
Sunscreen Pollution at Hanauma Bay
A Forty Year Legacy

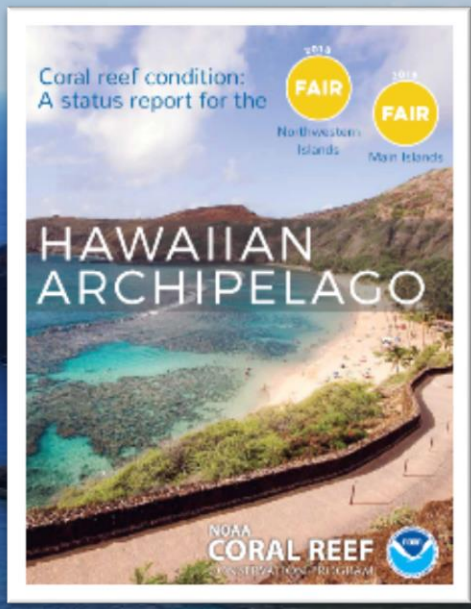
Friends of Hanauma Bay

- (501)(c)(3) founded in 1990
- Leading NGO advocate for best stewardship of Hanauma Bay
- Work with elected officials/decision makers at City, State, and Federal levels
- Collaborate with members of international scientific community and other State and National NGO's

"Friends of Hanauma Bay has been an invaluable resource, doing much of the work that those who have legal jurisdiction over the area haven't."

