Seafari – Marine Conservation Education Curriculum

Lesson Title:

How Do You Design a Marine Protected Area?

Grades: 4-6	**Topic:** Mapping/Designating a Marine Protected Area	**Lesson # 1** in a unit of 4 lessons

Brief Lesson Description:

Students will set their own criteria and designate a Marine Protected Area (MPA) within the Santa Barbara Channel. Students will then study the California MPA system and the SoCal MPAs. Students will compare their criteria to criteria used by stakeholders and policymakers to designate the California system of MPAs.

Performance Expectations:

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Specific Learning Outcomes:

Students will evaluate criteria used for policy making
Students will learn about the California Marine Protected Areas and California Marine Life Protection Act

Background Information:

Marine Protected Areas, also called MPAs for short, are kind of like underwater parks. Just like we have national, state, and regional parks on land, there are many different types of MPAs. Different parks allow different activities - same with MPAs! In some of them, you can fish, while in others you can't. Some MPAs allow all kinds of activities (fishing, swimming, boating, etc.) while others are much stricter. By restricting what people can do and what they can take in these underwater parks, we can protect our ocean resources.

In 1999, California legislators adopted the Marine Life Protection Act that said that California had to create a network of MPAs to help protect our ocean resources.
California has 124 MPAs all along the coast. Here in the Santa Barbara Channel we have a network of 19 MPAs, five along the coast and 14 surrounding the Channel Islands.

These MPAs protect many different habitats where many different animals live. MPAs give marine species a safe place to breed and grow. Animals inside of MPAs may be larger than those found outside of MPAs, allowing them to have more babies than smaller animals. Babies born within MPAs may also have access to more food, space, and other resources, allowing offspring to be healthier. Scientific studies also show that there can be Studies show that there can be over 20% more species inside a reserve than outside.

MPAs also provide opportunities for people to see beautiful, protected ocean spaces through snorkeling, scuba diving, swimming, kayaking etc. Sometimes, people don't know that they are in an MPA and accidentally do something they aren't supposed to do. That's why it's important to understand what MPAs are, why we have them, and where they are - so you know if you are in one!

Definitions:
Marine Protected Area (MPA): MPAs are areas in or near the ocean made to protect and conserve marine life and habitat, safeguard cultural sites, and provide enhanced recreational opportunities.

Science and Engineering Practices: Asking questions Constructing explanations Obtaining, evaluating, and Communicating information	Disciplinary Core Ideas: Developing possible solutions	Crosscutting Concepts: Patterns Cause and Effect
NGSS: 3-5-ETS1-2 5-ESS3-1 MS-ETS1-2	Ocean Literacy Principles: 5F 6D 6G	Climate Literacy Principles:

Lesson Outline:

Materials:
Blank map of the Santa Barbara Channel
Map of California MPA system
Paper/Slide for K-W-L chart
Chart paper/Slide for student MPA presentation
NewsELA article "What Is A Marine Protected Area?"

Engage:
Begin a K-W-L Chart on Marine Protected Areas/Sanctuaries (What I Already Know, What I Want to Know, and What I Have Learned)

A marine protected area is a place in which resources and organisms are protected/preserved.
Use the map of the Santa Barbara Channel to create a marine protected area.
Mark off your MPA on the map and detail all the criteria you used to decide the placement of your MPA.

*Note to teacher – this may be done individually or in small groups of 3-5 students

Explore:
Present your Marine Protected Area map and criteria/reasoning to your classmates.

*Note to teacher – this may be done as a presentation to the entire class or by students rotating from table to table to hear presentations.

Explain:
Introduce students to the California MPA network and the criteria used to determine the placement for these MPAs.
Using the criteria ideas they came up with for their own MPAs students will start brainstorming ideas for the criteria that stakeholders used to create the California MPA network. Following list is also listed on separate page in this document (following map page).
Stakeholders voted on proposed designations to decide final designations. Stakeholder group included scientists, conservation groups, recreational and commercial fishermen, and Native American tribes. View the southcoast stakeholders member list here:
http://www.dfg.ca.gov/marine/mpa/scproject.asp#members

Criteria for California MPA designation (taken from pgs 6-12 of Outline of Information required for MPA Proposals:

Biological criteria:
Ability to restore/protest rare, threatened, or endangered native species or habitats.
Protect populations of one or more fish species that have been declared 'overfished' by the National Marine Fisheries Service (NMFS) or harvested species that are of concern to state/federal fishery managers.
One of more habitats within the proposed site are designated as essential fish habitat.
Protect connections between geographic areas and/or habitat types (including estuarine and marine, wetland and intertidal, intertidal and subtidal, deep and shallow water)
Biologically highly productive

Socio-economic criteria:
Provides public access consistent with resource protection goals
Provides educational and interpretive activities
Historically received relatively little fishing effort
Not likely to have a significant negative socio-economic impact on those who have traditionally used the area
Likely to have a positive socio-economic impact
Likely to have spillover effect on populations in bordering locations

Management and Enforcement criteria:
Site overlaps or is adjacent to an existing protected or managed area facilitating enforcement
Site adjacent to a populated area in which public stewardship would facilitate enforcement
Site has boundaries that are practical and enforceable
Designating site would lessen the impact of human uses on sensitive populations of marine or estuarine organisms

Site has little or no direct access from land, or the access is controlled
Site will have funding sources for enforcement and management of activities

Evaluation and Research criteria:
Site will provide opportunity for scientific research or monitoring in marine habitats or ecosystems
Site will have funding for scientific research or monitoring
Seafloor habitat within the proposed site has been partially or totally mapped using side-scan sonar or equivalent technology

Read NewsELA article What Is A Marine Protected Area and answer the related comprehension questions.

