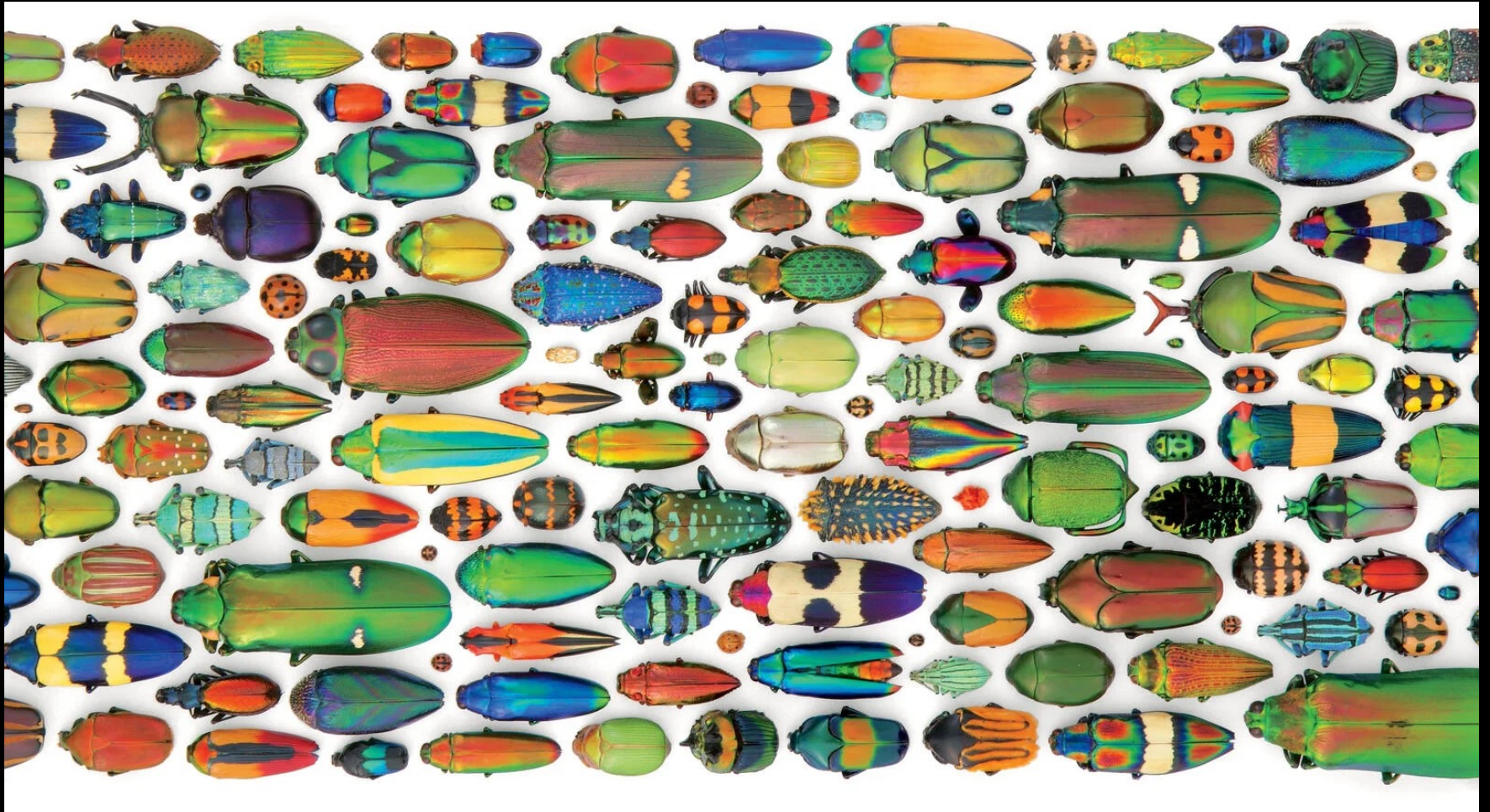


Mission STEMCAP: Biodiversity Loss Art and Science Workshop

Katie Seastrand & Andrew George
University of Utah



Which group of animals has the most species?