Hawai'i State Senator Chris Lee
December 10, 2020

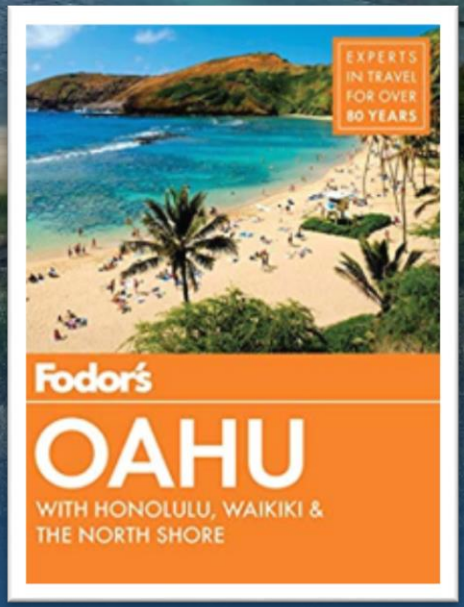
Hanauma Bay



Oahu, Hawai'i

Marine Life Conservation District

An iconic symbol of Hawai'i around the world



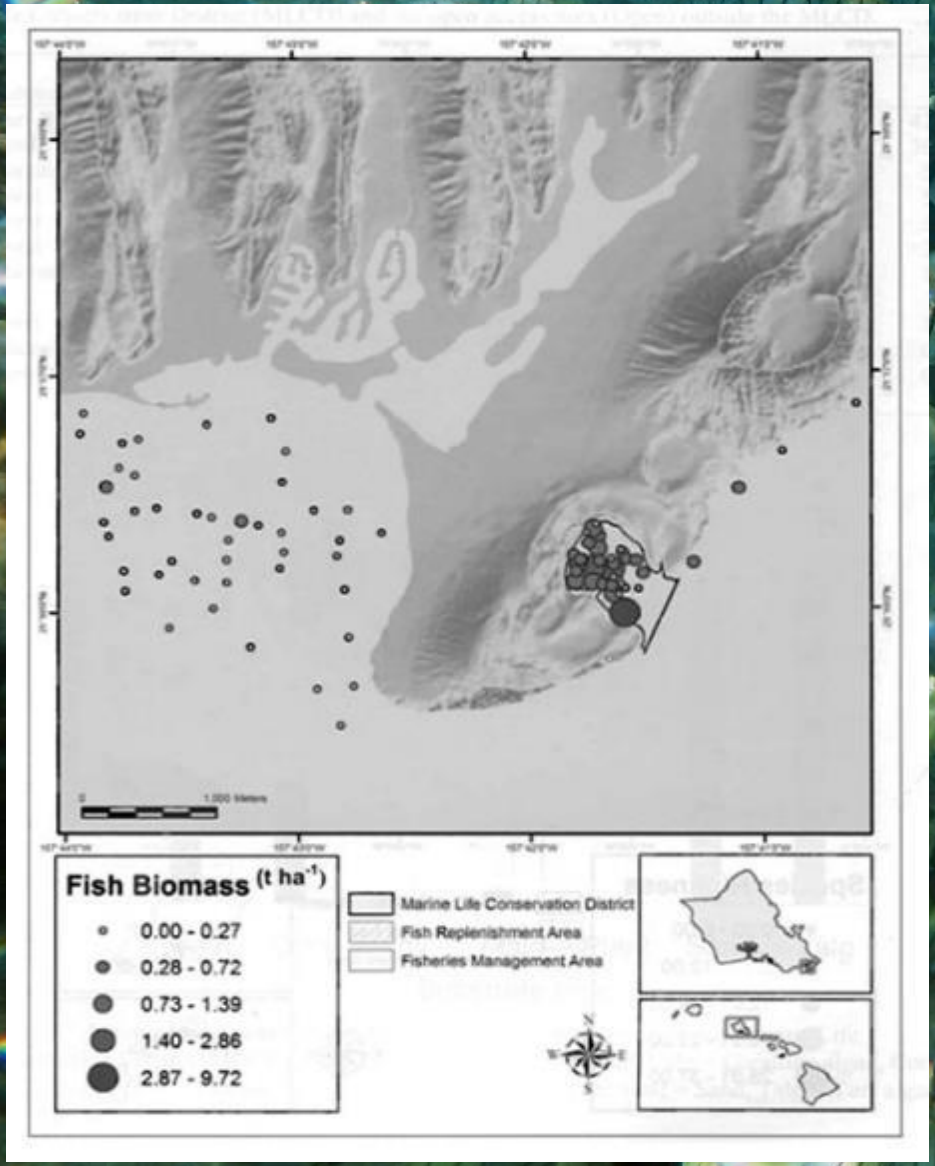
Hanauma Bay

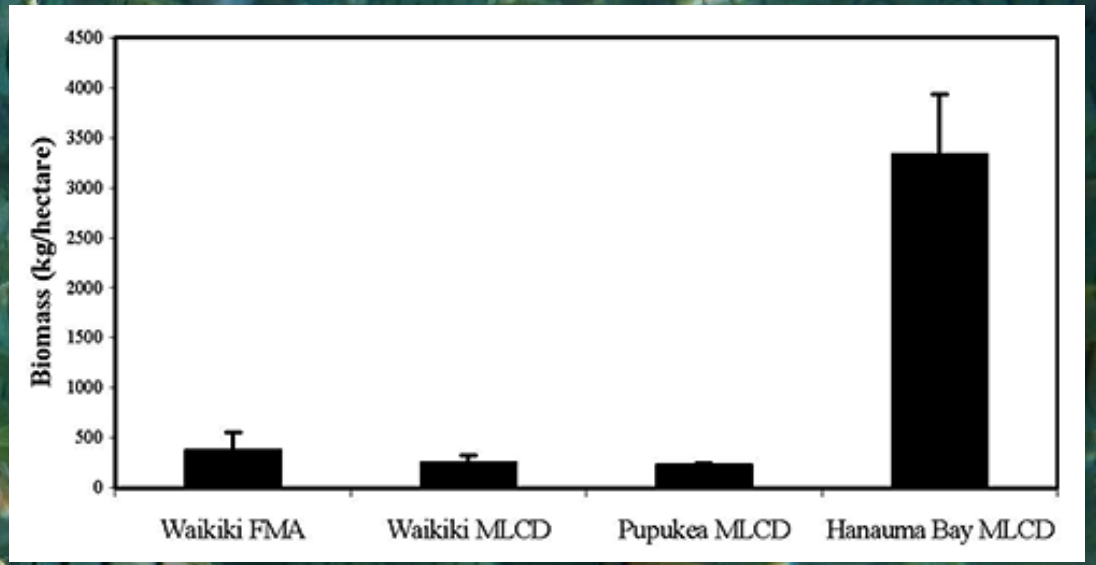
- Hawaii‘s first Marine Life Conservation District (1967)
- Adjoins Hawaiian Islands Humpback Whale National Marine Sanctuary
- One of 12 Hawai’i Class AA marine embayments under Clean Water Act
- Number one snorkeling tourist attraction in Hawai’i
- Hosts over 1 million visitors per year

