



## REEF FRIENDLY SUNSCREEN ORDINANCE TOOLKIT

An emerging concern among ocean scientists, stewards, and beach-goers is the impact that certain chemical sunscreens have on the marine environment, notably coral reefs, and human health.

This has led to bans on the sale and use of conventional sunscreens in states like [Hawaii](#), and island communities including [Key West](#), the US Virgin Islands, Aruba and Palau.

This concern has even triggered the [FDA to consider removing certain popular sunscreen chemicals](#) from the Generally Accepted as Safe and Effective (GRASE) list. As such, there has been a surge in the production of “reef friendly” mineral-based sunscreens to provide safer alternatives for sun protection.

### Importance of Coral Reefs in Florida

The Florida Reef Tract is the third largest barrier reef system in the world. [NOAA suggests that coral reefs in southeast Florida have an asset value of \\$8.5 billion, generating \\$4.4 billion in local sales, \\$2 billion in local income, and 70,400 full and part-time jobs.](#)

Our Florida coral reefs are paramount to our economy, and we need to protect them. Some threats, like the warming and acidification of the ocean, are global in scale. Other stressors, like the threats posed by oxybenzone and octinoxate, are immediately preventable. We must take action to increase reef resiliency and give this critical ecosystem a fighting chance. Surfrider Activists can do that by educating your local community on the risks of toxic sunscreens, ensuring micro-sized mineral based sunscreens are readily available in local stores, and asking your elected officials to enact “sunscreens ordinances” along Southeast Florida coast.

### Summary of Major Impacts to Coral Reefs from Oxybenzone[7]

- Kills off symbiotic algae in coral reefs, zooxanthellae, causing coral bleaching[10]



- Acts as a skeleton endocrine disruptor, encasing coral polyps in their own skeletons[8]
- Causes gene mutations, impacting hormone regulation and damaging DNA[9]
- Causes mortality in developing coral and aborted embryonic development
- Reduces coral reproduction and fertilization rates
- Reduces the fitness of larvae and decreases their settlement and survival rate
- Contributes to “zombie reefs”- corals that look healthy but are unable to procreate
- Reduces number of ovaries in each polyp
- Reduces immunity and resiliency of corals[11]

### **Human Health Threats from Oxybenzone**

Some of these chemicals also pose potential threats to human health. The bioaccumulative nature of oxybenzone means that once added to and absorbed by our skin, it remains in our system. A CDC study found that 97% of the over 2,500 people tested had oxybenzone in their urine. It's estimated that four percent of the oxybenzone in our sunscreen is absorbed by our bodies during each sunscreen application. Emerging studies have also shown that the concentration of oxybenzone continues to rise with daily use and remains in the body for at least 24 hours after sunscreen application. We can also be exposed to oxybenzone by swimming in areas where oxybenzone has been added to the marine environment, e.g. popular swimming holes.[22]

[Learn More on Surfrider's Beacheapedia Site](#)

### **WHAT WE ARE ASKING YOU TO DO:**

Urge your elected officials to consider oxybenzone and octinoxate ordinances, especially if your city/town/county lies along the borders of the Florida Coral Reef Tract which includes: Monroe County, Miami-Dade County, Broward County, Palm Beach County and Martin County.

### **PLEASE POST TO YOUR SOCIAL CHANNELS**

Hashtag: #ProtectOurFLReef #SurfriderFoundation. Tag: @Surfrider



## TALKING POINTS

### Sunscreen Ordinances Protect Coral Reefs

Common chemical UV blockers (including oxybenzone and octinoxate) and other additives (octocrylene & octisalate) in sunscreen products have severely toxic impacts on our marine ecosystems, especially to coral reefs and fish. While there are many stressors on our marine environments, this is one that we can immediately prevent by simply changing what products we use.

#### Coral Importance

- Coral reefs are likely the most important ecosystem the ocean provides. Reefs provide essential habitat and food source for thousands of fish and bird species
- Coral reefs provide billions of dollars in coastal protection, tourism, and fisheries value, prevent beach sand erosion so we can keep our beautiful white sand beaches, provides nurseries for commercially important fish and lobster, and supports the snorkeling and scuba diving industries

#### Coral Loss

- Coral bleaching is the loss of zooxanthellae (symbiotic algae) which causes increased risk for disease
- 99% of reefs in the Florida Keys, and 85% of Caribbean reefs have suffered die-offs in the past 50 years
- Warming water is the main driver of coral bleaching, but what we've now learned is that exposure to certain chemicals, like oxybenzone and octinoxate, can also cause bleaching, and reduce corals ability to fend off disease and reduce recover after bleaching events
- For five years after the 2005 bleaching event in the Virgin Islands, recruitment and survival of juvenile coral was near 0% in coastal waters with high oxybenzone concentrations at popular tourist areas, while areas with low to no oxybenzone concentrations had flourishing coral communities with an abundance of recruitment
- Oxybenzone contamination from beaches can travel over 0.6 km in distance from the pollution source



