

# Kids as Airborne Mission Scientists

## Lesson overview: Why is the government interested in this problem and What is its role?

### FRAME   INFORM   EXPLORE   TRY   SUPPORT

Students are prompted to think about the purpose of the Executive Order in the mission request letter.	Students are prompted to find out why the government's two Executive Orders were established for preserving the coral reefs and what the responsibility of the Coral Reef Task Force (CRTF) is.	Students are divided into teams and assigned the role of one of the government organizations to explore their efforts for preserving the coral reefs of Northwestern Hawaiian islands.	Students will explore the efforts of government for preserving the coral reefs of Kailua Bay.	Support materials for the teacher include ideas to promote student reflection, sample answers to activities, and extension of ideas.
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Click on FRAME, INFORM, EXPLORE, TRY, or SUPPORT above to view the detailed lesson plan.

**Lesson context:** To participate well in KaAMS, students need to understand why the government and government agencies are interested in preserving coral reefs and what efforts they have undertaken. The goal of this lesson is for students to develop an understanding of why the government is interested in preserving the coral reefs. To do this, students role play members of different government organizations that comprise the Coral Reef Task Force. Based on their new understanding of government efforts to the coral reef problem, students will investigate what the government must do to preserve the coral reefs of Kailua Bay.

#### Key science concepts:

- The mission and main responsibilities of various government agencies such as NASA and NSF.

#### Links to teacher resources:

- [The Mission Request Letter](http://www.higp.hawaii.edu/kaams/lpreef/problem/support.html#letter)  
(<http://www.higp.hawaii.edu/kaams/lpreef/problem/support.html#letter>)
- [Executive Order 13089\(1998 year\)](http://nodis.gsfc.nasa.gov/Library/Directives/NASA-WIDE/nasaeoas/eo13089.html)  
(<http://nodis.gsfc.nasa.gov/Library/Directives/NASA-WIDE/nasaeoas/eo13089.html>)
- [Executive Order 13178\(2000 year\): Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve](#)

#### Problems addressed in this lesson:

- What are the efforts of the federal government to preserve the coral reefs at the Federal level?
- What are the efforts of the state government to preserve the coral reefs?
- What are the efforts of the government agencies including NASA to preserve the coral reefs?

**Activity bursts:**

- Group 1: Federal Government:
  - [President](#) | [Department of Interior](#) | [Department of Commerce](#) | [Department of State](#)
- Group 2: State Government:
  - [Hawaii Governor](#) | [Government in the state of Hawaii](#)
- Group 3: Government agencies:
  - [NASA](#) | [NSF](#) | [EPA](#)

**Links to other resources:**

<b>Lesson</b>	<b><u>Teacher</u></b>	<b><u>Student</u></b>
INFORM	Executive Order 13089(1998 year) <a href="http://nodis.gsfc.nasa.gov/Library/Directives/NASA-WIDE/nasaeoas/eo13089.html">http://nodis.gsfc.nasa.gov/Library/Directives/NASA-WIDE/nasaeoas/eo13089.html</a>	Executive Order 13089(1998 year) <a href="http://nodis.gsfc.nasa.gov/Library/Directives/NASA-WIDE/nasaeoas/eo13089.html">http://nodis.gsfc.nasa.gov/Library/Directives/NASA-WIDE/nasaeoas/eo13089.html</a>
	Executive Order 13178(2000 year): Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve <a href="http://nodis.gsfc.nasa.gov/Library/Directives/NASAWIDE/nasaeoas/eo13178.html">http://nodis.gsfc.nasa.gov/Library/Directives/NASAWIDE/nasaeoas/eo13178.html</a>	Executive Order 13178(2000 year): Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve <a href="http://nodis.gsfc.nasa.gov/Library/Directives/NASAWIDE/nasaeoas/eo13178.html">http://nodis.gsfc.nasa.gov/Library/Directives/NASAWIDE/nasaeoas/eo13178.html</a>
	Coral Reef Task Force (CRTF) <a href="http://coralreef.gov/">http://coralreef.gov/</a>	Coral Reef Task Force <a href="http://coralreef.gov/">http://coralreef.gov/</a>
	CRTF Purpose <a href="http://coralreef.gov/purpose.cfm">http://coralreef.gov/purpose.cfm</a>	CRTF Purpose <a href="http://coralreef.gov/purpose.cfm">http://coralreef.gov/purpose.cfm</a>