Coral at Hanauma Bay

- Nearly all types of reef corals known to Hawai‘i are found at Hanauma Bay
- Of the 25 types of coral found at Hanauma Bay, 5 are endemic
- However, only 10 species are found on the inner reef

High Fish Biomass at Hanauma Bay





Fish biomass (kg/ha) at three MLCDs and one fisheries management area, 1994-1998 (Friedlander & Brown 2004)

Fish biomass for southeast Oahu (May2004). (Friedlander et al. 2006)
There are over eight times as many fish inside the bay as outside of it.

Hanauma Bay Coral Reefs Declining Since 2002

- **Brown et al., 2004; Rodgers et al., 2015:**

  “The Hanauma Bay Nature Preserve has shown decline in coral cover in shallow waters since 2002 …”

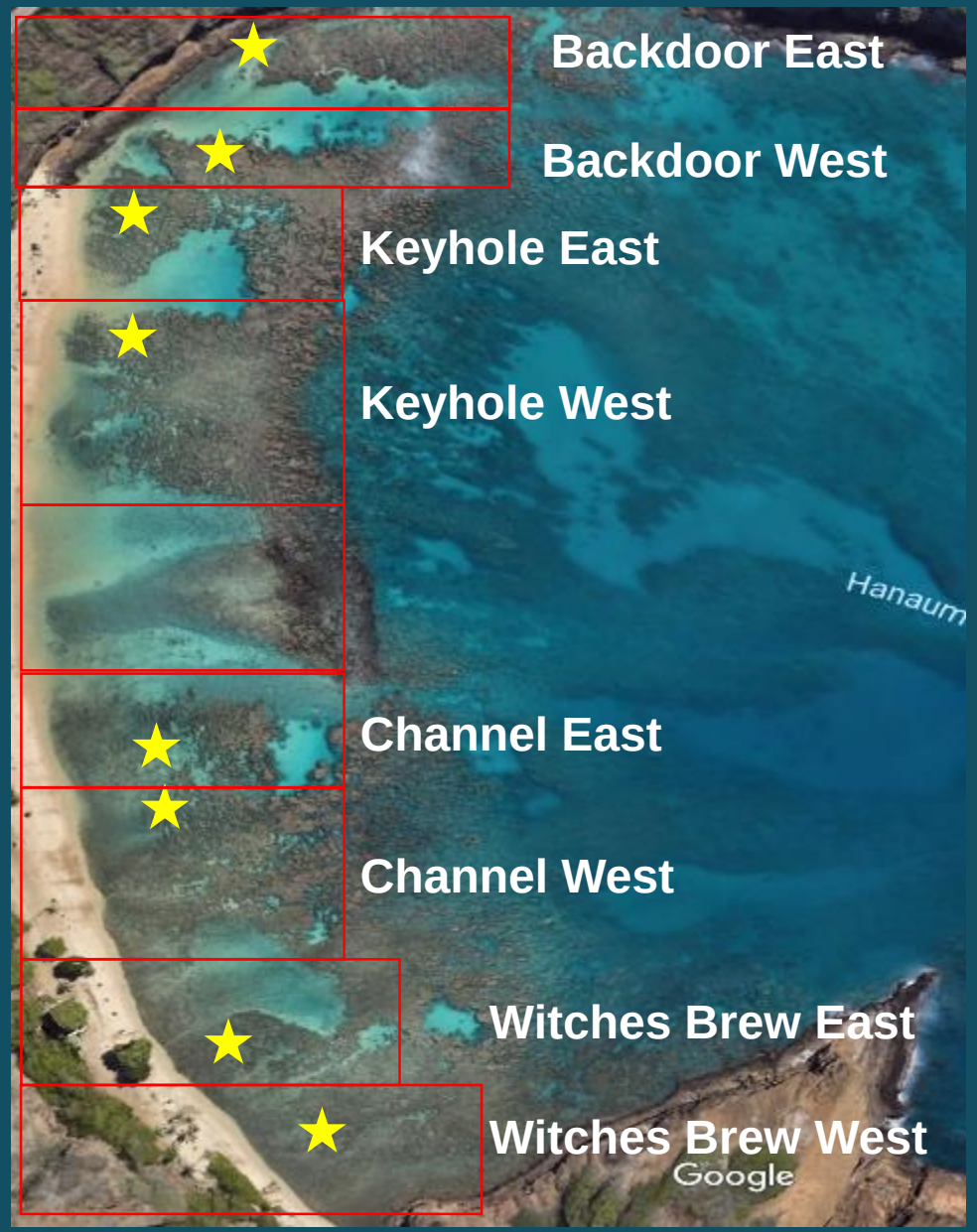
  “Increasing length, severity, and frequency of coral bleaching events pose an imminent threat to the biological sustainability of the HBNP ecosystem and a significant economic threat to the state of Hawai‘i.”