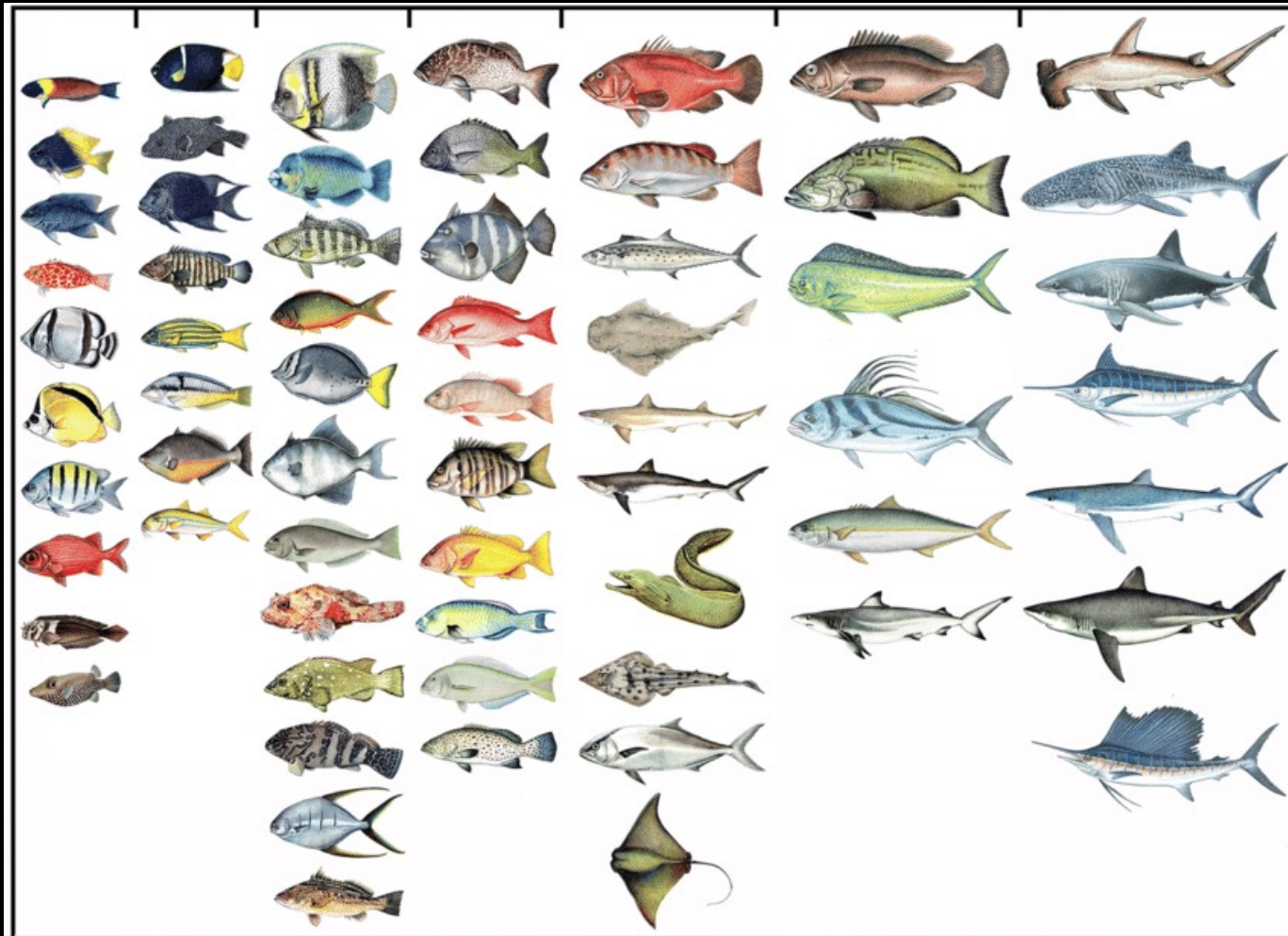


Which group of vertebrates
has the most species?

Which group of vertebrates
has the most species?

- A. Birds
- B. Mammals
- C. Fish
- D. Reptiles
- E. Amphibians

Which group of vertebrates has the most species?



Which habitat is home to the most fish biodiversity?

- A. Lakes
- B. Rivers
- C. Coral Reefs
- D. The Deep Sea
- E. Marshes

Which habitat is home to the most fish biodiversity?



Why do so many species live on coral reefs?