Elaborate:
Compare the criteria you (or your group) used to develop your MPA to the criteria that was used to develop the California MPA network. How are they similar? How do they differ?
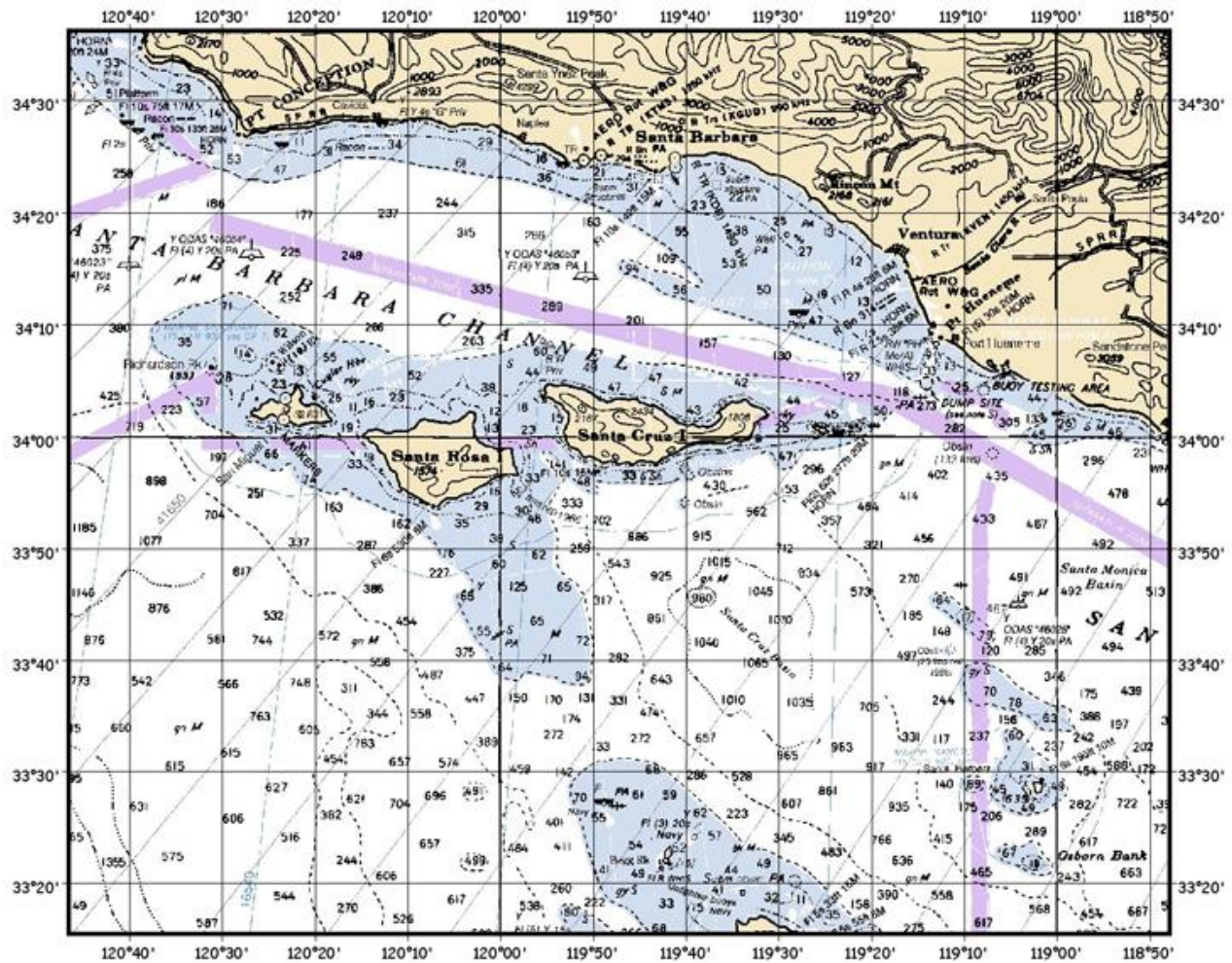
Evaluate:
Now that you know the criteria scientists and policy makers used to create the California MPA system would you make any alterations for your MPA or criteria list?

