
Hawaiian watersheds, nonpoint source pollution, and coral reefs…

# …A story of creeping degradation

A presentation by

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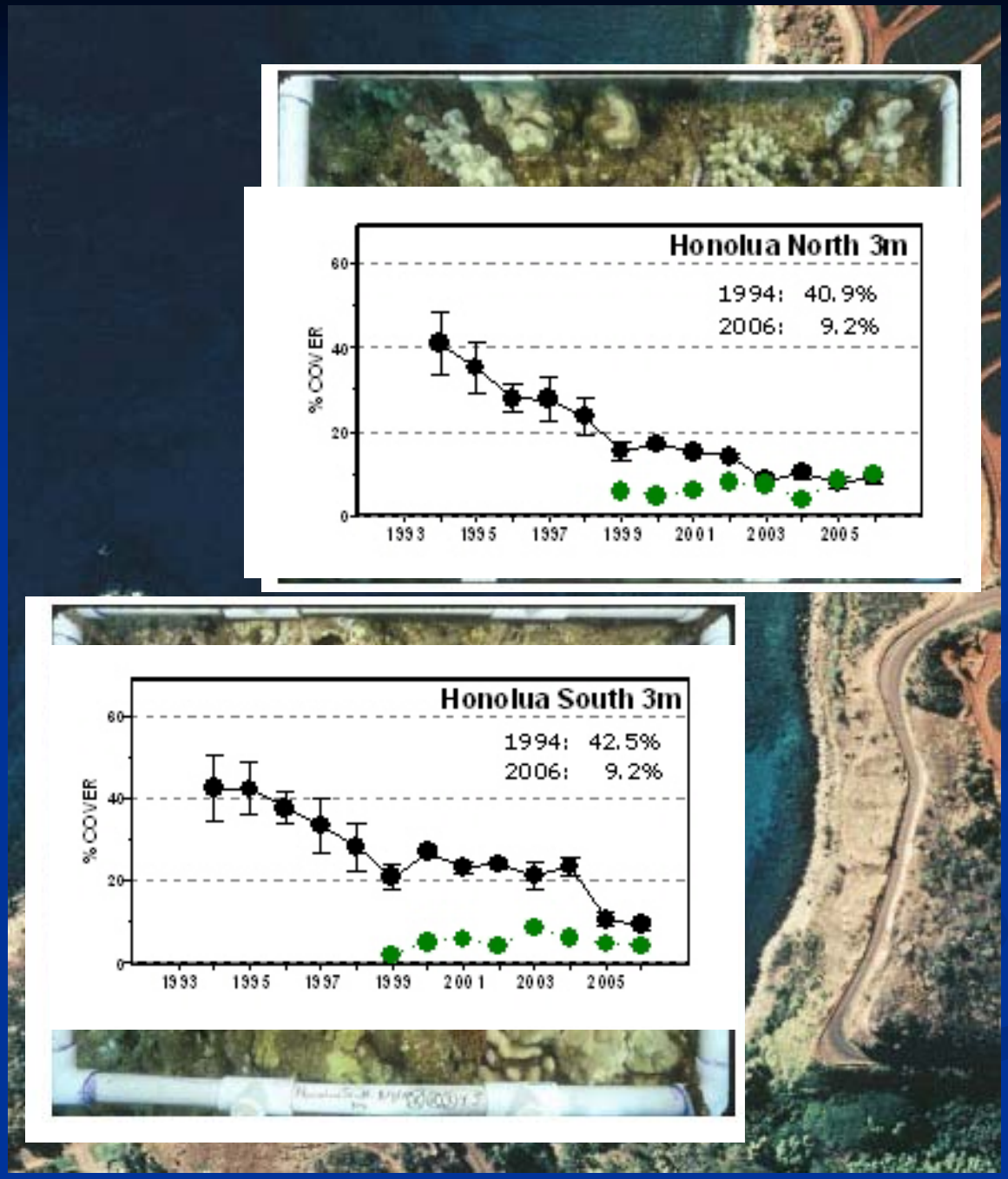
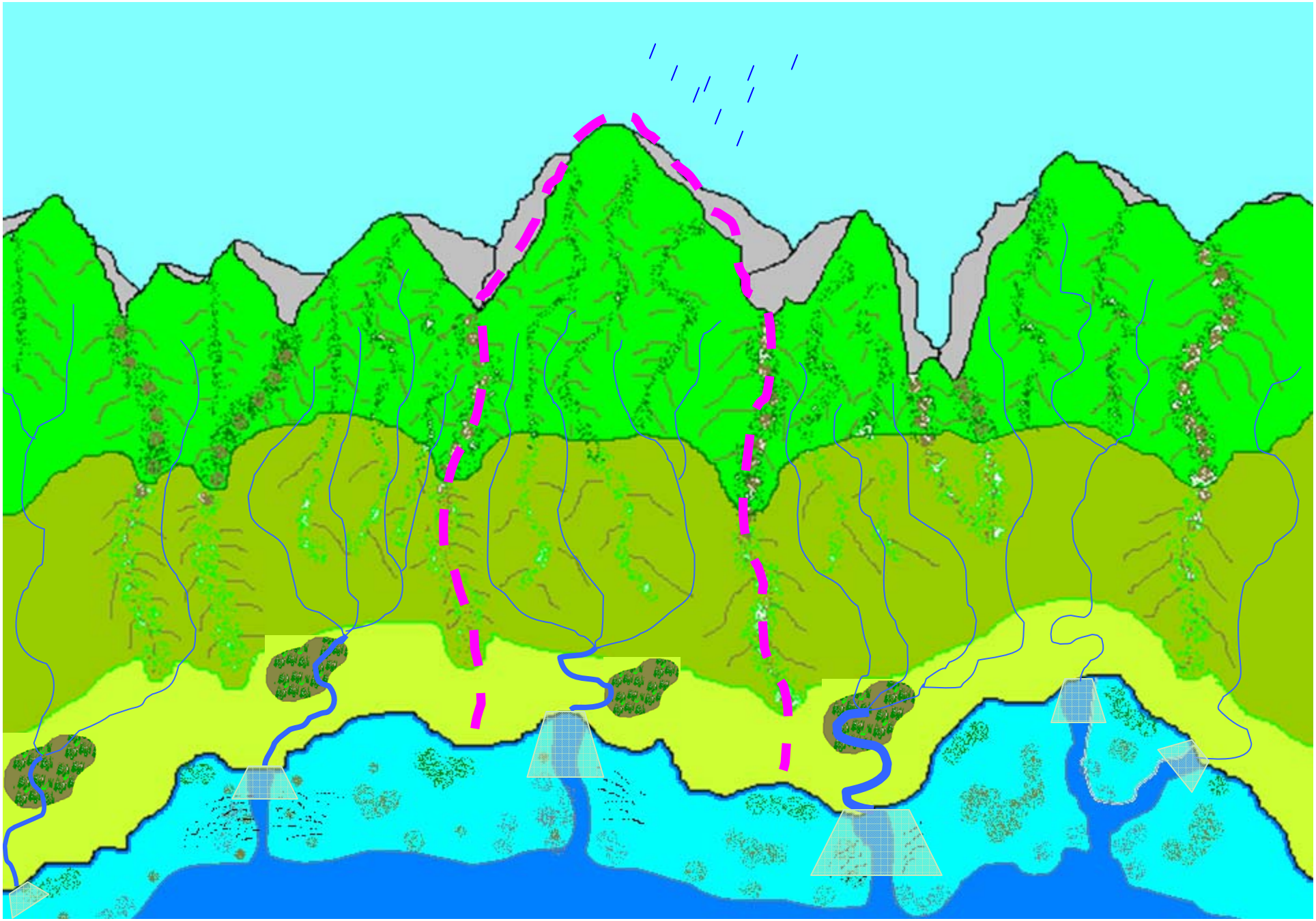
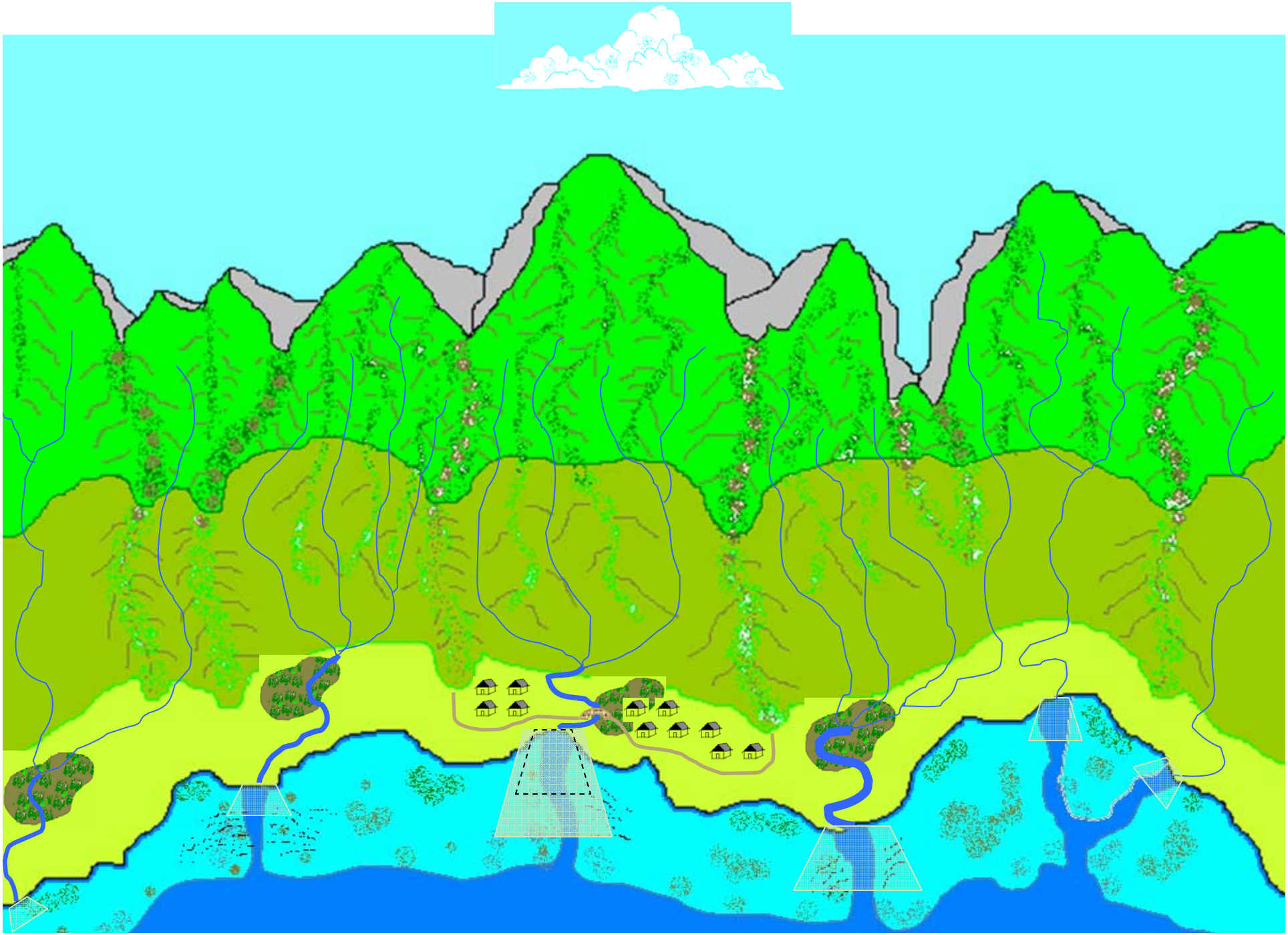
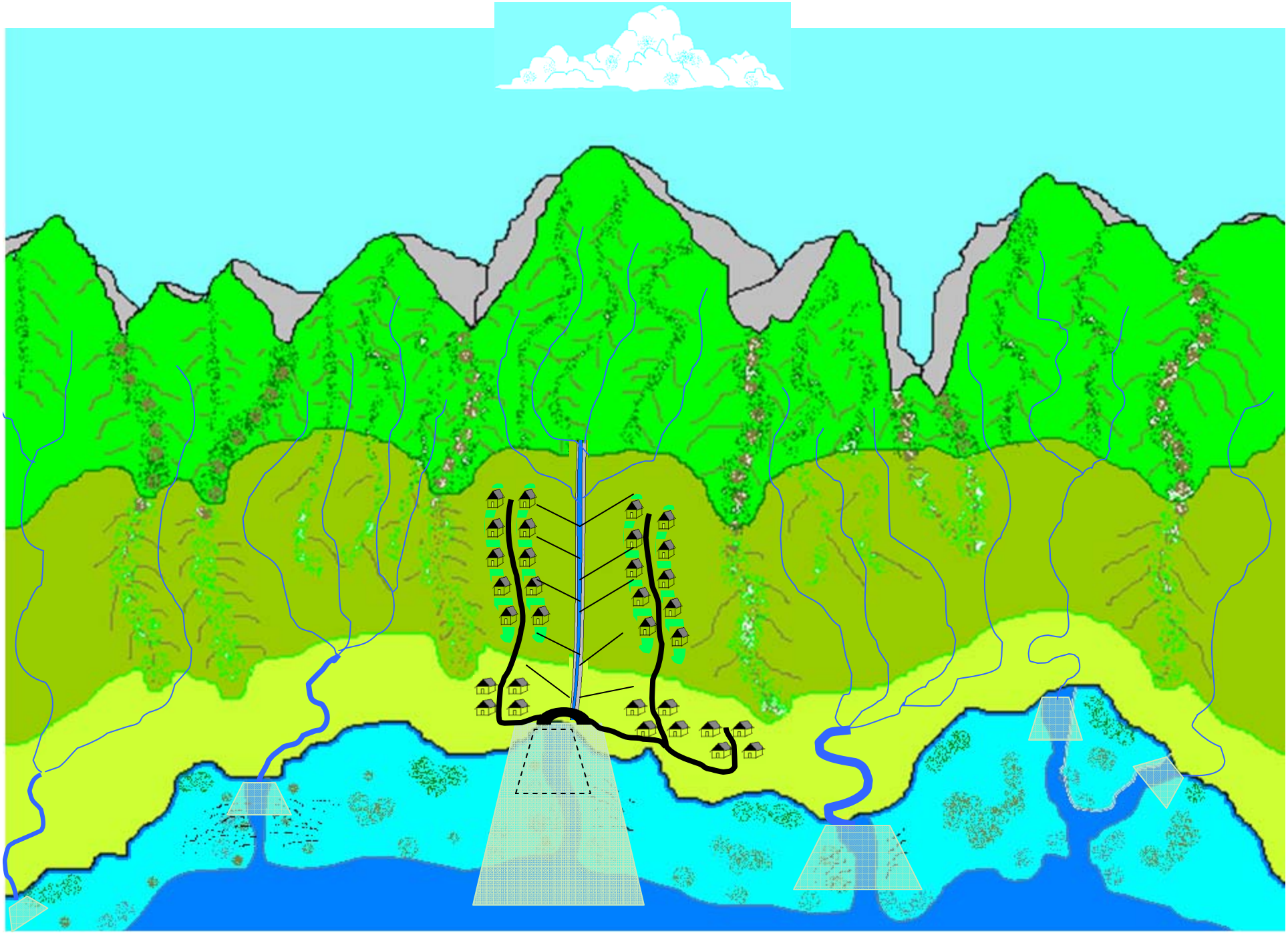