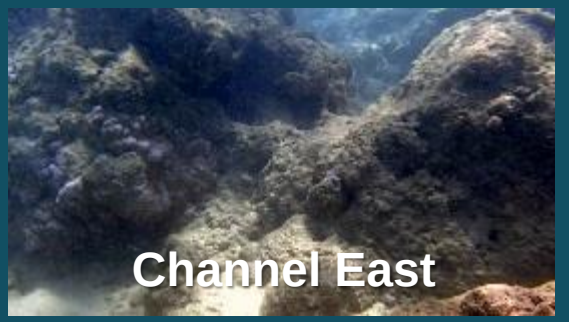
Photo: Anke Roberts, Sep 13, 2019, Near Keyhole

2014-15 Global Bleaching Impact on Hanauma Bay

- In 2014 and 2015 main Hawaiian Islands coral reefs suffered
  - up to 90% bleaching,
  - with higher than 50% subsequent mortality in some areas.
- October 2015 and January 2016 surveys at Hanauma Bay revealed
  - extensive bleaching (47%)
  - high levels of coral mortality (9.8%)
  - Ranging from:
    - a low of 31% in the central bay at Channel
    - to a high of 57% in the area most frequented by visitors - Keyhole

State of the Inner Reef – 2018 Capacity Study






While the inner reef is covered in turf algae,
the outer reef has healthy coral coverage
(beyond the reach of hands, feet and fins)

Inner Reef Touch and Trample Depth








Inner Reef Photos: Anke Roberts, Oct 2018 – Sep 2019

Outer Reef Scuba Depth








Outer Reef Photos: Glenn Roberts, Oct – Dec 2018

SUNSCREEN CHEMICALS AND MARINE LIFE

How sunscreen chemicals enter our environment:

How sunscreen chemicals can affect marine life:

GREEN ALGAE: Can impair growth and photosynthesis.

CORAL: Accumulates in tissues. Can induce bleaching, damage DNA, larval defects and even kill.

MUSSELS: Can induce larval deformities

SEA URCHINS: Can damage immune and reproductive systems, and deform larvae.

FISH: Can decrease fertility and reproduction, and cause female characteristics in male fish.

DOLPHINS: Can accumulate in tissues and be transferred to young.

What can we do?

Seek shade between 10 am & 2 pm, use Ultraviolet Protection Factor (UPF) sunwear, and choose sunscreens with chemicals that don't harm marine life.