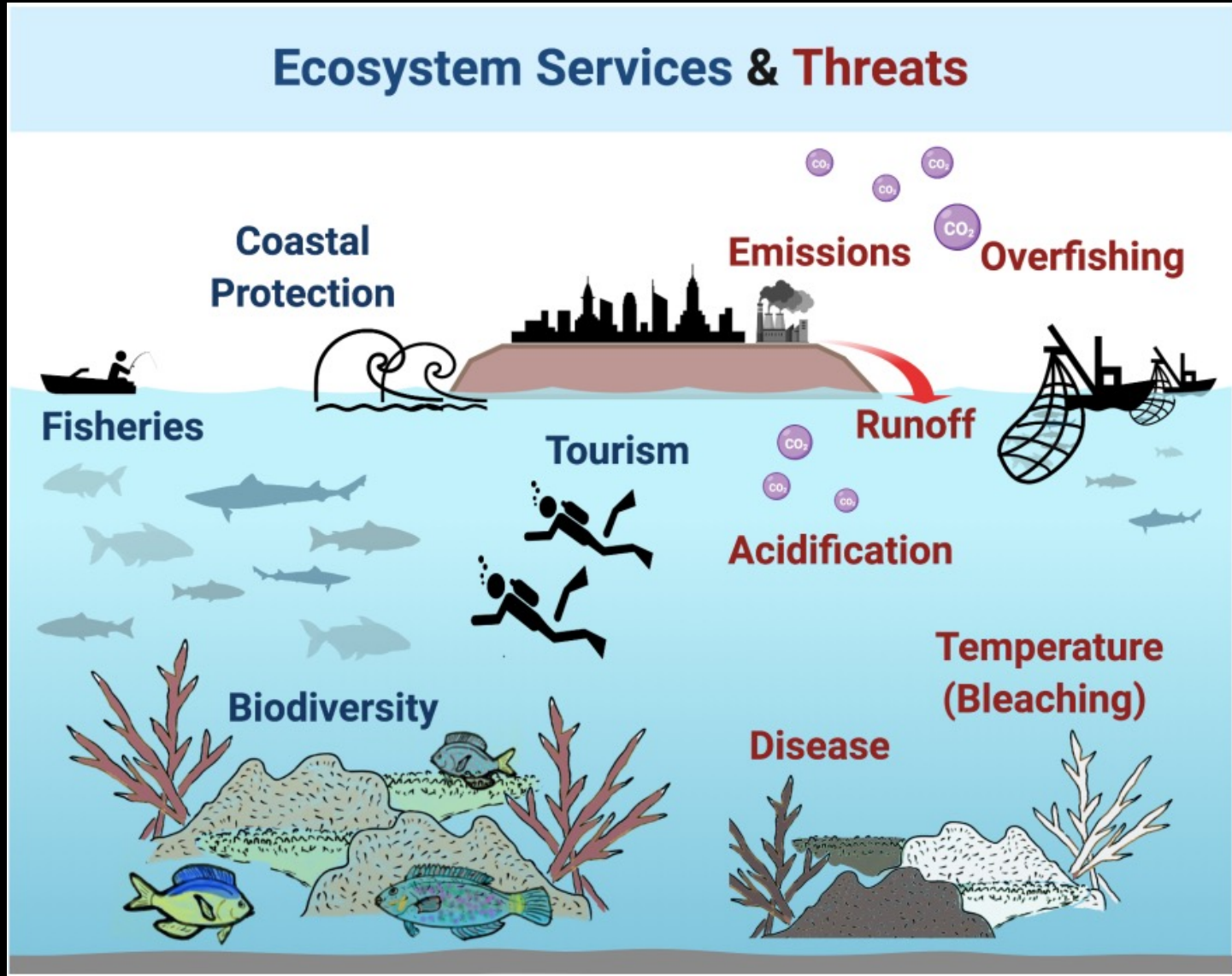


Reef Microhabitats

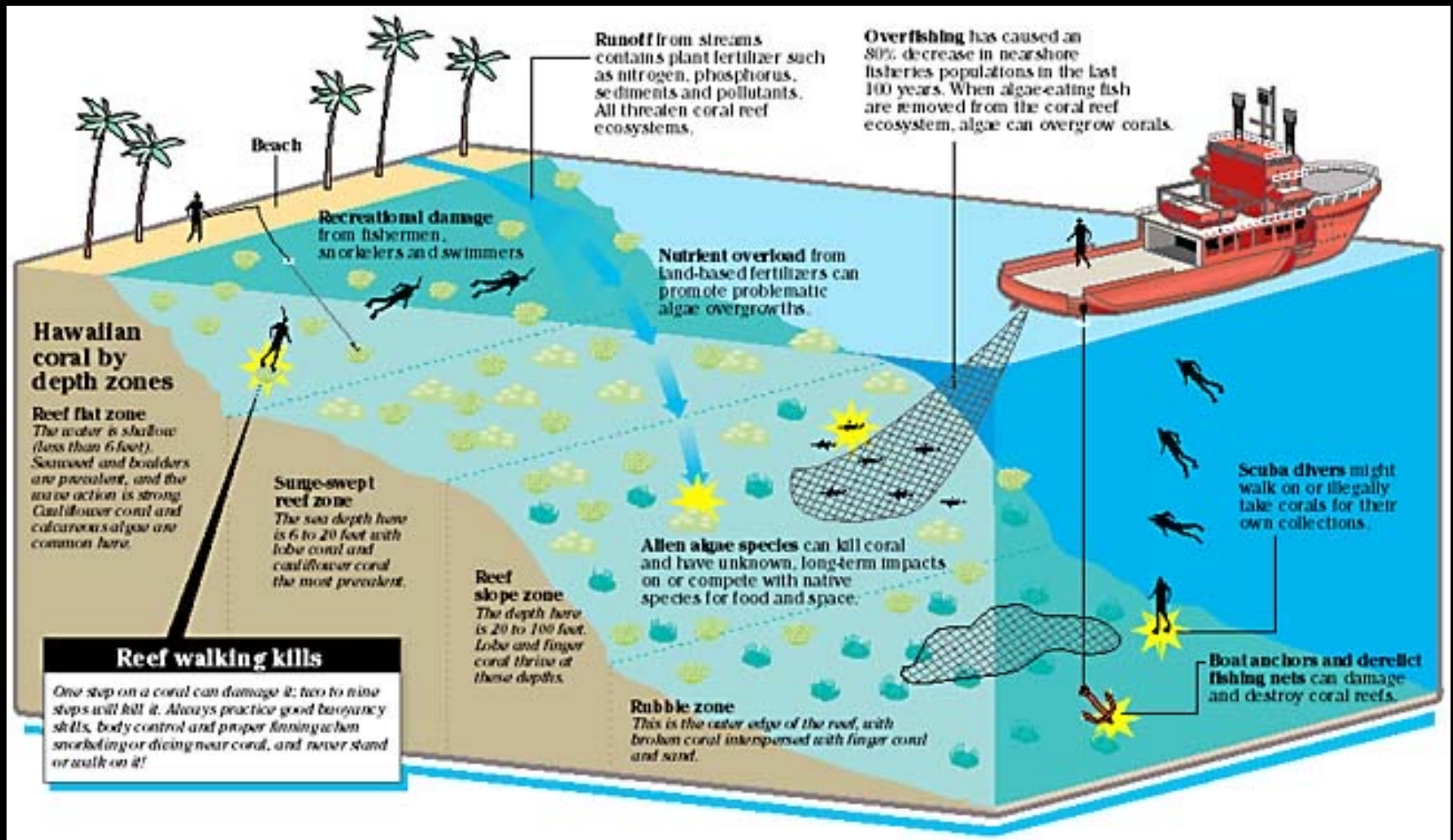


Reef Microhabitats

Threats to Reef Biodiversity



Threats to Reef Biodiversity



Climate Change



Why functional groups?

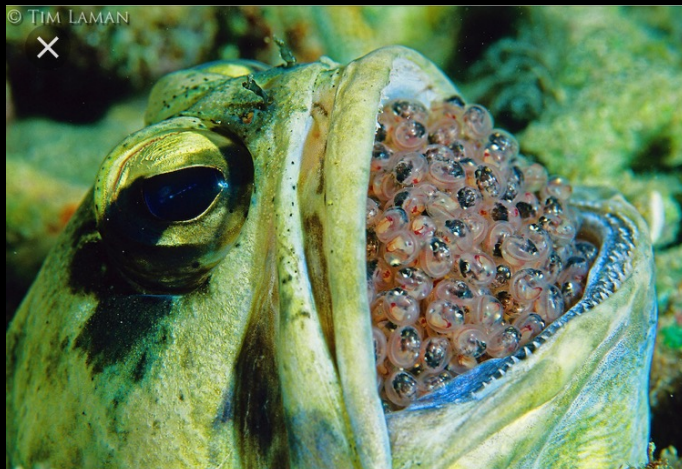


Resilience!

Create Your Own Fish For a Resilient Reef!

Questions to Consider

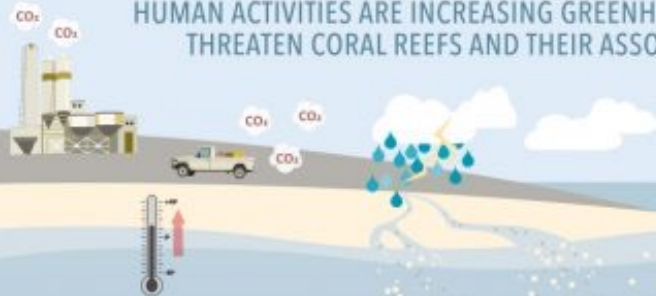
- Where does it live?
 - Microhabitat
- How does your species move?
- What does it eat?
- How big is your species?
- How is it unique?