Honolua North 3m
1994: 40.9%
2006: 9.2%
% COVER
0
20
40
60
1993
1995
1997
1999
2001
2003
2005
Honolua South 3m
1994: 42.5%
2006: 9.2%
% COVER
0
20
40
60
1993
1995
1997
1999
2001
2003
2005

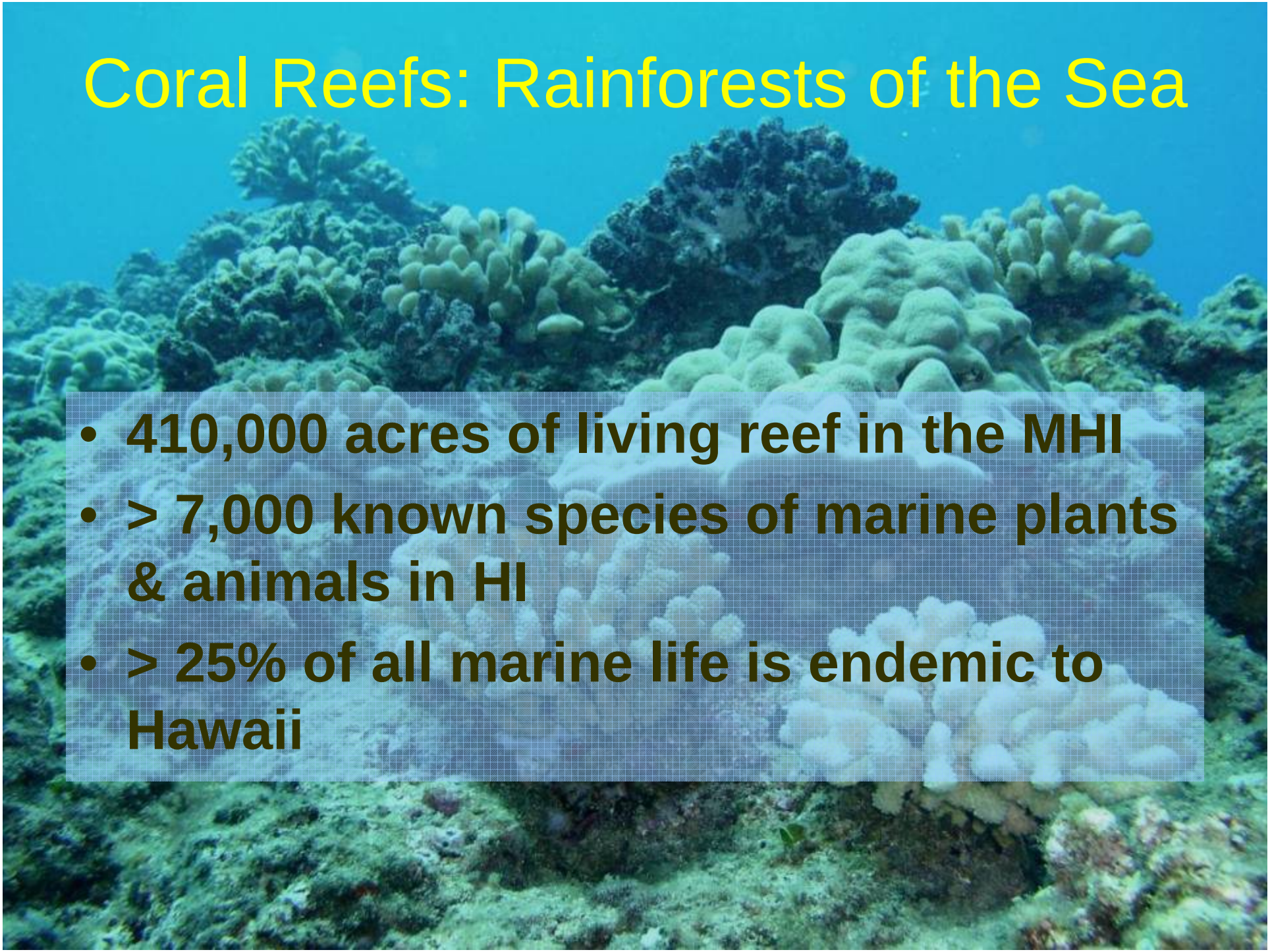
# WATERSHED BOUNDARY





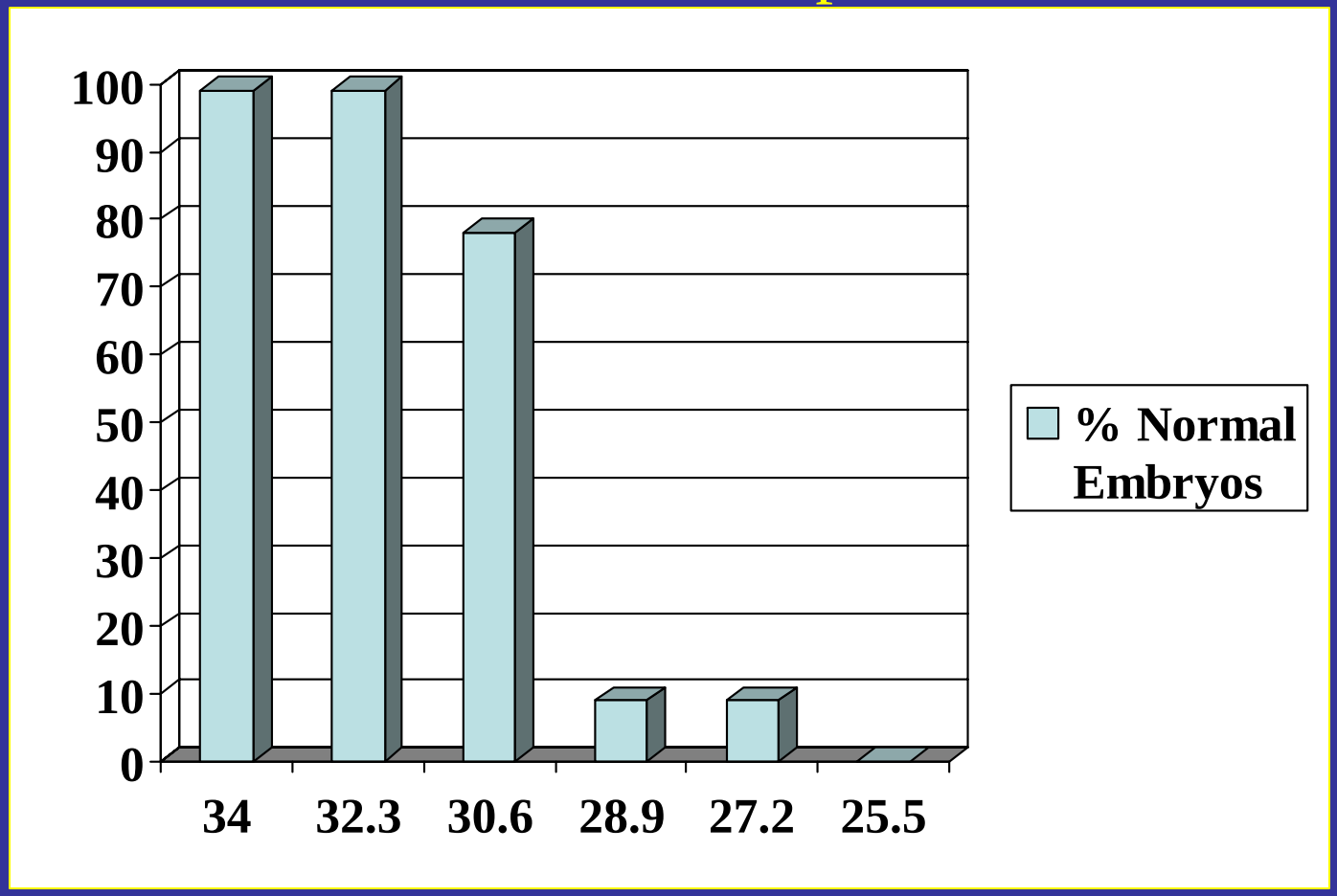


# Coral Reefs: Rainforests of the Sea



- **410,000 acres of living reef in the MHI**
- **> 7,000 known species of marine plants & animals in HI**
- **> 25% of all marine life is endemic to Hawaii**