Seek shade: 10am to 2pm

Umbrella

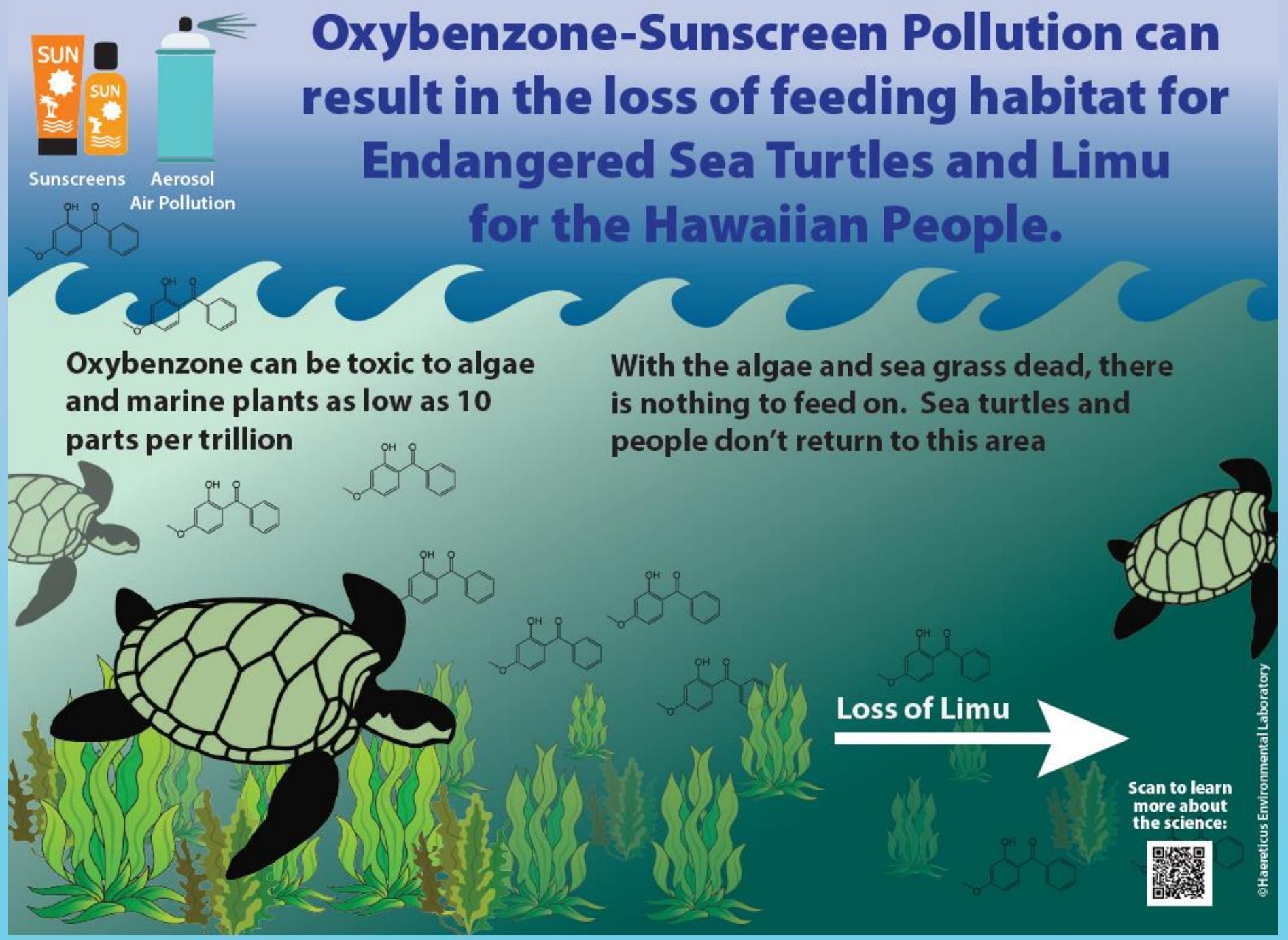
Sun hat

UV Sun glasses

Sun shirt

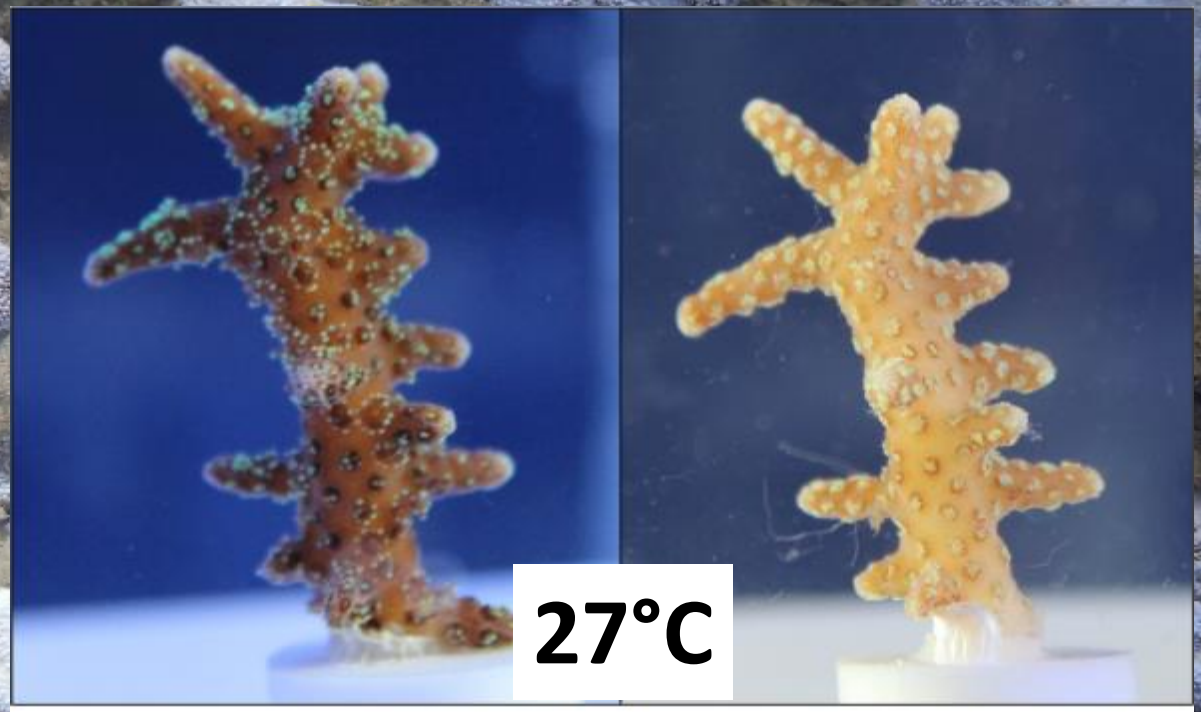
Leggings

oceanservice.noaa.gov/news/sunscreen-corals