*Additional Exploration:
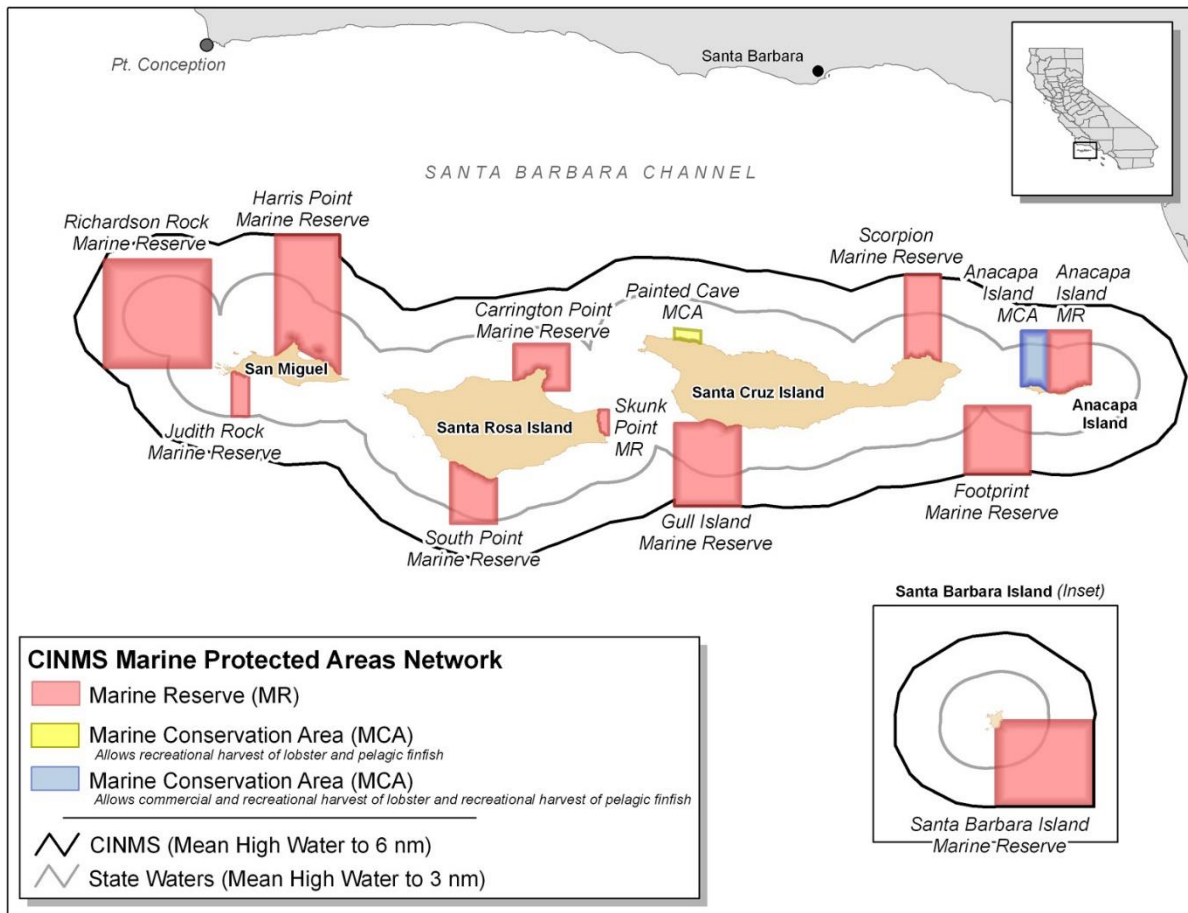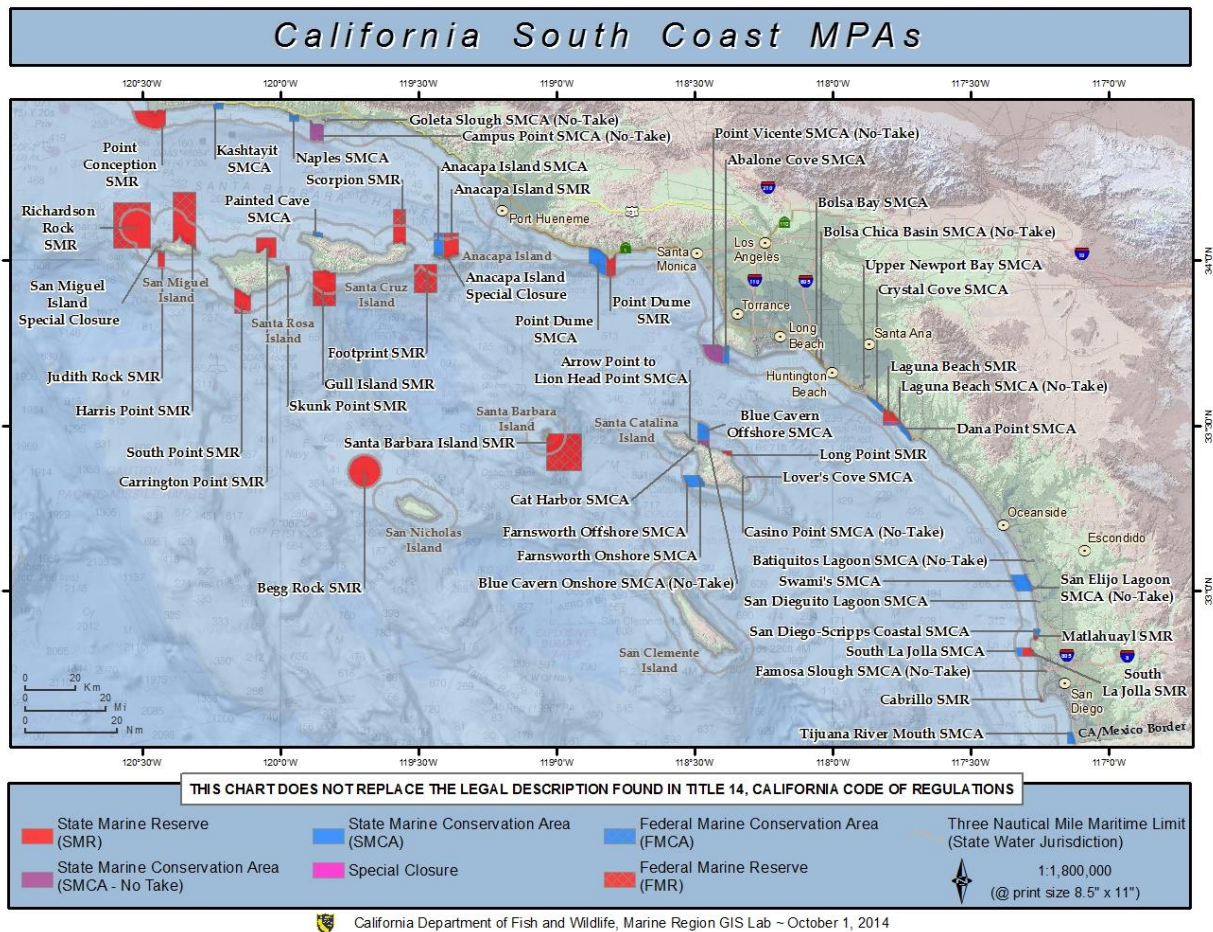http://www.dfg.ca.gov/marine/mpa/scproject.asp#members
View the list of South Coast Stakeholder members and discuss the various groups that are represented, what their expertise brings to the table, and how their interests may be similar and how their interests may differ.