# Effects of Altered Salinity on Coral Fertilization and Development



# Stressors entering HI ocean from watersheds
(from USGS NAWQA)

- Groundwater: fresh water & nitrogen
- Base flows streams: freshwater, nitrogen, herbicides(ag)
- Storm flow streams: freshwater, sediments, phosphorus, chromium, copper

  Agriculture: herbicides, arsenic

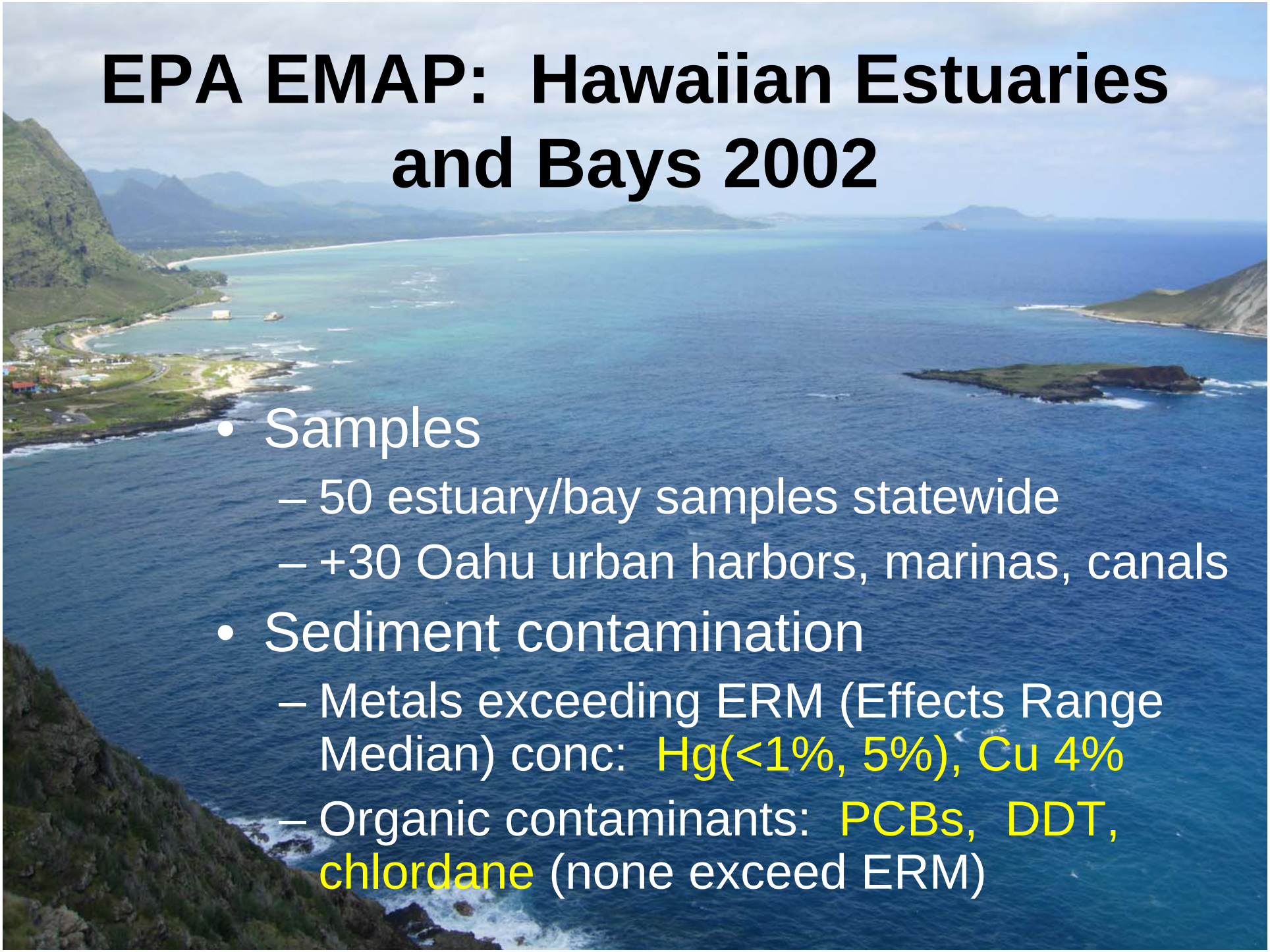
  Urban: insecticides (chlordane & dieldrin), lead, zinc

# Organic compounds in sediment and fish in Oahu streams vs. US

(from USGS NAWQA)