EXPLORE	Members of the U.S. Coral Reef Task Force <a href="http://coralreef.gov/members.cfm">http://coralreef.gov/members.cfm</a>	Members of the U.S. Coral Reef Task Force <a href="http://coralreef.gov/members.cfm">http://coralreef.gov/members.cfm</a>
	President <a href="http://www.whitehouse.gov/president">http://www.whitehouse.gov/president</a>	President <a href="http://www.whitehouse.gov/president">http://www.whitehouse.gov/president</a>
	Department of Interior <a href="http://www.doi.gov/">http://www.doi.gov/</a>	Department of Interior <a href="http://www.doi.gov/">http://www.doi.gov/</a>
	Department of Commerce <a href="http://www.coralreef.noaa.gov/">http://www.coralreef.noaa.gov/</a>	Department of Commerce <a href="http://www.coralreef.noaa.gov/">http://www.coralreef.noaa.gov/</a>
	Department of State <a href="http://www.state.gov/">http://www.state.gov/</a>	Department of State <a href="http://www.state.gov/">http://www.state.gov/</a>
	Hawaii Governor <a href="http://gov.state.hi.us/">http://gov.state.hi.us/</a>	Hawaii Governor <a href="http://gov.state.hi.us/">http://gov.state.hi.us/</a>
	Government in the state of Hawaii <a href="http://www.ehawaii.gov.org/government/html/index.html">http://www.ehawaii.gov.org/government/html/index.html</a>	Government in the state of Hawaii <a href="http://www.ehawaii.gov.org/government/html/index.html">http://www.ehawaii.gov.org/government/html/index.html</a>
	NASA (National Aeronautics and Space Administration) <a href="http://www.nasa.gov/">http://www.nasa.gov/</a>	NASA (National Aeronautics and Space Administration) <a href="http://www.nasa.gov/">http://www.nasa.gov/</a>
	NSF (National Science Foundation) <a href="http://www.nsf.gov/">http://www.nsf.gov/</a>	NSF (National Science Foundation) <a href="http://www.nsf.gov/">http://www.nsf.gov/</a>
	EPA (Environmental Protection Agency): Coral Reef Protection <a href="http://www.epa.gov/owow/oceans/coral/index.html">http://www.epa.gov/owow/oceans/coral/index.html</a>	EPA (Environmental Protection Agency): Coral Reef Protection <a href="http://www.epa.gov/owow/oceans/coral/index.html">http://www.epa.gov/owow/oceans/coral/index.html</a>
	U.S. Department of the Interior: Protecting the Nation's Coral Reefs <a href="http://coralreef.gov/doi.cfm">http://coralreef.gov/doi.cfm</a>	U.S. Department of the Interior: Protecting the Nation's Coral Reefs <a href="http://coralreef.gov/doi.cfm">http://coralreef.gov/doi.cfm</a>
	Protecting the Nation's Coral Reefs <a href="http://www.usgs.gov/coralreef.html">http://www.usgs.gov/coralreef.html</a>	Protecting the Nation's Coral Reefs <a href="http://www.usgs.gov/coralreef.html">http://www.usgs.gov/coralreef.html</a>

Mapping the Decline of Coral Reefs  
<http://earthobservatory.nasa.gov/Study/Coral/>

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# Kids as Airborne Mission Scientists



## **Why is the government interested in this problem and What is its role?**

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**Related subject area:** Science

**Overall problem:** Which activities (if any) should be restricted around the coral reefs of Kailua Bay to insure their lasting protection?

**Relationship of problem in this lesson to overall problem:** In order to understand the Executive Order in the mission request letter, students need to understand what governments have to do with the coral reefs problem. During this lesson students participate in collaborative role-playing and will develop a conceptual understanding of the efforts by the government at the different levels to preserve coral reefs.

**Estimated time required:** 1 to 2 class periods

**Student outcomes/objectives:**

- Students will be able to define what an Executive Order is.
- Students will be able to identify the efforts of the government to preserve the coral reefs at the Federal level.
- Students will be able to identify the efforts of the State government to preserve the coral reefs.
- Students will be able to identify the efforts of government agencies including NASA to preserve the coral reefs.

**Prerequisite skills or knowledge:**

- Basic internet skills
- Basic reading and writing skills

**Teacher preparation:**

- Print Student Journal /Activity sheets for these activities.
- Bookmark appropriate websites for students.