Blank Map for Student Determined MPAs:

Map of Channel Islands MPAs:

Map of Southern California MPAs:

California South Coast MPAs

THIS CHART DOES NOT REPLACE THE LEGAL DESCRIPTION FOUND IN TITLE 14, CALIFORNIA CODE OF REGULATIONS

Legend:
- State Marine Reserve (SMR)
- State Marine Conservation Area (SMCA - No Take)
- State Marine Conservation Area (SMCA)
- Special Closure
- Federal Marine Conservation Area (FMCA)
- Federal Marine Reserve (FMR)
- Three Nautical Mile Maritime Limit (State Water Jurisdiction)
- 1:1,800,000 (@ print size 8.5" x 11")

California Department of Fish and Wildlife, Marine Region GIS Lab ~ October 1, 2014

Criteria for California MPA designation (taken from pages 6-12 of California Department of Fish & Wildlife's Outline of Information required for MPA Proposals):

Biological criteria:

Ability to restore/protest rare, threatened, or endangered native species or habitats.

Protect populations of one or more fish species that have been declared 'overfished' by the National Marine Fisheries Service (NMFS) or harvested species that are of concern to state/federal fishery managers.

One of more habitats within the proposed site are designated as essential fish habitat.

Protect connections between geographic areas and/or habitat types (including estuarine and marine, wetland and intertidal, intertidal and subtidal, deep and shallow water)

Biologically highly productive

Socio-economic criteria:

Provides public access consistent with resource protection goals

Provides educational and interpretive activities

Historically received relatively little fishing effort

Not likely to have a significant negative socio-economic impact on those who have traditionally used the area

Likely to have a positive socio-economic impact

Likely to have spillover effect on populations in bordering locations

Management and Enforcement criteria:

Site overlaps or is adjacent to an existing protected or managed area facilitating enforcement

Site adjacent to a populated area in which public stewardship would facilitate enforcement

Site has boundaries that are practical and enforceable

Designating site would lessen the impact of human uses on sensitive populations of marine or estuarine organisms

Site has little or no direct access from land, or the access is controlled

Site will have funding sources for enforcement and management of activities

Evaluation and Research criteria:

Site will provide opportunity for scientific research or monitoring in marine habitats or ecosystems

Site will have funding for scientific research or monitoring

Seafloor habitat within the proposed site has been partially or totally mapped using side-scan sonar or equivalent technology

Notes for Criteria Used to Develop California MPA System:

Size (square miles)

Area of coastline

Depth

Habitat type (sandy, rocky shore, coastal marsh, tidal flats, surfgrass or eelgrass, kelp forest)

Type of Designation to be applied (SMR, SMCA, SMP, SMRMA – see details below)

Types of Designations:

State Marine Reserve: no take allowed

State Marine Recreational Management Area: some are no take and some allow limited recreational/commercial take

State Marine Park: limited take area

State Marine Conservation Area: some are no take and some allow limited recreational/commercial take

Special Closure: no entry

Information on the California MPA Designation Process:

 Goals of the Marine Life Protection Act (MLPA) of 1999:

1. Protect the natural diversity and abundance of marine life, and the structure, function and integrity of marine ecosystems.
2. Help sustain, conserve and protect marine life populations, including those of economic value, and rebuild those that are depleted.
3. Improve recreational, educational and study opportunities provided by marine ecosystems that are subject to minimal human disturbance, and to manage these uses in a manner consistent with protecting biodiversity.
4. Protect marine natural heritage, including protection of representative and unique marine life habitats in CA waters for their intrinsic values.
5. Ensure California's MPAs have clearly defined objectives, effective management measures and adequate enforcement and are based on sound scientific guidelines.
6. Ensure the State's MPAs are designed and managed, to the extent possible, as a network.

To help achieve these goals, three MPA designations (state marine reserves, state marine parks and state marine conservation areas), one marine managed area (state marine recreational management area) and special closures were used in the MPA planning process. For the purposes of MPA planning, a public-

private partnership commonly referred to as the MLPA Initiative was established, and the state was split into five distinct regions (four coastal and the San Francisco Bay) each of which had its own MPA planning process. All four coastal regions have completed these individual planning processes. As a result, the coastal portion of California's MPA network is now in effect statewide. Options for a planning process in the fifth and final region, the San Francisco Bay, have been developed for consideration at a future date.

The MLPA Initiative was established to help the State of California implement the MLPA. From 2004 to 2012, the MLPA Initiative (a public-private partnership between California Department of Fish & Wildlife, the California Natural Resources Agency, and Resources Legacy Fund Foundation) directed and informed four regional, science-guided and stakeholder-driven MPA design and siting processes. This was accomplished by using the best readily-available science and the advice and assistance of scientists, resource managers, experts, stakeholders and members of the public.

The Basic Steps in the MPA Planning Process:

In each study region, an appointed regional stakeholder group developed MPA proposals that were reviewed and evaluated by a science advisory team, the California Department of Fish and Game, MLPA Initiative staff, and a policy-level blue ribbon task force. Based on these evaluations and public input, MPA proposals were then refined by the regional stakeholder group and presented to a blue ribbon task force, which made recommendations to the California Fish and Game Commission, the sole authority empowered to adopt and implement MPAs.