Sunscreen Pollution can be a symptom of Unsustainable Tourism.

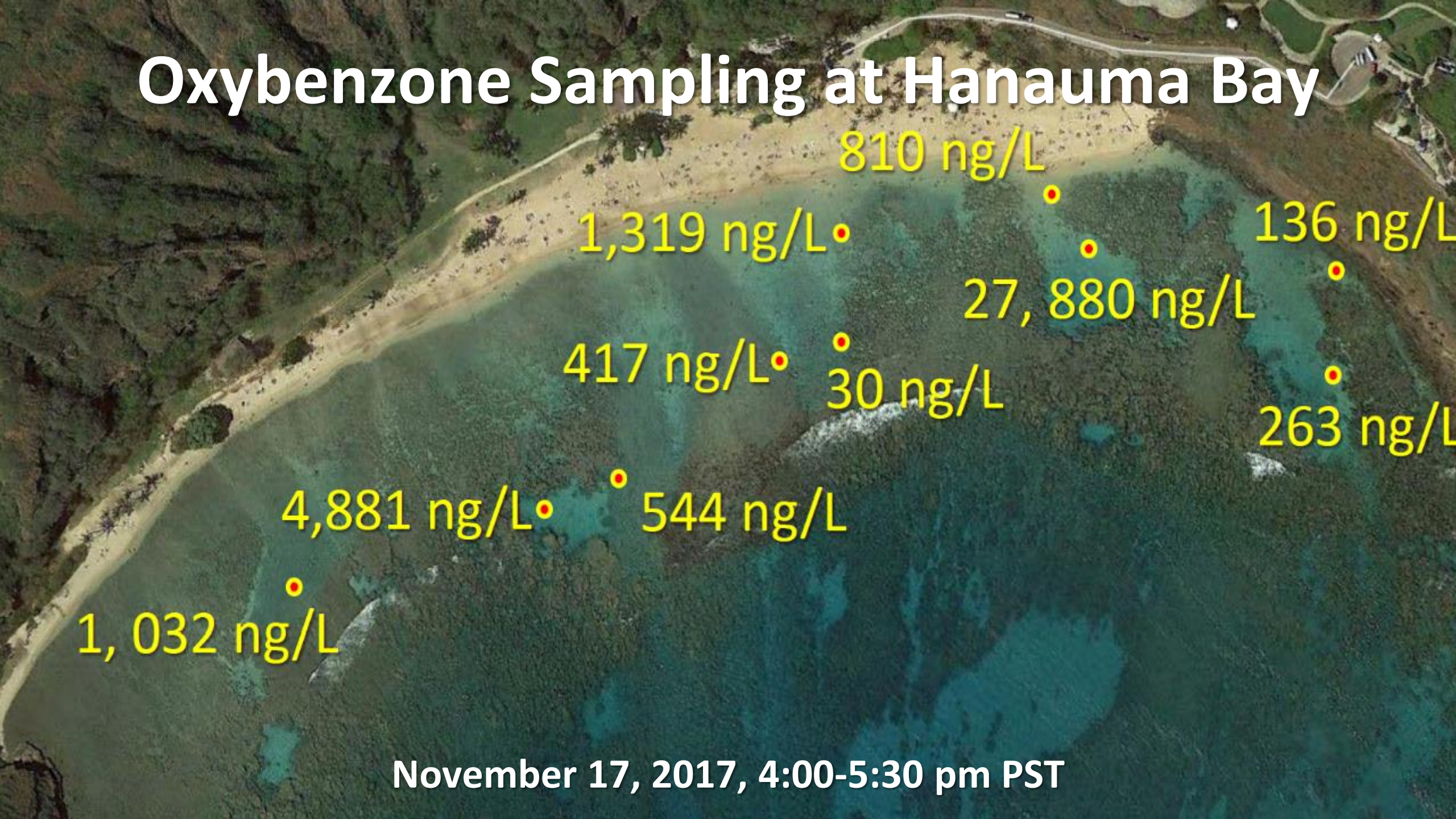
Oxybenzone Lowers Temperature Threshold for Coral Bleaching