**Student reflection and assessment:** [Student reflection activity](#) | [Assessment](#)

**Education standards supported by this lesson:**

[National Science Education Standards](#) | [Project 2061 Benchmarks](#)

[National Standards for School Mathematics](#) | [National Technology Standards](#) | [National Geography Standards](#)

**Cross-curricular connections to National Education Standards for this lesson:**

[Math](#) | [Technology](#) | [Geography](#)

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### Teacher activities

**FRAME** the lesson by reminding students about the Executive Order (EO) in the mission request letter.

**Ask** students to remember the mission request letter and refer students to find it in their journal.

**Ask** what is the overall problem that we have been investigating?

**Prompt** students to find the Executive Order (EO) in the mission request letter

- Circle the Executive Order
- Underline the sentences for the EO in the mission request letter

**Ask** which words in the letter they are having difficulty with.

**Ask** what the purposes of EO were and

### Student activities

Sample student responses:

- Evaluating the state of coral reefs in the Kailua Bay
- Read Mission Request Letter
- Circled words may include: December 2000, President Clinton signed the Executive Order
- Underlined sentences include from line 3 to line 10
- Possible student's responses: Natural Stress, Executive Order, Reserve, Jurisdiction, Ecosystem, CRTF, Department of Commerce, Department of Interior, Restrictive, Detrimental, CRS, Restrictions.

Possible students responses:

what government has to do to preserve the coral reefs?

- To take steps to protect, manage, research, and restore the coral reef ecosystem
- Establish the Coral Reef Task Force(CRTF) and establish the reserve for the Northwestern Hawaiian Island area

**Inform** students that they will be learning about the reasons why the Government established the EO and what efforts they undertook to preserve coral reefs

### Teacher activities

**Inform** students of important concepts in the two Executive Orders for preserving the coral reefs.

**Provide** students with the two Executive Orders (EO) for preserving the coral reefs

- [Executive Order 13089\(1998 year\)](#)
- [Executive Order 13178\(2000 year\): Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve](#)

### Teacher note:

It is recommended to download the full-texts of two Executive Orders and take a look at it before providing them to the students.

**Explain** the purpose of each EO to students. The first EO was to raise concerns regarding the coral reefs and establish the Coral Reef Task Force. The second EO was to establish the reserve to Northwestern Hawaiian Island Coral Reef Ecosystem.

**Ask** students to think about why the EO was written and what efforts the government undertook to implement the EO?

### Student activities

Sample student responses:

- Coral reefs are one of the U.S.'s natural resources to protect and therefore the U.S. government wrote the EO to create the Coral Reefs Task Force in order to preserve the

**Ask** students to identify which government organizations are involved in preserving the coral reefs?

**Ask** students to think about the following questions and to complete [the Activity sheets : Coral Reefs Task Force Research \(G-1\)](#)

- When was the U.S. Coral Reef Task Force (CRTF) established?
- What are the responsibilities of CRTF?
- Who are the members of CRTF?
- How can you group the members of CRTF and which organizations are belonged to each category (group)?

### **Teacher activities**

**Explore** the efforts of each government organization for preserving the coral reefs.

**Break** students into three stakeholder groups and assign each group to the role of a government organization involved in the [Executive Order 13178\(2000 year\): Northwestern Hawaiian Islands Coral Reef](#)

coral reefs effectively.

- Federal Government: President, Department of Interior, Department of Commerce, Department of State.
- State Government: Governors, Governments in the state of Hawaii
- Government Agencies: NASA, NSF, EPA
- Students complete [the Activity sheets: Coral Reefs Task Force Research \(G-1\)](#) while exploring the following web sites.
- Research Background web site:
  - [Coral Reefs Task Force](#)
  - [CRTF Purpose](#) (<http://coralreef.gov/purpose.cfm>)
  - [Members of the U.S. Coral Reef Task Force](#) (<http://coralreef.gov/members.cfm>)

### **Student activities**

## Ecosystem Reserve

- Group 1: Federal Government:
  - [President.](#)
  - [Department of Interior](http://coralreef.gov/doi.cfm)  
(<http://coralreef.gov/doi.cfm>)
  - [Department of Commerce](#)
  - [Department of State](#)
- Group 2: State Government
  - [Hawaii Governor](#)
  - [Government in the state of Hawaii](#)
- Group 3: Government agencies
  - [NASA](#)
  - [NSF](#)
  - [EPA](#)

Ask students to think about the following questions and complete [\*\*the Activity Sheets: Exploring the Government's efforts in establishing the Executive Order \(G-2\)\*\*](#)

- What are the reasons to establish the EO for the Northwestern Hawaiian Islands Coral Reefs?
- What are the roles of your group?
- What efforts did your group undertake to preserve the coral reefs?

Ask each group to present their main roles and efforts of the government organizations that they investigated .