How were MPAs designed during the planning process?

MPAs were designed through a collaborative public process. Regional stakeholder groups were formed that included people who were knowledgeable in the uses and/or resources of the planning region. Members included commercial and recreational anglers, tribal and government representatives, educators, researchers, and conservationists. Each group worked together to design MPA proposals for each region. Once the MPA proposals were completed, they underwent scientific and policy review and were then forwarded to the California Fish and Game Commission for adoption and implementation.

Resources:

https://wildlife.ca.gov/Conservation/Marine/MPAs/FAQs#27582618-what-is-the-marine-life-protection-act-mlpa

https://wildlife.ca.gov/Conservation/Marine/MPAs/Planning-Process#26189361-south-coast-study-region---point-conception-to-ca-mexico-border

http://www.dfg.ca.gov/marine/mpa/scproject.asp#members (South Coast stakeholders member list)

https://www.mpacollaborative.org/

What is a marine protected area?

By National Oceanic and Atmospheric Administration (NOAA), adapted by Newsela staff on 04.14.20
Word Count **565**
Level **970L**

The first modern marine protected area in the United States was Pelican Island National Wildlife Refuge in Florida. It was established in 1903 to protect pelicans and other birds from hunting. Parks like this one offer protection for fish and wildlife, as well as their habitats. Photo: U.S. Fish and Wildlife Service

The United States has National Parks and other protected land. Yet marine ecosystems are also worthy of protection, and the country has selected marine protected areas to do just that. These areas are meant to help the populations of plants, animals, and microbes that live there. People can visit most of these areas, and millions do each year. Some examples include places like the Florida Keys and Padre Island in Texas.

Marine protected areas help marine life and maintain coastal and ocean environments and resources for a long time. This is important because there are threats to marine ecosystems worldwide. Some threats include extreme weather events, like hurricanes and typhoons. Other threats are the result of human activity. For example, overfishing has caused some fish populations to decrease and pollution is warming the ocean's average temperature and changing its chemistry.

Protecting Marine Ecosystems

Marine protected areas can help reduce stress on marine, or ocean, ecosystems. An ecosystem is a community of organisms and their environment. Marine protected areas also protect biological diversity. This is the variety of life in a particular area. When an area is protected, the variety of life forms living in that area is greater.

Some of these underwater parks protect the places where fish can breed and lay eggs. These areas can be found near coral reefs and wetlands. Other marine protected areas can even help humans. They shield coastal communities from storms and flooding. These areas also bring in tourists.

Marine protected areas are found in a range of habitats. These include open ocean, coastal areas and ocean-like bodies of water such as the Great Lakes.

Protecting Ocean Resources

Native American and Pacific Island traditional cultures have protected some of these areas for centuries. They protected these areas to support marine life and to help their communities. They considered certain areas "taboo." That meant they were off limits to fishing or hunting.

The first modern marine protected area in the United States was Pelican Island National Wildlife Refuge in Florida. It was established in 1903 to protect pelicans and other birds from hunting. At the time, people used pelican feathers to decorate women's hats.

Today, marine protected areas include a wide range of ocean and coastal resources. Some areas protect habitats, such as coral reefs and seagrasses. Other areas protect at-risk animals by giving them safe spaces to live and grow. Some areas protect cultural resources, such as shipwrecks.

Each marine protected area targets a specific goal. For example, an area that aims to help a fish population may focus on fishing restrictions. Areas looking to protect coral reefs may focus on establishing places where ships can tie up instead of using anchors. Anchors cause damage to coral and other animals on a reef. They might also focus on education to teach snorkelers and scuba divers how not to harm the reef's wildlife. But many areas focus on protecting entire ecosystems.

Most marine protected areas in U.S. waters allow a variety of activities, including fishing, swimming and diving. However, about 3 percent of U.S. waters are very strict and forbid any activities. This is to provide the maximum protection to ocean resources. These areas are called marine reserves. They protect the wildlife and habitats within their boundaries. These areas can even support sea life outside their boundaries, producing eggs and young fish that "spill over" into nearby waters.

Quiz

1   Read the sentence below.

> *A protected marine area can still be used and enjoyed by people.*

Which sentence from the article provides the BEST support for the statement above?

(A)   Marine protected areas serve different purposes and have different levels of protection.

(B)   When an area is protected, the variety of life forms living in that area is greater.

(C)   They protected these areas to support marine life and to help their communities.

(D)   Most marine protected areas in U.S. waters allow a variety of activities, including fishing, swimming and diving.

2   Read the section "Protecting Ocean Resources." Select the sentence from the article that suggests marine protected areas are NOT limited to natural habitats.

(A)   At the time, people used pelican feathers to decorate women's hats.

(B)   Some areas protect cultural resources, such as shipwrecks.

(C)   Areas looking to protect coral reefs may focus on establishing places where ships can tie up instead of using anchors.

(D)   However, about 3 percent of U.S. waters are very strict and forbid any activities.

3   Which sentence from the article would be MOST important to include in a summary of the article?

(A)   But what they all have in common is a focus on the long-term conservation, or the management and protection, of coastal and ocean resources.

(B)   Native American and Pacific Island traditional cultures have protected some of these areas for centuries.

(C)   Areas looking to protect coral reefs may focus on establishing places where ships can tie up instead of using anchors.

(D)   Most marine protected areas in U.S. waters allow a variety of activities, including fishing, swimming and diving.

4   Which statement is a central idea of the article?

(A)   Examples of marine habitats are open ocean, coastal areas and the Great Lakes.