Honour Booth Survey > 1,500 ppt Oxybenzone at Hanauma Bay

2015 averaged 2,600 swimmers/day

- 187 kilograms of sunscreen lotion a day (78 grams per person)
- 5.61 kilograms of oxybenzone a day (3% oxybenzone)
- 168 kilograms of oxybenzone per month (~370 pounds per month)
- 68,255 kilograms of sunscreen product per year (150,476 lbs/year)
- 2,048 kilograms of oxybenzone per year (4,515 pounds /year)


Oxybenzone Sampling at Hanauma Bay
810 ng/L
1,319 ng/L
136 ng/L
27, 880 ng/L
417 ng/L
30 ng/L
263 ng/L
4,881 ng/L
544 ng/L
1, 032 ng/L
November 17, 2017, 4:00-5:30 pm PST

Senator Will Espero, Representative Gene Ward, and Dr. Craig Downs leading the 2017 Study of oxybenzone sunscreen levels at Hanauma Bay

Members of our citizen science team

Sunscreen Pollution at HANAUMA BAY, HAWAI'I

Oxybenzone, a common sunscreen ingredient, has been measured in our Bay at levels that threaten ecosystem health.

ALGAE

Can impair growth and photosynthesis

CORAL

Accumulates in tissues. Can induce bleaching, damage DNA, deform young and kill.

FISH

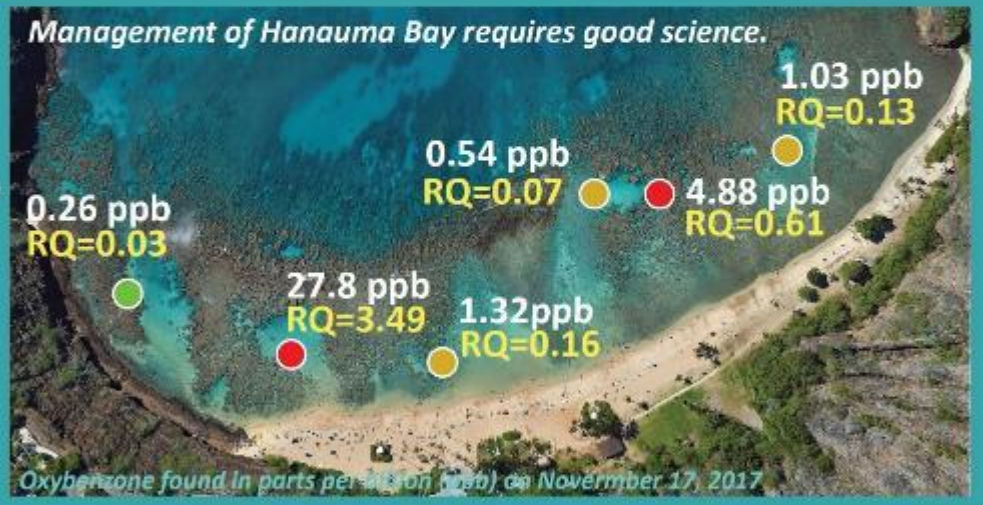
Can decrease fertility and reproduction, and cause female characteristics in male fish.