### **Toxic Sunscreen Impacts to Coral**

- Oxybenzone is a photo-toxicant, meaning when exposed to light it causes adverse effects. To coral, it is toxic even in darkness, especially to coral larvae, meaning toxicity can occur around the clock
- Oxybenzone doesn't just impact current corals, but reduces their ability to procreate, and the few larvae that do settle are even more sensitive to oxybenzone, meaning continued exposure kills current corals and future generations of corals
- Oxybenzone causes damage at almost every stage of coral development- spawning, embryo development, planula survival and settlement
- Continued exposure to oxybenzone from frequent swimmers means persistent exposure, negating benefits of dilution
- Fringing reefs grow faster so are less tolerant to harmful chemicals like oxybenzone
- In popular swimming areas in the Virgin Islands, water samples showed concentrations of oxybenzone as high as 1,350 ppb. Coral polyp impairment and mortality starts at just 5 ppb.

### **Summary of Impacts to Reefs from Oxybenzone Exposure**

- Acts as a skeleton endocrine disruptor, encasing coral polyps in their own skeletons
- Causes gene mutations, impacting hormone regulation and damaging DNA
- Causes mortality in developing coral
- Reduces coral reproduction and fertilization rates
- Causes aborted embryonic development
- Reduces the fitness of larvae and decreases their settlement and survival rate
- Contributes to "zombie reefs"- corals that look healthy but are unable to procreate
- Kills off the symbiotic algae in coral reefs, causing coral bleaching
- Reduces number of ovaries in each polyp
- Reduces immunity and resiliency of corals

### **Summary of Impacts to Fish from Oxybenzone Exposure**

- Causes hermaphroditism and sex changes (males turn into females) in clownfish, parrotfish, moray eels, gobies, medkas, and wrasse



- Disrupts estrogen production in zebrafish
- Reduces sperm viability and fertilization of Bonnethead shark
- Increases mortality in mammals (pregnant mice), reducing immune response and disrupting hormones. May have similar impacts on marine mammals
- Reduces egg hatchings in fish and increases amount of miscarriages
- Deforms a clownfish embryo at just 1 ppb
- Increases reproductive disease and alters embryonic development of invertebrates including sea urchins
- Causes neurotoxicity in fish
- Bioaccumulates and biomagnifies in marine mammals including dolphins

### **Human Health Impacts from Toxic Sunscreens**

- 4% of oxybenzone gets absorbed by skin during every application
- 97% of the over 2,500 people tested in a CDC study had oxybenzone in their urine, with concentrations between 3 ppm to 15 ppb
- A study on pregnant women in Puerto Rico found oxybenzone concentrations of 41 to 66 ppb in urine samples
- Oxybenzone, octinoxate and other chemical sunscreen additives including octocrylene, have been found in breast milk
- Oxybenzone can cause skin irritations when exposed to sunlight (it's a photo-toxicant)
- It is unknown what impact high concentrations of oxybenzone and octinoxate pose to human health, which is why the FDA is proposing to recategorize these chemicals at Category II Substances, which would prevent their ability to be added to future OTC sunscreens

### **Routes**

- Estimate that up to 14,000 tons of sunscreen entering the ocean every year, but these chemicals also make it to the ocean through wastewater treatment plants and leaking septic systems, as any residue left on our skin washes down the drain in the shower

### **Sunscreen Bans**

- Passed: Hawaii, US Virgin Islands, Palau, Aruba, Bonaire, and Key West
- Introduced: HR 1834- all National Marine Sanctuaries containing reefs



### **Things you can do**

- Best to cover up or stay out of the sun during peak sunlight hours (10 AM - 2 PM)
- Use a wide brim hat and long sleeve shirt, preferably with UPF
- Read the ingredients on your sunscreen - some are marketed as reef friendly but that term is not regulated so you need to actually look at the label
- Avoid the O's- oxybenzone, octinoxate & octocrylene as well as parabens
- Use mineral based sunscreens like non-nano sized Zinc Oxide or Titanium Dioxide, just avoid spray sunscreens containing nano-sized Titanium Dioxide
- There are now hundreds of non-nano mineral sunscreens widely available at similar price-points
- Spread awareness about the issue to friends, family and community members
- Ensure that your local stores are offering reef friendly sunscreen products
- Encourage local stores to stop the sale of harmful products
- Support legislation that bans the use and sale of toxic sunscreens

**CITATIONS AVAILABLE AT: [http://beachapedia.org/Reef\\_Friendly\\_Sunscreens](http://beachapedia.org/Reef_Friendly_Sunscreens)**