminants in Habitat	—		11	Contaminants in Habitat						
Living Resources				Living Resources (LR)							
12/13	Key Species Status/Condition	?	?	12	Keystone & Foundation species						
				13	Other Key Species						
11	Non-indigenous Species	▼		14	Non-Indigenous Species						
9	Biodiversity	?		15	Biodiversity						
Maritime Archaeological Resources (MAR)				Maritime Heritage Resources (MHR)							

# Rating System

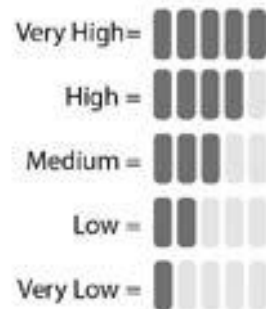


▲ = Improving    — = Not Changing    ▼ = Worsening

? = Undetermined

N/A = Not Applicable

Confidence Scale:



EXAMPLE:

This symbol indicates the condition was rated "fair" with "medium confidence" and a "worsening" trend with "very high confidence."



# Status Description

Status description for a given status rating is specific to the question being asked

Available in Appendix A

WQ/Human Health

Habitat/Integrity

<b>Good</b>	Water quality does not appear to have the potential to negatively affect human health.
<b>Good/Fair</b>	One or more water quality indicators suggest the potential for human health impacts, but human health impacts have not been reported.
<b>Fair</b>	Water quality problems have caused measurable human impacts, but effects are localized and not widespread or persistent.
<b>Fair/Poor</b>	Water quality problems have caused severe impacts that are either widespread or persistent.
<b>Poor</b>	Water quality problems have caused severe, persistent, and widespread human impacts.
<b>Good</b>	Habitats are in near-pristine condition.
<b>Good/Fair</b>	Selected habitat loss or alteration is suspected and may degrade some attributes of ecological integrity, but has not yet caused measurable degradation.
<b>Fair</b>	Selected habitat loss or alteration has caused measurable, but not severe degradation in some attributes of ecological integrity.
<b>Fair/Poor</b>	Selected habitat loss or alteration has caused severe degradation in some, but not all attributes of ecological integrity.
<b>Poor</b>	Selected habitat loss or alteration has caused severe degradation in most, if not all attributes of ecological integrity.

# Ecosystem Services

*(Benefits to people from Ecosystems)*

Cultural

*Non-material benefits*

Provisioning

*Products obtained*

Regulating

*Benefits from processes that control change*

# Evaluating Relationships between People and their Environment

- All people benefit from their environment
- Different cultures have different worldviews, making evaluation a challenge
- The approach used by ONMS allows for consistency across ecosystems and sanctuaries
  - Modelled after the United Nations Millennium Ecosystem Assessment
  - This approach (particularly the cultural aspects) will be subject to further refinement



# Cultural Ecosystem Services

## *(non-material benefits)*

**Heritage** — *Recognition of historical or heritage legacy (e.g. historic properties)*

**Consumptive recreation** — *Recreational activities that cause removal of or damage to natural or cultural resources*

**Non-consumptive recreation** — *Recreational activities without removal of or damage to natural or cultural resources*

**Sense of place** — *Aesthetic and spiritual attraction, and level of recognition and appreciation of efforts to protect a place's iconic elements (e.g. intangible values)*

**Science** — *Capacity to acquire and contribute information and knowledge*

**Education** — *Capacity to acquire and provide intellectual enrichment*

# Provisioning Ecosystem Services

## *(material benefits)*

**Food** — *Capacity to support demands for edible marine resources*

**Water** — *Providing water for human use by minimizing pollution, including nutrients, sediments, pathogens, chemicals, and trash*

**Ornamentals** — *Resources used for decorative or aesthetic purposes*

**Biotechnology** — *Medicine and other chemicals from sanctuary animals or plants*

**Energy** — *Use of ecosystem-derived materials or processes for the production of energy*

# Regulating Ecosystem Services

*(buffers to change)*

**Coastal protection** — *Flow regulation that protects habitats, property, coastlines, and other features*

# Rating System for Ecosystem Services

<b>Good</b>	Demand for the service is being met at a sustainable level.
<b>Good/Fair</b>	Demand for the service is not fully met, but performance is acceptable and may not warrant enhanced management.
<b>Fair</b>	The ability to meet demand for the service is compromised, and existing management would require enhancement to enable acceptable performance.
<b>Fair/Poor</b>	The ability to meet demand for the service is compromised, and it is unclear whether new or enhanced management would restore it.
<b>Poor</b>	Demand for the service is not being met and it is doubtful that new or enhanced management would restore it.