EPA GUIDELINE: RISK QUOTIENT (RQ) ≥ 0.5 = HIGH RISK

Risk Quotients are used to determine the need for a REGULATORY ACTION for a chemical of concern.

- High ecological risk *(greater than or equal to 0.5)*
- Acute risk for *endangered species (greater than or equal to 0.05)*
- Moderate risk and potential for restricted use (greater than or equal to 0.1 but less than 0.05)
- Low risk (greater than or equal to 0.05 but less than 0.1)

NO ACTION will lead to further death of Hanauma Bay corals.



OTHER THREATS:

- Unsustainable tourism
- Walking on reef
- Invasive species
- Climate change

WHAT WE CAN DO:

Inspect active ingredients & choose non-nano zinc oxide and titanium dioxide sunscreens

Seek shade between the hours of 10 a.m. and 2 p.m.

Use Ultraviolet Protection Factor (UPF) sunwear

Reduce pollution in the Bay and educate visitors

friendsofhanaumabay.org

Oxybenzone Levels, Oahu

Impact of Hanauma Bay Oxybenzone Pollution Study

- Oxybenzone levels measured were determined to pose high ecological risk to corals and other marine wildlife in Hanauma Bay by:
  - US NOAA
  - Spanish National Research Council (CSRC) Institute of Environmental Assessment and Water Research (IDAEA)
  - Haereticus Environmental Laboratory
- Instrumental in Hawai'i passing world's first ban on OTC sale of sunscreens containing oxybenzone and octinoxate in 2018
- Informed greatest consumer-driven reformulation of personal care products in history
- Informs educational outreach on effects of sunscreen pollution in near shore marine environments

COVID-19 Impacts on Hanauma Bay

- Unprecedented 8 month closure
- Dramatic unexpected ecological resurgence in marine environment
- First time in 40+ years without almost daily renewal of sunscreen load
- Blue water with no grey chemical sunscreen haze
- No taste of sunscreen in water / smell in air
- Unprecedented improvement in water clarity (64%)
- First time in generations without visitors walking on reef flats damaging or destroying corals
- New coral recruitment in inner reef
- Larger fish and larger schools of fish
- Natural resurgence ~ landmark FOHB coral restoration project
- Renewed community and elected leadership commitment to conserving a naturally regenerated Hanauma Bay for current and future generations

Environmental Management Perspectives

- Hanauma Bay is a classic example of a coral reef site suffering from multiple stressors, with elevated levels of human impacts from large numbers of visitors.
- Long residence time of water in the Bay, with far less flushing than open coastal areas, makes it a sunscreen hotspot (15- 50 hour retention time).
- Reducing chemicals that contribute to coral reef ecosystem stress is the widely accepted, critical approach endorsed by the scientific community.
- Global climate change is a long-term threat with no single solution. Immediate options for mitigation include eliminating known local stressors, especially those affecting water quality.

Environmental Management Perspectives

- For over 40 years, Industry has failed to demonstrate the safety and effectiveness of organic UV filters in sunscreens.
- The preponderance of scientific evidence indicates these organic UV filters are also toxic to coral and other marine wildlife.
- Removing chemicals of concern and effect from sunscreens is one clear action that needs to be implemented and enforced.
- As post-COVID tourism is exploding, this is a critical time to act.

Sunscreen Pollution in Hawai’i

- Existential threat to marine life in near-shore marine environments
- Compounds impacts of other stressors
- Unites residents and natural resource managers:
  - Cindi Punihaole - Kahalu’u Bay (Hawai’i Island)
  - Bill White - Waialea Bay (Hawai’i Island)
  - Mendy Dant - Kealakekua Bay (Hawai’i Island)
  - Pat Lindquist - Napili Bay (Maui)
  - Jeff Bagshaw - ‘Ahihi Kina‘u Natural Area Reserve (Maui)
  - Wilkie McClaren - Ha’ena Beach Park (Kauai)
  - Jon Jokiel - National Park Service Kaloko-Honokohau National Historical Park (Hawai‘i Island)