(B)   The Pelican Island National Wildlife Refuge was established in 1903 to protect pelicans.

(C)   There are many ways for marine protected areas to conserve marine resources.

(D)   It is important to protect coral reefs from damage caused by anchors and scuba divers.

Answer Key

1   Read the sentence below.

A protected marine area can still be used and enjoyed by people.

Which sentence from the article provides the BEST support for the statement above?

(A)   Marine protected areas serve different purposes and have different levels of protection.

(B)   When an area is protected, the variety of life forms living in that area is greater.

(C)   They protected these areas to support marine life and to help their communities.

(D)   Most marine protected areas in U.S. waters allow a variety of activities, including fishing, swimming and diving.

2   Read the section "Protecting Ocean Resources." Select the sentence from the article that suggests marine protected areas are NOT limited to natural habitats.

(A)   At the time, people used pelican feathers to decorate women's hats.

(B)   Some areas protect cultural resources, such as shipwrecks.

(C)   Areas looking to protect coral reefs may focus on establishing places where ships can tie up instead of using anchors.

(D)   However, about 3 percent of U.S. waters are very strict and forbid any activities.

3   Which sentence from the article would be MOST important to include in a summary of the article?

(A)   But what they all have in common is a focus on the long-term conservation, or the management and protection, of coastal and ocean resources.

(B)   Native American and Pacific Island traditional cultures have protected some of these areas for centuries.

(C)   Areas looking to protect coral reefs may focus on establishing places where ships can tie up instead of using anchors.

(D)   Most marine protected areas in U.S. waters allow a variety of activities, including fishing, swimming and diving.

4   Which statement is a central idea of the article?

(A)   Examples of marine habitats are open ocean, coastal areas and the Great Lakes.

(B)   The Pelican Island National Wildlife Refuge was established in 1903 to protect pelicans.

(C)   There are many ways for marine protected areas to conserve marine resources.

(D)   It is important to protect coral reefs from damage caused by anchors and scuba divers.

Lesson Title:

What Does the Science Say?

Grades: 4-6	Topic: Analyzing Scientific Data	Lesson # 2 in a unit of 4 lessons

Brief Lesson Description:
Students will analyze given data sets and graphs and use given information to draw conclusions about the state of marine organisms and habitats.
Students will learn about the variables that may affect populations and how those variables may contribute to whether marine protected areas can successfully increase population size for specific organisms.

Performance Expectations:

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Specific Learning Outcomes:

Students will be able to convert data from a table into a line graph
Students will be able to analyze a ling graph and identify trends in it
Students will be able to utilize scientific information to draw opinions

Science and Engineering Practices: Asking questions Constructing explanations Obtaining, evaluating, and Communicating information	Disciplinary Core Ideas: Developing possible solutions	Crosscutting Concepts: Patterns Cause and Effect
NGSS: 4-LS1-1 5-ESS3-1 MS-LS2-1	Ocean Literacy Principles: 5F 6D 6G	Climate Literacy Principles: 3A 6D

Lesson Outline:

Materials:
Data sheets and bar graphs for California Spiny Lobster, Sunflower Star, and Ochre Sea Star
Graph paper

Engage:
Student groups will be given a table of data (either for California Spiny Lobster, Sunflower Star, or Ochre Sea Star).
In small groups students will use the data to create a line graph. Students will then examine the line graph and determine some possible conclusions. Students will present their graphs and identify trends in the data to the class.

Explore:
Students will graph data from tables provided (California Spiny Lobster, Sunflower Star, and Ochre Star).
Student groups will be shown the line graphs provided (California Spiny Lobster, Sunflower Star, and Ochre Star).
Student groups will compare their line graphs to those given and conclude whether the graph they created using the data is accurate. If not students will explore why their graph does not match the graph given.

Prompts to discuss for each set of data:
What trends do you notice?
What outliers (odd balls) do you see?
What do the trends tell you?
What questions does the data make you want to ask?

Explain:
Students will conduct online research to try to determine what factors might have influenced any trends they see in their data.

Elaborate:

Research and Discuss this Question:
What are some factors that may contribute to these specific species populations being positively affected by Marine Protected Areas?
Mode of reproduction, mode of transportation, preferred type of habitat, available food sources,

Web resources/videos re: sea star wasting, lobster variance within MPAs etc.

Evaluate:
Students will answer these questions:

Can Marine Protected Areas help increase the Ochre Star populations in the Santa Barbara Channel? If your opinion is 'yes they can', then explain how. If your opinion is no then explain why not and if there is another solution to helping these populations recover.

California Spiny Lobster Density
conducted by UCSB PISCO at Santa Cruz Island

Year	Inside MPA	Outside MPA
2003	0.00	0.00
2004	1.33	2.67
2005	1.67	1.17
2006	1.00	1.08
2007	0.83	1.33
2008	1.83	2.17
2009	8.08	2.00
2010	3.17	0.50
2011	6.00	1.17
2012	4.25	1.58
2013	9.17	1.67
2014	7.50	1.50
2015	3.17	7.08
2016	13.17	0.17
2017	16.75	0.58
2018	17.75	21.25
2019	8.33	4.75
2020	9.17	5.00