- Students complete [\*\*the Activity Sheets: Exploring the Government's efforts in establishing the Executive Order \(G-2\)\*\*](#) while exploring the following web sites.
- Research Background website:
  - [U.S. Department of the Interior: Protecting the Nation's Coral Reefs](http://coralreef.gov/doi.cfm)  
(<http://coralreef.gov/doi.cfm>)

- [Protecting the Nation's Coral Reef](#)
- [Mapping the Decline of Coral Reefs](#)

### Teacher activities

**Try** using knowledge they learned about the Executive Order.

**Ask** what the overall problem we have been investigating is.

**Prompt** students think about why CRTF made a new recommendation that another EO be established for preserving the coral reefs of Kailua Bay.

**Prompt** students to think about what efforts the government should undertake if another EO is established for preserving the coral reefs of Kailua Bay.

**Explain** that they will now participate in a mission activity to explore the problems that CRTF investigate. In this activity, they will form a CRTF. To do this they will choose the government organization in their CRTF and identify their mission.

**Ask** students which government organizations will be involved in new CRTF?

**Break** students into several groups. Ask each group to form CRTF groups. Each

### Student activities

Sample students responses:

- Which restrictions (if any) should be applied to activities around the coral reefs of Kailua Bay to insure their lasting protection?
- Because CRTF wanted to preserve the coral reefs of Kailua Bay.
- Various government organizations should collaborate wok to preserve the coral reefs of Kailua Bay.

group should identify a person to assume the role of a government organization at the following levels:

- Federal Government level
- State Government level
- Government Agencies

**Ask** the each group to explore what they should do to preserve the coral reefs of the Kailua bay and write the results of their investigation on [the Students Activity Sheet: Finding the Government's tasks as defined by the new Executive Order for Kailua Bay\(G-3\)](#)

**Ask** each group to present the results of their investigation to the class.

- Federal Government, State of Hawaii Government, Government agencies.
- Choose a role of government and form a CRTF.

- Students complete [the Activity Sheet: Finding the Government's tasks as defined by the new Executive Order for Kailua Bay \(G-3\)](#)
- Each group presents their investigation results.

**Student reflection activity:**

Prompt students to think about the following:

- Why did the government establish two Executive Orders for preserving coral reefs?
- Why did the Coral Reef Task Force recommend that another EO be established for preserving the coral reefs of Kailua Bay?
- How do government organizations work together to preserve the coral reefs?
- What government organizations are involved in preserving the coral reefs?

**Assessment:**

- Check the descriptions about the key members and their roles of Coral Reef Task Forces in student journal.
  - Federal Government: President, Department of the Interior, Department of Commerce, Department of State
  - State Government: Hawaii Governor, Government in the state of Hawaii
  - Government agencies: NASA, NSF, EPA
- Check the result of group investigation about the efforts of governments for preserving the coral reefs of Kailua Bay.

**Ideas for math lesson connections**

- Students practice communication skills by creating graphs of various variables in order to interpret the role of the members in the Coral Reefs Task Force play.

**Related National Education Math Standards**

- Numbers and Operations
- Representation

**Ideas for geography lesson connections**

- Students investigate the Hawaiian Islands. For example, the students might create a report describing the location, climate, history, culture, and geography of the island.
- Students investigate the relationship between the coral reefs, the ecosystem and the roles different government organizations that are members in the Coral Reefs Task Force.

**Related National Education Geography Standards**

- The World in Spatial Terms (3)
- Physical System (8)
- Environment and Society (14, 15, & 16)

**Ideas for technology lesson connections**

- Word processing: Students create their own electronic journal for keeping notes on KaAMS project.
- Database: Students create a database of vocabulary words and terms they will learn throughout KaAMS.
- Presentation software: Students create a short presentation on their understanding of airborne remote sensing.

**Related National Education Science Technology Standards**

- Technology and Society (4)
- The Designed World (17)

## Activity Sheet 1: Coral Reef Task Force Research (G-1)

1. When was the U.S. Coral Reef Tasks Force (CRTF) established?

The U. S. Coral Reef Task Force (CRTF) was established by President Clinton in June 1998 through Executive Order #13809 on Coral Reef Protection to lead the U.S. response to growing, global environmental crisis to the coral reefs.

2. What are the responsibilities of CRTF (Please write at least 3 responsibilities)?

The CRTF is responsible for overseeing implementation of the Executive Order and developing coordinated efforts to 1) map and monitor U. S. coral reefs, 2) research the causes and solutions to coral reef degradation, 3) reduce and mitigate coral reef degradation from pollution, over fishing and other causes, 4) implement strategies to promote conservation and sustainable use of coral reefs internationally.