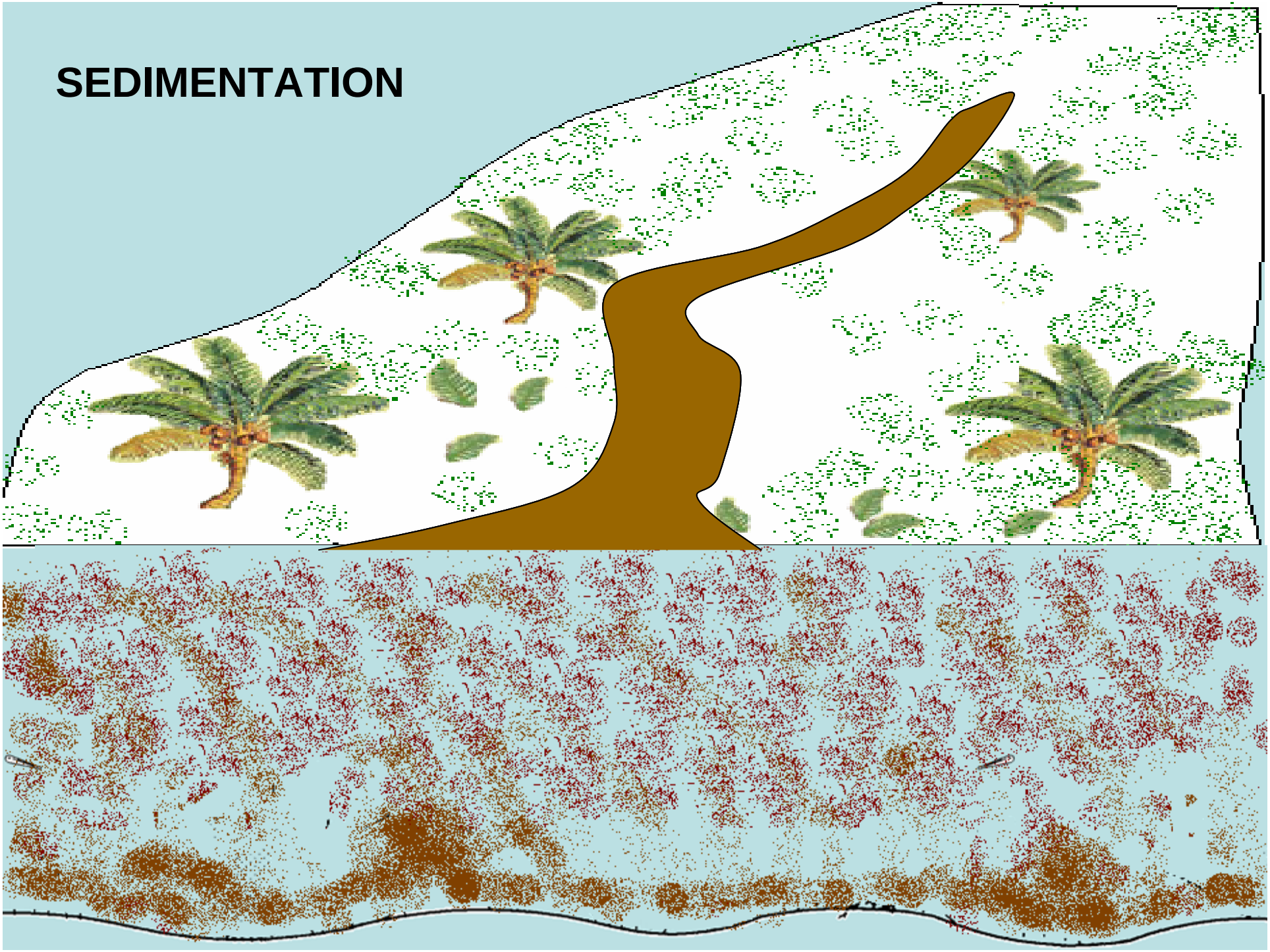
| **Pollutant** | **Conc: % of national range** | **# sites** |
|---|---|---|
| Dieldrin<br>Chlordane | Highest in US | 1 Nuuanu stream |
| PCBs | 15 | 5 sites<br>Urban + ag |
| PAH | 25 | 8 sites |
| DDT | 5 | 3 sites<br>Ag/urban |

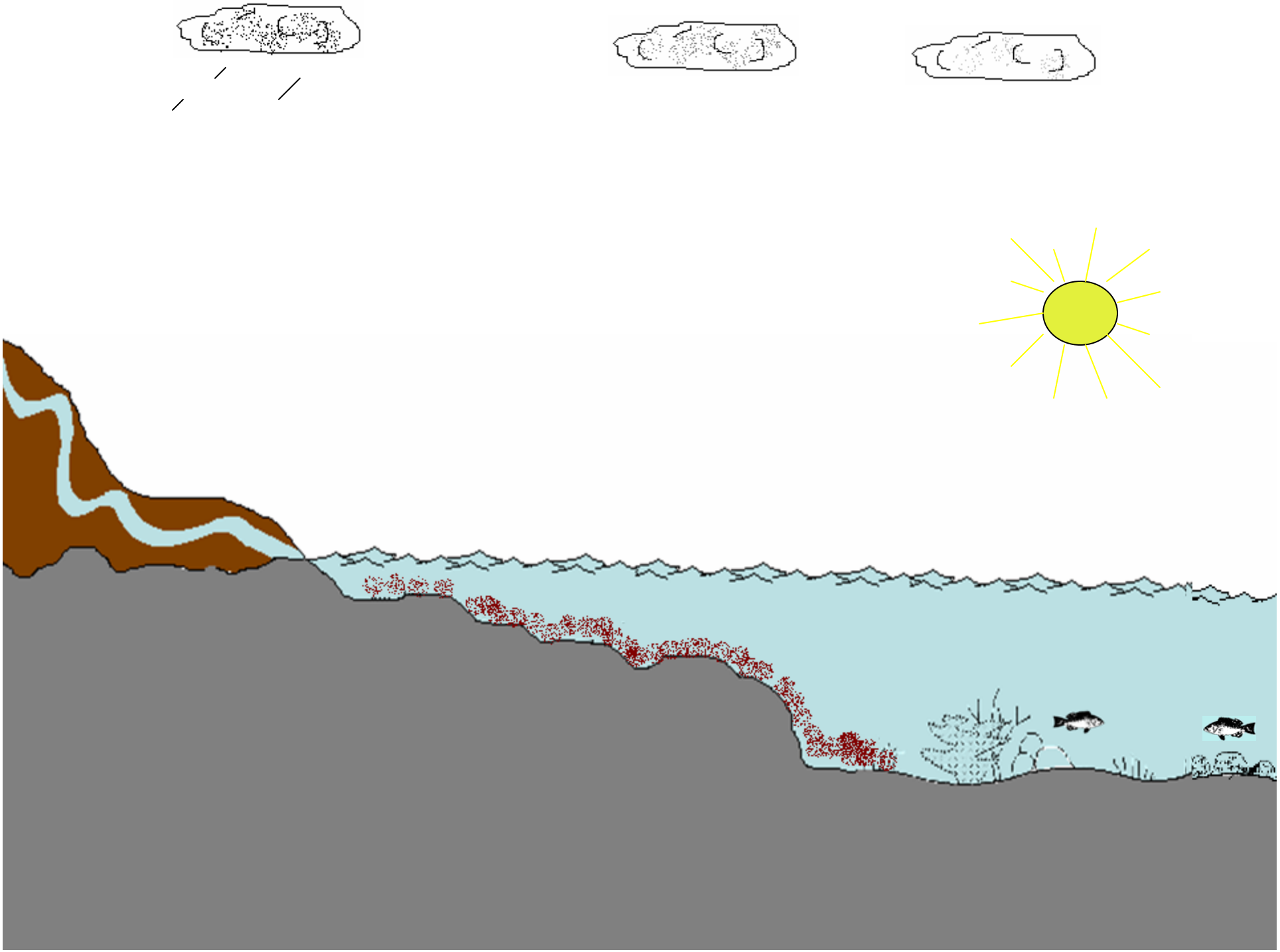
# EPA EMAP: Hawaiian Estuaries and Bays 2002