CA Spiny Lobster Inside vs. Outside MPAs
Santa Cruz Island
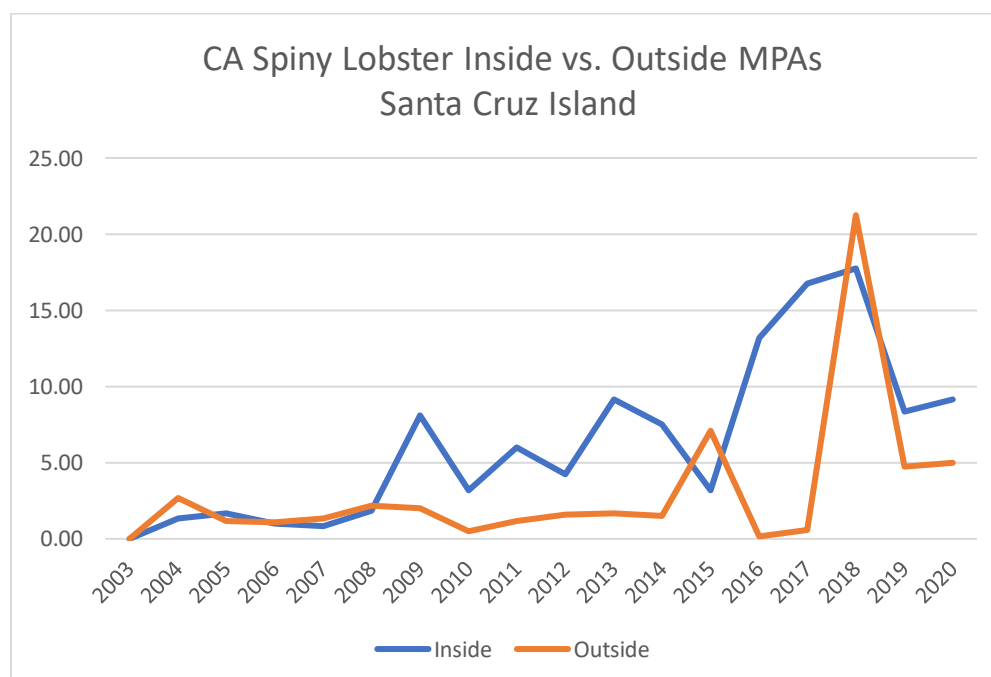
Ochre Sea Star Density
conducted by UCSB PISCO at Santa Cruz Island

Year	Ochre Sea Star Density
2003	2.85
2004	9.17
2005	2.75
2006	12.75
2007	21.83
2008	28.75
2009	17.00
2010	48.75
2011	42.58
2012	38.92
2013	24.50
2014	0.58
2015	0.17
2016	0.00
2017	1.67
2018	0.42
2019	0.00
2020	1.17

Ochre Star Density at SCI
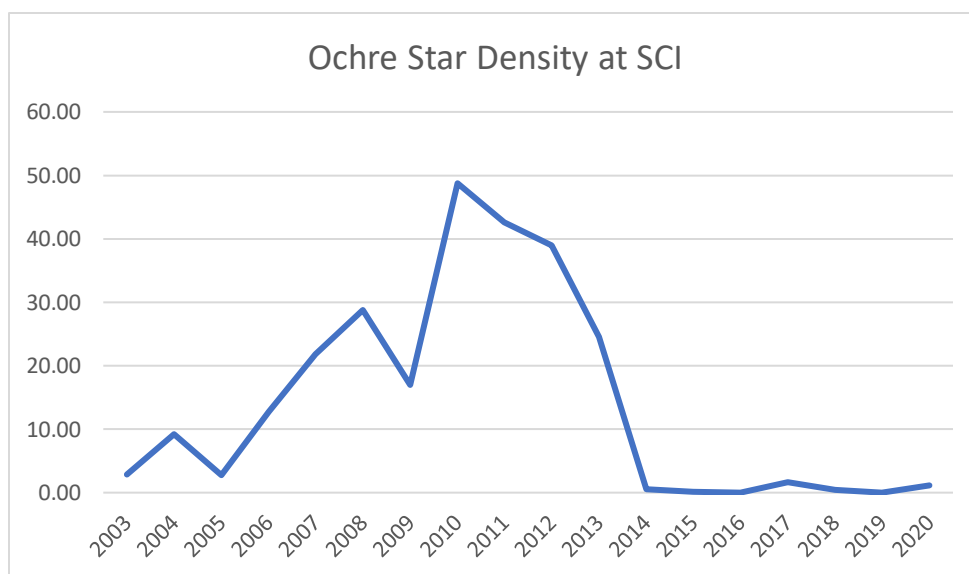
Sunflower Sea Star Density
conducted by UCSB PISCO at Santa Cruz Island

Year	Sunflower Star Density
2003	22.13
2004	25.92
2005	14.33
2006	17.67
2007	9.67
2008	17.33
2009	24.17
2010	20.67
2011	32.08
2012	32.17
2013	1.17
2014	0.00
2015	0.00
2016	0.00
2017	0.00
2018	0.00
2019	0.00
2020	0.00

Sunflower Star Density at SCI
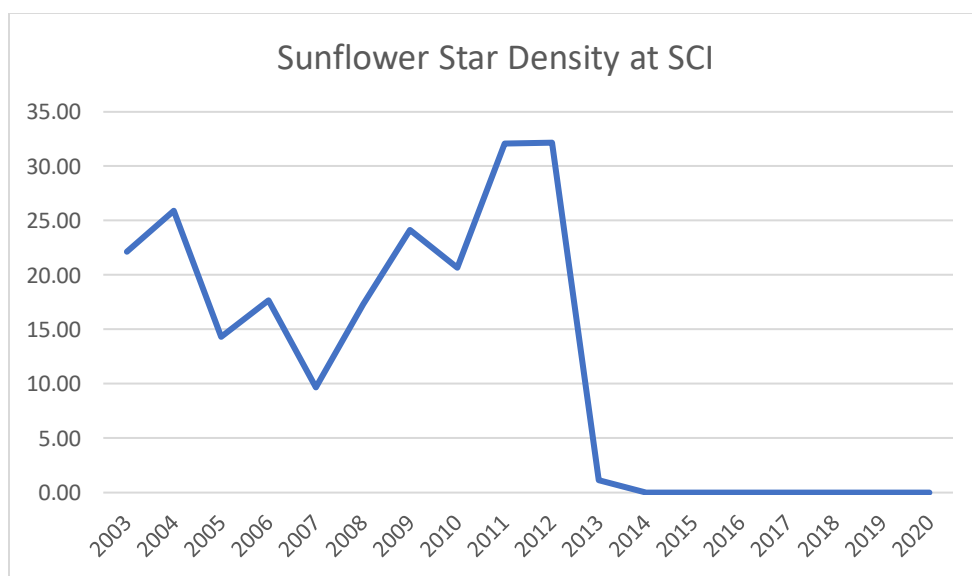
Lesson Title:

