



## **Sunscreen Ordinances Protect Coral Reefs**

### **The Issue**

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, fish, and marine mammals. 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. Provide essential habitat and food source for thousands of fish and bird species
- Provides billions of dollars in coastal protection, tourism, and fisheries value- prevents beach sand erosion so we 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 a loss of zooxanthellae (symbiotic algae) and increases risk for disease
- 99% of reefs in Florida Keys, and 85% of Caribbean reefs have disappeared 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 (BP-3) and octinoxate, can also cause bleaching, reduce corals ability to fend off disease, and reduce ability to 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 BP-3 concentrations at popular tourist areas while areas with low to no BP-3 concentrations had flourishing coral communities with an abundance of recruitment
- BP-3 contamination from beaches can travel over 0.6 km in distance from the pollution source

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

- BP-3 is a photo-toxicant, so when exposed to light it causes adverse effects, but to coral, it is toxic even in darkness, especially to coral larvae
- Doesn't just impact current corals, but reduces their ability to procreate, and the few larvae that that settle are even more sensitive to BP-3, meaning continued exposure kills current corals and future generations of corals.

- Causes damage at almost every stage of development- spawning, embryo development, planula survival and settlement, increased disease potential
- Continued swimmers means persistent exposure, negating benefits of dilution
- Fringing reefs grow faster so are less tolerant

### **Summary of impacts**

- o Acts as a skeleton endocrine disruptor, encasing coral polyps in their own skeletons[8]
- o Causes gene mutations, impacting hormone regulation and damaging DNA [9]
- o Causes mortality in developing coral
- o Reduces coral reproduction
- o Reduces coral fertilization rates
- o Causes aborted embryonic development
- o Reduces the fitness of larvae and decreases their settlement and survival rate
- o Contributes to “zombie reefs”- corals that look healthy but are unable to procreate
- o Kills off the symbiotic algae in coral reefs, causing coral bleaching[10]
- o Reduces number of ovaries in each polyp
- o Reduces immunity and resiliency of corals[11]

### **Toxic Sunscreen Impacts to Fish**

- Causes hermaphroditism and sex changes (males turn into females) in clownfish, parrotfish, moray eels, gobies, medkas, and wrasse[12]
- Disrupts estrogen production in zebrafish[13]
- Reduces sperm viability and fertilization of Bonnethead shark[14]
- Increases mortality in mammals (pregnant mice), reducing immune response and disrupting hormones. May have similar impacts on marine mammals[15]
- Reduces egg hatchings in fish and increases amount of miscarriages[16]
- Deforms a clownfish embryo at just 1 ppb BP-3[17]
- Increases reproductive disease and embryonic development of invertebrates including sea urchins[18]
- Causes neurotoxicity in fish[19]
- Bioaccumulates and biomagnifies in marine mammals including dolphins[20]

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

- 4% of BP-3 gets absorbed by skin every application
- 97% of the over 2,500 people tested in a CDC study had BP-3 in their urine



- o Concentrations in urine were between 3 ppm to 15 ppb
- A study on pregnant woman in Puerto Rico found BP-3 concentrations of 41 to 66 ppb
- BP-3 concentrations have been found in breast milk
- BP-3 can cause skin irritations when exposed to sunlight (it's a photo-toxicant)

### **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, Palau, Aruba, Bonaire, and Key West

### **Things you can do**

- Best- cover up or stay out of the sun during peak sunlight hours (10-2)
  - o Use a UPF or even regular long sleeve shirt
- Read the ingredients on your sunscreen
  - o Some are marketed as reef friendly sunscreen- but that term is not regulated so you need to actually look at the label
- Avoid the O's- BP-3, octinoxate & octocrylene as well as parabens
- Use mineral based sunscreens like non-nano sized Zinc Oxide (except 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
  - o Ensure that your local stores are offering reef friendly sunscreen products
  - o Encourage local stores to stop the sale of harmful products
  - o 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)**