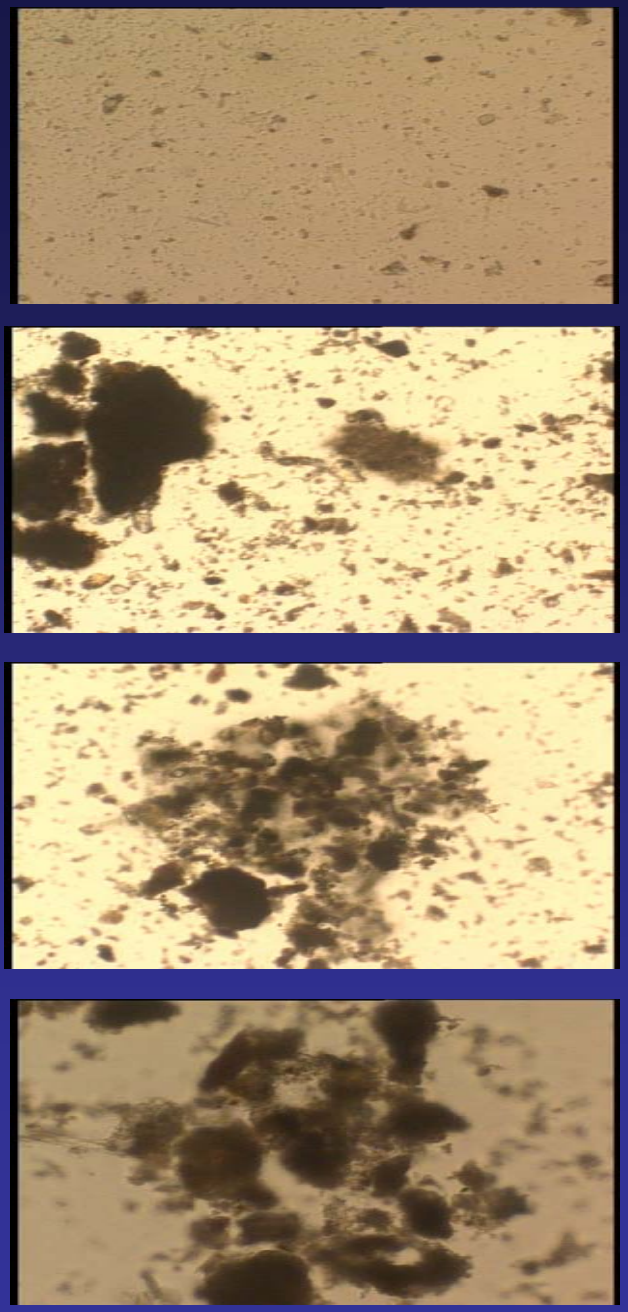


- Samples
  - 50 estuary/bay samples statewide
  - +30 Oahu urban harbors, marinas, canals
- Sediment contamination
  - Metals exceeding ERM (Effects Range Median) conc: Hg(<1%, 5%), Cu 4%
  - Organic contaminants: PCBs, DDT, chlordane (none exceed ERM)