Who Lives in California's MPAs?

Grades: 4-6	**Topic:** Organisms that live within Marine Protected Areas	**Lesson # 3** in a unit of 4 lessons
Brief Lesson Description: Students will get to know some inhabitants of our local Marine Protected Areas. Students will then delve deeper by researching an organism that interests them and share that information with the class.		
Performance Expectations: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.		
Specific Learning Outcomes: Students will explore ocean ecosystems and learn about inhabitants Students will learn about animal taxonomy and research and report back about ocean organisms Demonstrate knowledge of different organisms that live in ocean		
Science and Engineering Practices: Asking questions Constructing explanations Obtaining, evaluating, and Communicating information	**Disciplinary Core Ideas:** Developing possible solutions	**Crosscutting Concepts:** Patterns Cause and Effect
NGSS: HS-LS2-2 HS-LS2-7 HS-ESS3-1	**Ocean Literacy Principles:** 5A 5E 6D	**Climate Literacy Principles:**

Lesson Outline:

Materials:
Who Lives in an MPA slide show
Who Lives in an MPA script
Link to slide show & script:
https://drive.google.com/drive/folders/1kA0j4cvNd5iDbe86Loy9T4Do4jpLEH8f?usp=sharing

Internet access for research
Slides and/or art supplies for research presentations

Explore:
Class creates a K-W-L chart for organisms that might live in a Marine Protected Area

Explain:
Present the Who Lives In An MPA slide show
Use the Who Lives In An MPA script to introduce scientific information about organisms.

Elaborate:
Students will choose one organism that lives in an MPA and complete a research project on chosen organism. Present information (to class or in small groups).
Information on organism should include: common and scientific name; family of organisms (i.e. phyla such as fishes(Chordata), Echinoderm, Mollusca, etc.); what type(s) of habitat organism inhabits; interesting facts life history

Evaluate:
Play Who Lives in An MPA Jeopardy
https://www.playfactile.com/kzj1bnuncf

Santa Barbara
CHANNELKEEPER®

Lesson Title:

To have MPAs or Not?

Grades: 4-6	Topic: Presenting an argument for or against MPAs	Lesson # 4 in a unit of 4 lessons
Brief Lesson Description: As the culminating lesson in this unit students will utilize the knowledge gained to take a position on the implementation of MPAs and craft a persuasive essay citing evidence supporting their position.		
Performance Expectations: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		
Specific Learning Outcomes: Demonstrate knowledge of MPAs Utilize data and supporting evidence Craft a well written essay		
Science and Engineering Practices: **Asking Questions** **Constructing Explanations** **Obtaining, evaluating, and communicating information**	**Disciplinary Core Ideas:** **Identify evidence that supports …**	**Crosscutting Concepts:** **Patterns** **Cause and Effect**
NGSS: 4-LS1-1 3-5-ETS1-2 5-ESS3-1 MS-ESS3-3 MS-LS2-1 MS-LS2-2	Ocean Literacy Principles: 5E 5F	Climate Literacy Principles: 6D 6G
Lesson Outline: **Materials:** How to Write a Persuasive Essay outline Persuasive Writing Rubric		

MPA Messaging Resource produced by Resource Media
https://drive.google.com/drive/folders/13pvuoLrP6UF7PFdI-qf9hG8wOT_Of5nC?usp=sharing

Articles:
Kelp Forests May Curb Ocean Acidification
UN Says Oceans Are in Trouble
https://drive.google.com/drive/folders/1pOShpiw1TFQjmI85ez_KfAaaauYEnMfD?usp=sharing

Engage:
Answer this question: Do you support the implementation of MPAs? Why or why not? Pull from previous lessons and other prior knowledge to identify scientific evidence to support your position.

Explore:
Students will read the articles 'UN Says Oceans Are In Trouble', 'Kelp Forests May Curb Ocean Acidification', and one of the 3 fishing articles (California's Other Gold; New Research on Sea Urchins…, Purple Urchin Possibilities…)

Students will start creating a list of reasons they are for or against MPAs and use their prior knowledge to add supporting evidence for each reason.

Explain:
Teacher will review the 'How To Write A Persuasive Essay' and 'Persuasive Writing Rubric' with students to acquaint them with the expectations.

Students will research, write, and edit a persuasive essay For or Against the implementation of MPAs. Students will share with peers and teachers during the editing process. Peers and teacher can use the 'Persuasive Writing Rubric' to evaluate

Elaborate:
Evaluate the opinion in the article 'Kids catch lessons and lifelong memories on their first fishing trip'

As an additional activity, students may create a social media or school-wide campaign based on their position for or against MPAs

Evaluate:
Students' essays will be evaluated using the 'Persuasive Writing Rubric'