# Confidence Scores

## Evidence + Agreement = Confidence

### Step 1: Rate Evidence

Consider three categories of evidence typically used to make status or trend ratings: (1.) data, (2.) published information and (3.) personal experience.

Evidence Scores		
Limited	Medium	Robust
Limited data or published information, and little or no substantive personal experience.	Data available, some peer reviewed published information, or direct personal experience.	Considerable data, extensive record of publication, or extensive personal experience.

### Step 2: Rate Agreement

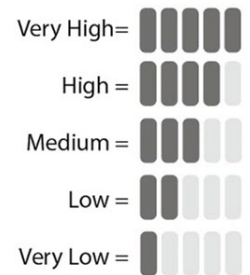
Rate agreement among those participating in determining the status and trend rating, or if possible, within the broader scientific community. Levels of agreement can be characterized as "low," "medium" or "high."

### Step 3: Rate Confidence

Using the matrix below, combine ratings for both evidence and agreement to identify a level of confidence. Levels of confidence can be characterized as "very low," "low," "medium," "high" or "very high."

Agreement ↑	<p><b>"Medium"</b> High agreement Limited evidence</p>	<p><b>"High"</b> High agreement Medium evidence</p>	<p><b>"Very High"</b> High agreement Robust evidence</p>
	<p><b>"Low"</b> Medium Agreement Limited evidence</p>	<p><b>"Medium"</b> Medium agreement Medium evidence</p>	<p><b>"High"</b> Medium agreement Robust evidence</p>
	<p><b>"Very Low"</b> Low agreement Limited evidence</p>	<p><b>"Low"</b> Low agreement Medium evidence</p>	<p><b>"Medium"</b> Low agreement Robust evidence</p>
Evidence (type, amount, quality, consistency) →			

Confidence Scale:



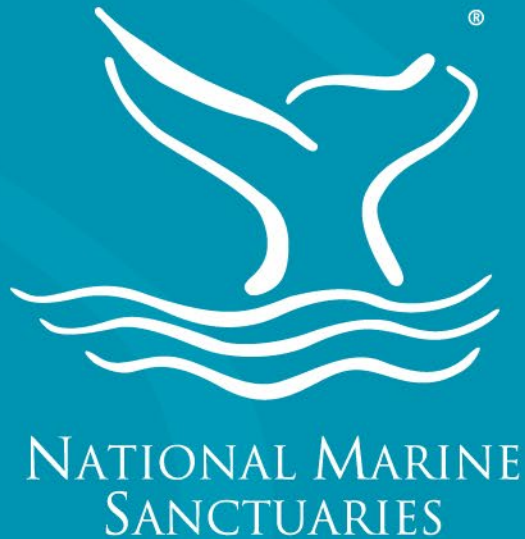
EXAMPLE:

This symbol indicates the condition was rated "fair" with "medium confidence" and a "worsening" trend with "very high confidence."





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<http://sanctuaries.noaa.gov>

# Human Dimensions

1. What are the states of influential **human drivers** and how are they changing?
2. What are the levels of **human activities** that may adversely influence **water quality** and how are they changing?
3. What are the levels of **human activities** that may adversely influence **habitats** and how are they changing?
4. What are the levels of **human activities** that may adversely influence **living resource** quality and how are they changing?
5. What are the levels of **human activities** that may adversely influence **maritime heritage resource** quality and how are they changing?

# Water Quality

6. What is the **eutrophic condition** of sanctuary waters and how is it changing?
7. Do sanctuary waters pose **risks to human health** and how are they changing?
8. Have recent changes in **climate** altered water conditions and how are they changing?
9. Are **other stressors**, individually or in combination, affecting water quality, and how are they changing?

# Habitat

10. What is the **integrity of major habitat types** and how is it changing?

11. What are **contaminant concentrations** in sanctuary habitats and how are they changing?

# Living Resources

12. What is the status of **keystone** and foundation species and how is it changing?
13. What is the status of **other focal species** and how is it changing?
14. What is the status of **non-indigenous species** and how is it changing?
15. What is the status of **biodiversity** and how is it changing?



# Maritime Heritage Resources

16. What is the **condition** of known maritime heritage resources and how is it changing?