# SEDIMENTATION







Freshwater

5 min

10 min

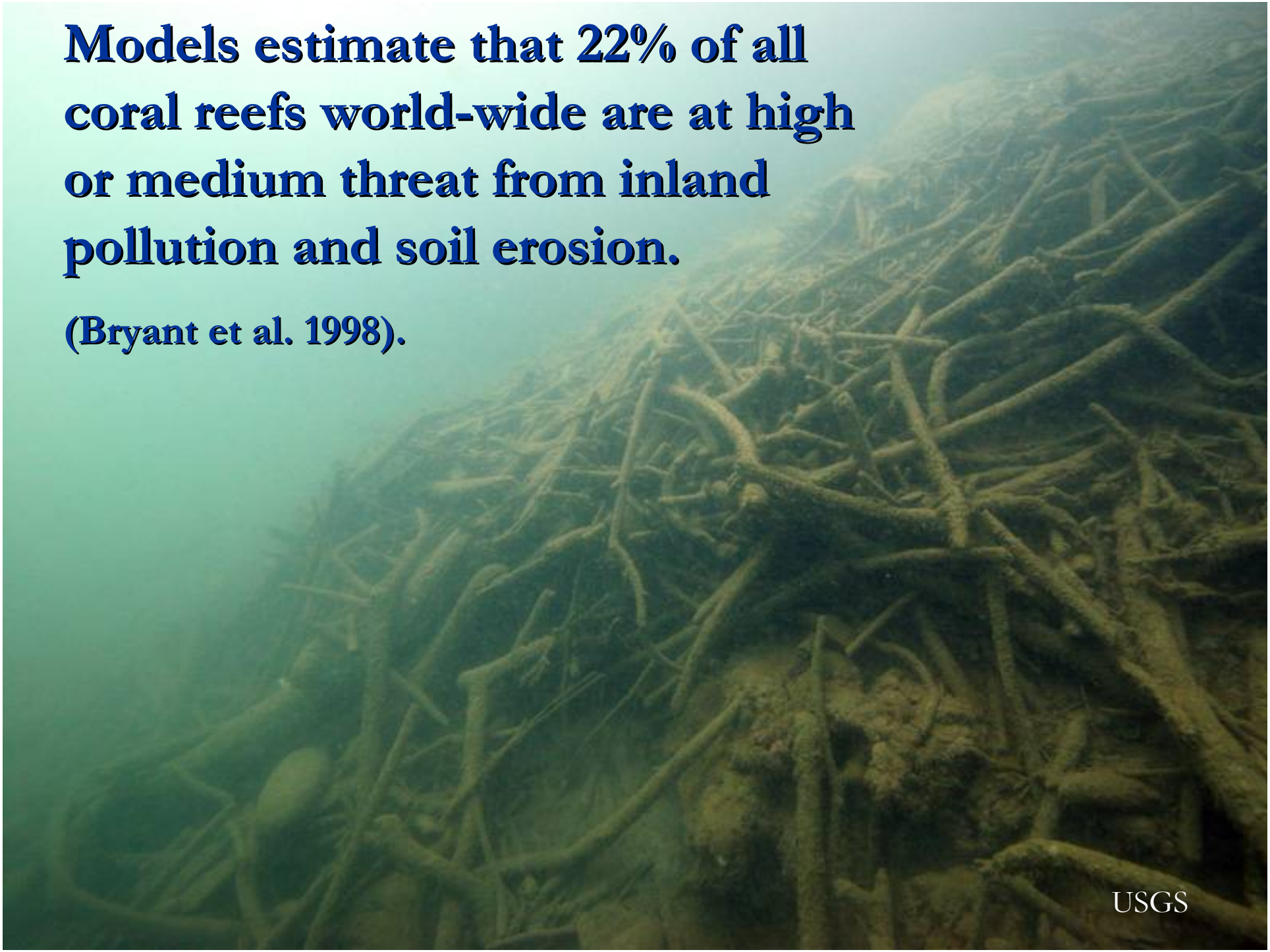
30 min

Width=1,000 µm

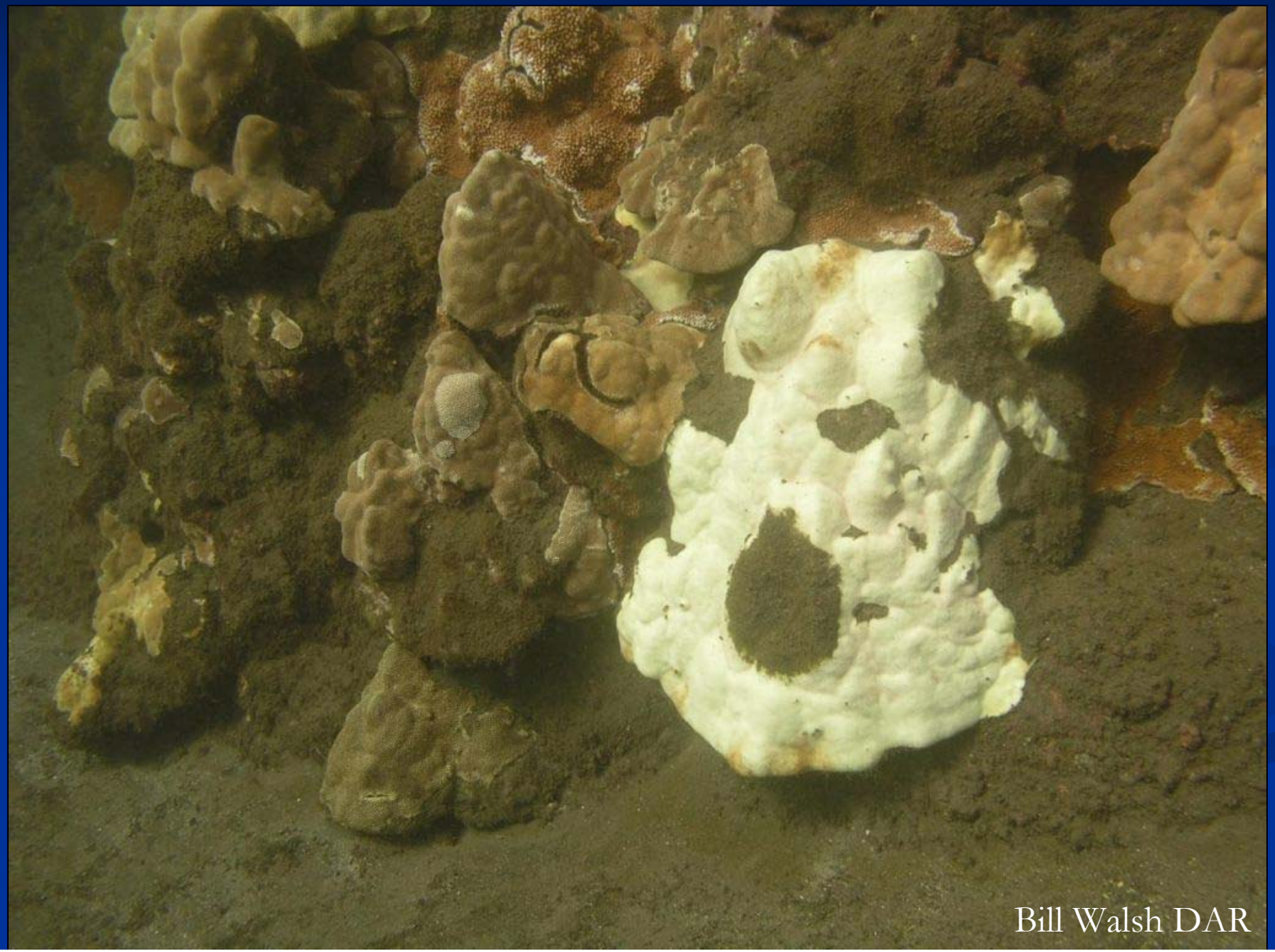
Sedimentation

**Models estimate that 22% of all coral reefs world-wide are at high or medium threat from inland pollution and soil erosion.**

**(Bryant et al. 1998).**



# Runoff impacts growth & survival of hard coral colonies



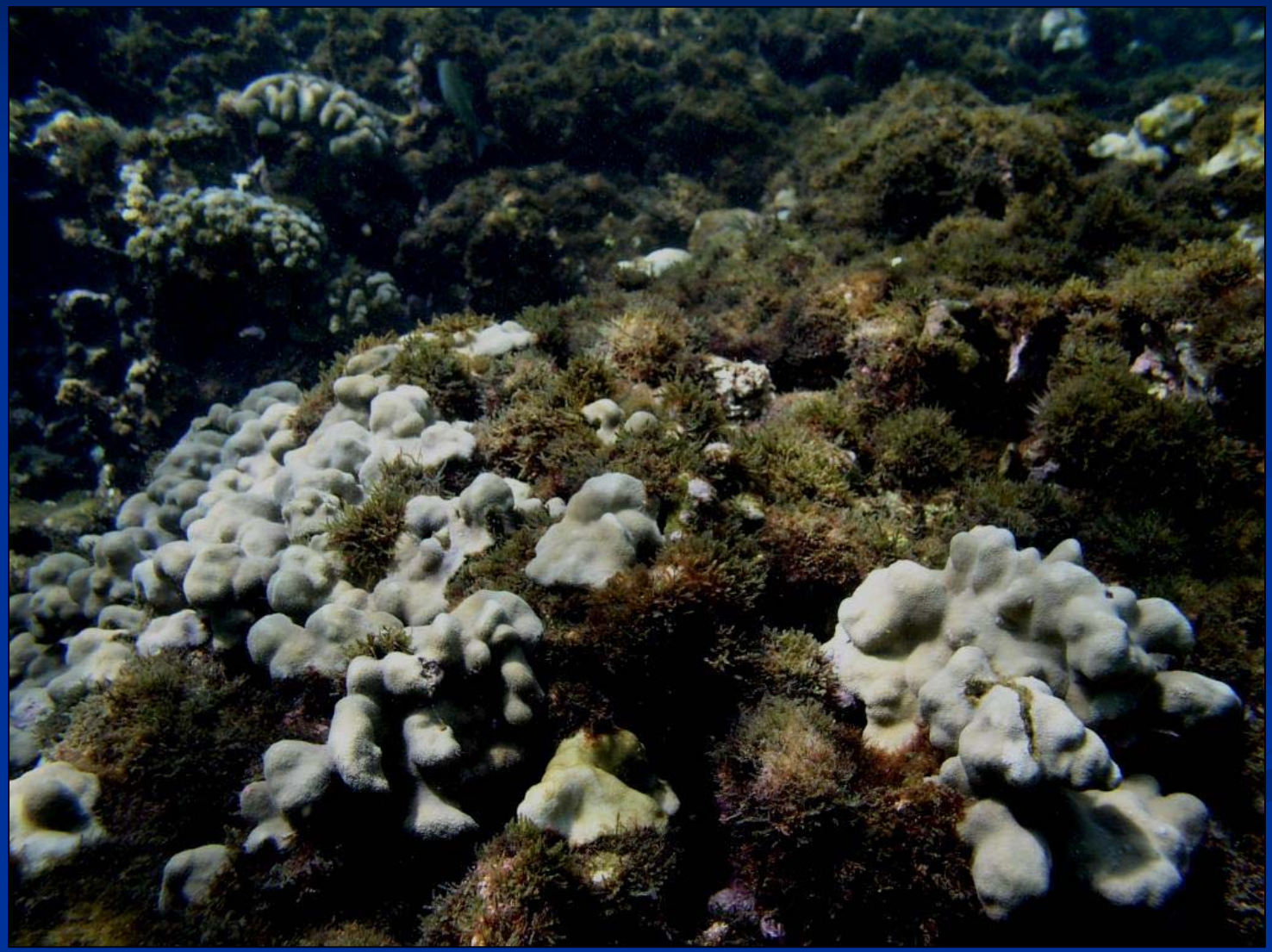
# Sediments reduce light and decrease coral growth