3. Who are the members of CRTF? (Please write the members of at least 5).

Department of the Interior  
Department of Commerce  
Environmental Protection Agency  
Department of Agriculture  
Department of State  
National Science Foundation  
National Aeronautics and Space Administration  
Guam  
Hawaii

4. How can you group the members of CRTF and which organizations do they belong to?

1. Federal Government: President, Department of Interior, Department of Commerce, Department of State
2. State Government: Hawaii Governor, Government in the state of Hawaii
3. Government agencies: NASA, NSF, EPA

## Activity Sheet 2: Exploring the government's efforts in establishing the Executive Order (G-2)

**Role (Circle your role):**

**Federal Government, State Government, Government Agencies**

**Team Member:**

Why should the EO for the Northwestern Hawaiian Islands Coral Reefs be established?

- Geological record
- Support dynamic reef ecosystem
- Cultural significance
- Preserve America's natural wonders for future

2. What is the role of your group? Define the mission in your group.

### 1) Federal Government

- President: The head of U.S. federal government.
- Department of the Interior: The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to tribes
- Department of Commerce: The mission is to describe and predict changes in the Earth's environment, and conserve and wisely manage the Nation's coastal and marine resources
- Department of State: U.S. diplomacy is an instrument of power, essential for maintaining effective international relationships, and a principal means through which the United States defends its interests, responds to crises, and achieves its international goals. The Department of State is the lead institution for the conduct of American diplomacy, a mission based on the role of the Secretary of State as the President's principal foreign policy adviser.

### 2) State Government

- Governor: The head of state government of Hawaii
- State Government of Hawaii: State Government of Hawaii is the government organization to oversee the coral reefs of Hawaii islands.

### 3) Government Agencies

- National Science Foundation the National Science Foundation is an independent U.S. government agency responsible for promoting science and engineering through programs that invest over \$3.3 billion per year in almost 20,000 research and education projects in science and engineering.
- National Aeronautics and Space Administration The NASA mission is to (1) Explore, use, and enable the development of space for human enterprise; (2) Advance scientific knowledge and understanding of the Earth, the solar system, and the universe and use the environment of space for research; and (3) Research, develop, verify, and transfer advanced aeronautics, space, and related technologies.
- Environmental Protection Agency: The mission of the U.S. Environmental Protection Agency is to protect human health and to safeguard the natural environment - air, water, and land - upon which life depends

### 3. How is the mission of the group you chose related to the coral reefs problem?

#### 1) Federal Government

- President: President signs the Executive Orders on Coral reef protection
- Department of the Interior: Coral reefs are one of U.S. Nation's natural resources and we need to protect our trust responsibilities to tribes
- Department of Commerce : Coral reefs ecosystem are in danger and therefore need to be wisely conserved as a Nation's coastal and marine resource
- Department of State: Preserving coral reefs can be more effectively achieved by international efforts between countries because coral reefs are distributed the all around world.

#### 2) State Government

- Hawaii Governor: Hawaii governor is one of the members who is in the CRTF and has the responsibility to preserve the coral reefs of Hawaii islands
- State Government of Hawaii: Because the reserved areas in the second EO are in Northwestern area of the islands of Hawaii, the state Government of Hawaii is responsible for preserving the coral reefs of Kailua bay.

#### 3) Government Agencies

- National Science Foundation: Because coral reefs are one of the main topics in science, the research on coral reefs should be promoted by NSF.
- National Aeronautics and Space Administration: Investigations on coral reefs are done by the airborne remote sensing mission scientists.

## **Activity Sheets 3: Finding the government's tasks as defined by the new Executive Order for Kailua Bay (G-3)**

1. What is the mission of the CRTF?

CTRF is responsible for overseeing implementation of the Executive Order, and developing and implementing the coordinated efforts to a) monitor coral reefs, b) research the coral reefs, c) implement strategies to promote conservation and sustainable use of coral reefs.

2. Why do we need to establish the reserve for the coral reefs of Kailua Bay?

Because the CRTF suggested a new recommendation that another EO should be established for preserving the coral reefs of Kailua Bay

3. Who are the members in the CRTF? Why did you choose an organization in your Task Force

- One of the organizations at the federal government Level such as Department of the Interior, Department of Commerce, Department of State, etc.
- State Government of Hawaii
- One of the organizations at the government agencies such as National Science Foundation and National Aeronautics and Space Administration

4. What will your group do to preserve the coral reefs of the Kailua bay? Please write a two to three sentence essay.

Our team is composed of different government organizations including the federal government, Hawaii state government, and a government agency such as NASA. For solving the coral reefs problem, each government organization will work together under the direction of the department of Interior and Commerce. Specific tasks that we will do included considering if we should establish another EO for preserving coral reefs of Kailua Bay and decide which activities (if any) should be restricted around the coral reefs of Kailua Bay to insure their lasting protection, etc.