Using Art to Inform Action!

CORAL REEFS & CLIMATE CHANGE

HUMAN ACTIVITIES ARE INCREASING GREENHOUSE GAS EMISSIONS, CHANGING THE EARTH'S CLIMATE AND ECOSYSTEMS. THESE CHANGES THREATEN CORAL REEFS AND THEIR ASSOCIATED BIODIVERSITY, AS WELL AS THE LIVELIHOODS OF THOSE WHO DEPEND ON THEM.



RISING TEMPERATURE

Greenhouse gas emissions are trapping heat in the earth's atmosphere and warming the world. Rising sea temperatures stress coral and cause **coral bleaching**. The more global temperatures rise, the more frequent bleaching events will be. This reduces the chance of corals recovering or even surviving.

CHANGING WEATHER

Global warming is changing weather patterns such as the frequency and amount of rain. More rain increases flows of **sediment and pollution** from the land, both of which damage reefs. This combined with rising sea temperature also causes **algal blooms**. Storms are becoming stronger and more frequent, causing **wave damage**.

SEA LEVEL RISE

Rising temperatures are raising sea levels due to melting polar ice and thermal expansion of warmer water. This can increase sedimentation and reduce sunlight reaching reefs, thus **reducing coral photosynthesis**.

ACIDIFICATION

Sea water absorbs carbon dioxide from the air, which increases the water's acidity. Thus, rising CO₂ levels are causing ocean acidification, making it harder for corals to build their calcium carbonate structure. Corals **grow slower**, are **weaker** and more prone to damage.

CUMULATIVE STRESS

Stress adds up. Every threat makes a reef more vulnerable - for example over-fishing makes a reef less likely to recover from an algal bloom. A polluted reef is more vulnerable to coral bleaching. Stressed corals are more vulnerable to **disease** and less likely to be resilient to **invasive species**.

THE GOOD NEWS...

Research shows that **geographic features** help stabilize water temperatures around some of the world's reefs. This protects them from the more severe impacts of climate change. So if we prevent over-fishing, pollution and physical damage, these reefs can remain healthy and productive!

Corals depend on photosynthesizing algae living inside them to provide food and energy. **Coral bleaching** is when these algae leave the coral due to excess heat and pollution. The coral then starves and is vulnerable to disease, breakage and death.

Healthy reef ecosystems contain a **diversity of species**, each of which has an ecological role. For example, herbivorous fish keep corals clean and healthy by grazing on surface algae. Carnivorous fish regulate coral predators such as sea urchins.

Over-fishing disrupts ecological balance making reefs more vulnerable to the effects of climate change.

Despite the challenges of climate change, we can help protect reefs in several ways:

- Create and manage effective marine protected areas
- Regulate fishing to sustainable levels
- Support research and monitoring of coral reef health
- Reduce marine pollution
- Reduce carbon emissions and support carbon sequestration.

HEALTHY REEFS ACT AS CARBON SINKS, SO PROTECTING REEFS HELPS MITIGATE THE EFFECTS OF CLIMATE CHANGE!
Healthy reefs provide food and livelihoods, support biodiversity and tourism and protect coasts from erosion.

REDUCING DAMAGING HUMAN ACTIVITIES INCREASES REEF RESILIENCE & PRODUCTIVITY, BENEFITING BIODIVERSITY AND PEOPLE!

TOGETHER WE CAN PROTECT CORAL REEFS

Using Art to Inform Action!



Local artist Chris Peterson aims to educate the public about Utah's native wildlife species and conservation efforts by creating a prominent wildlife mural in each county of Utah. Pictured above is a 120-foot mural of a Bonneville cutthroat trout in Sugar House. Photo: Utah DWR.

Example Field Guide

Orange-Lined Triggerfish



Scientific Name: *Balistapus undulatus*

General Description: Laterally compressed green fish with many orange lines running along the whole body. Orange fins.

Unique Features:

- Spine on the dorsal fin (arrow)
- Elongate dorsal and anal fins
- Rounded tail fin
- Small hooks on the caudal peduncle

Habitat: Salt water, shallow coral reefs.

Diet: Uses its strong jaw and large teeth to eat hard-shelled animals including clams, sea urchins and crabs.

Behavior: Grazes slowly along the bottom while feeding, but capable of fast bursts of speed. Aggressive and territorial around food sources. Sleeps in the reef at night. Lives in groups.

Locomotion: Swims with its long dorsal and anal fins.

Fish Fin Terms