# Sediments smother coral & sloughing wastes energy

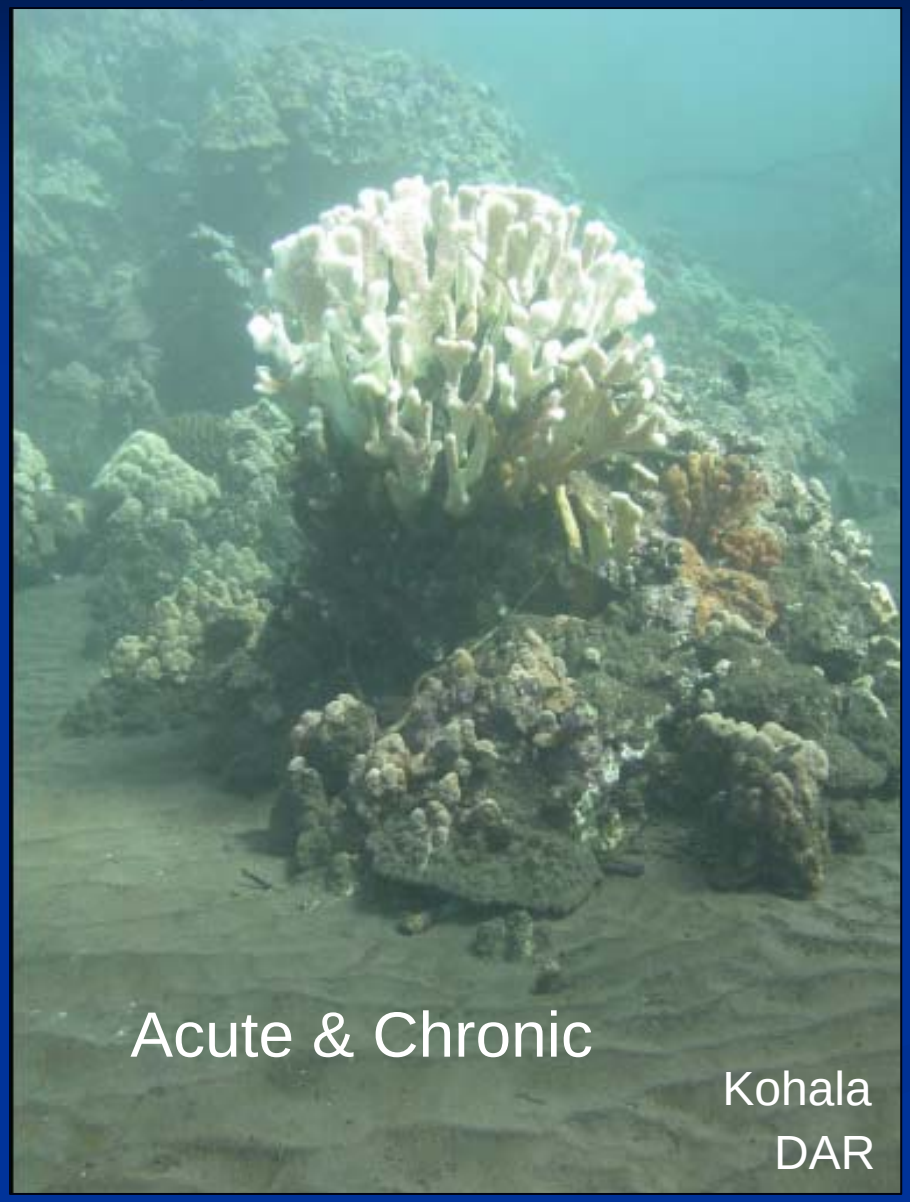
# Runoff effects coral reproduction & recruitment

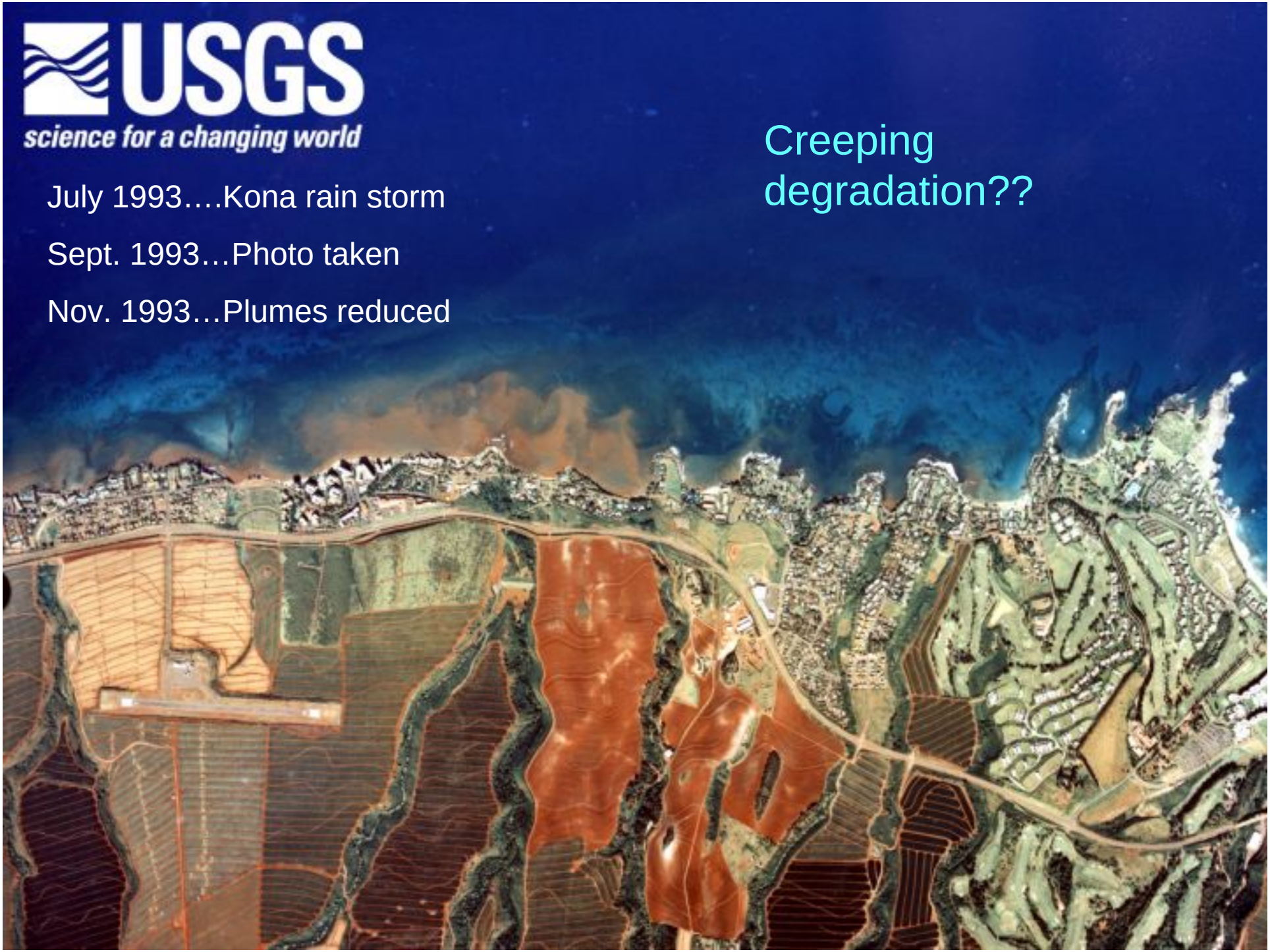
- Coral settlement rates are near zero on sediment covered surfaces
- Sediment tolerance is lower in new recruits

# Nutrients fuel invasive algae that interact with coral populations



# Sediment runoff is the most widespread land-based pollution threat to Hawaii's coral reefs





USGS
science for a changing world
July 1993….Kona rain storm
Sept. 1993…Photo taken
Nov. 1993…Plumes reduced
Creeping degradation??