NOAA FISHERIES

Southeast Regional Office

Impacts of Chemical Sunscreens on ESA-listed Corals

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ESA-listed Corals

Threatened Caribbean

Acropora cervicornis
Acropora palmata
Dendrygyra cylindrus
Mycetophyllia ferox
Orbicella annularis
Orbicella faveolata
Orbicella franksi

Endangered Indo-Pacific

Cantharellus noumeae
Siderastrea glynni
Tubastraea floreana

Threatened Indo-Pacific

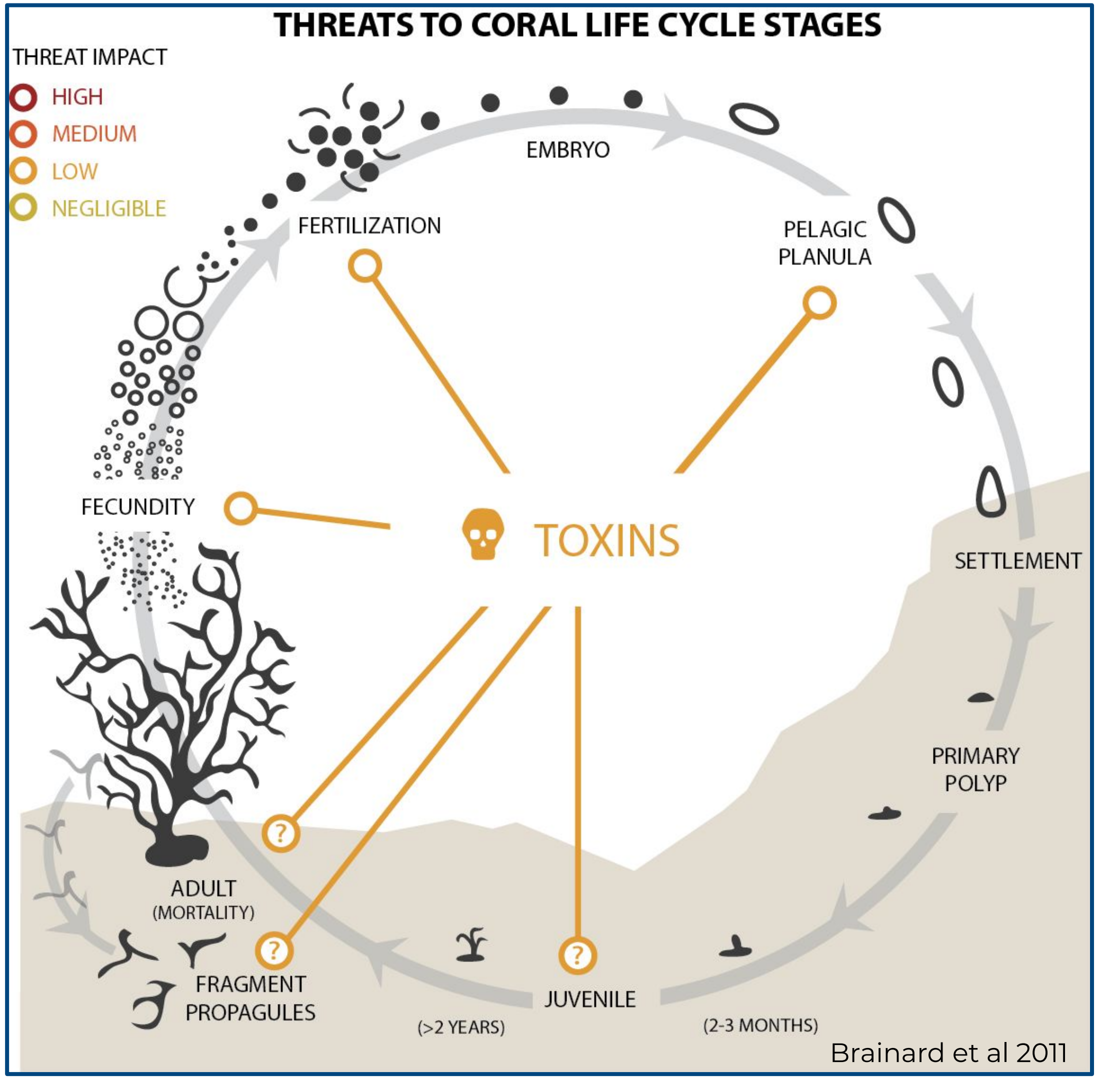
Acropora globiceps
Acropora jacquelineae
Acropora lokani
Acropora pharaonis
Acropora retusa
Acropora rudis
Acropora speciosa
Acropora tenella
Anacropora spinosa
Euphyllia paradivisa
Isopora crateriformis
Montipora australiensis
Pavona diffluens
Porites napopora
Seriatopora aculeata

CLIMATE CHANGE

The Ocean Agency

DISEASE, OVERFISHING, POLLUTION

ESA Listing Determinations



Proposed Critical Habitat

Reproductive, recruitment, growth, and maturation habitat. Sites that support the normal function of all life stages of the corals are natural, consolidated hard substrate or dead coral skeleton free of algae and sediment at the appropriate scale at the point of larval settlement or fragment reattachment, and the associated water column. Several attributes of these sites determine the quality of the area and influence the value of the associated feature to the conservation of the species:

(1) Substrate with presence of crevices and holes that provide cryptic habitat, the presence of microbial biofilms, or presence of crustose coralline algae;

(2) Reefscape (all the visible features of an area of reef) with no more than a thin veneer of sediment and low occupancy by fleshy and turf macroalgae;

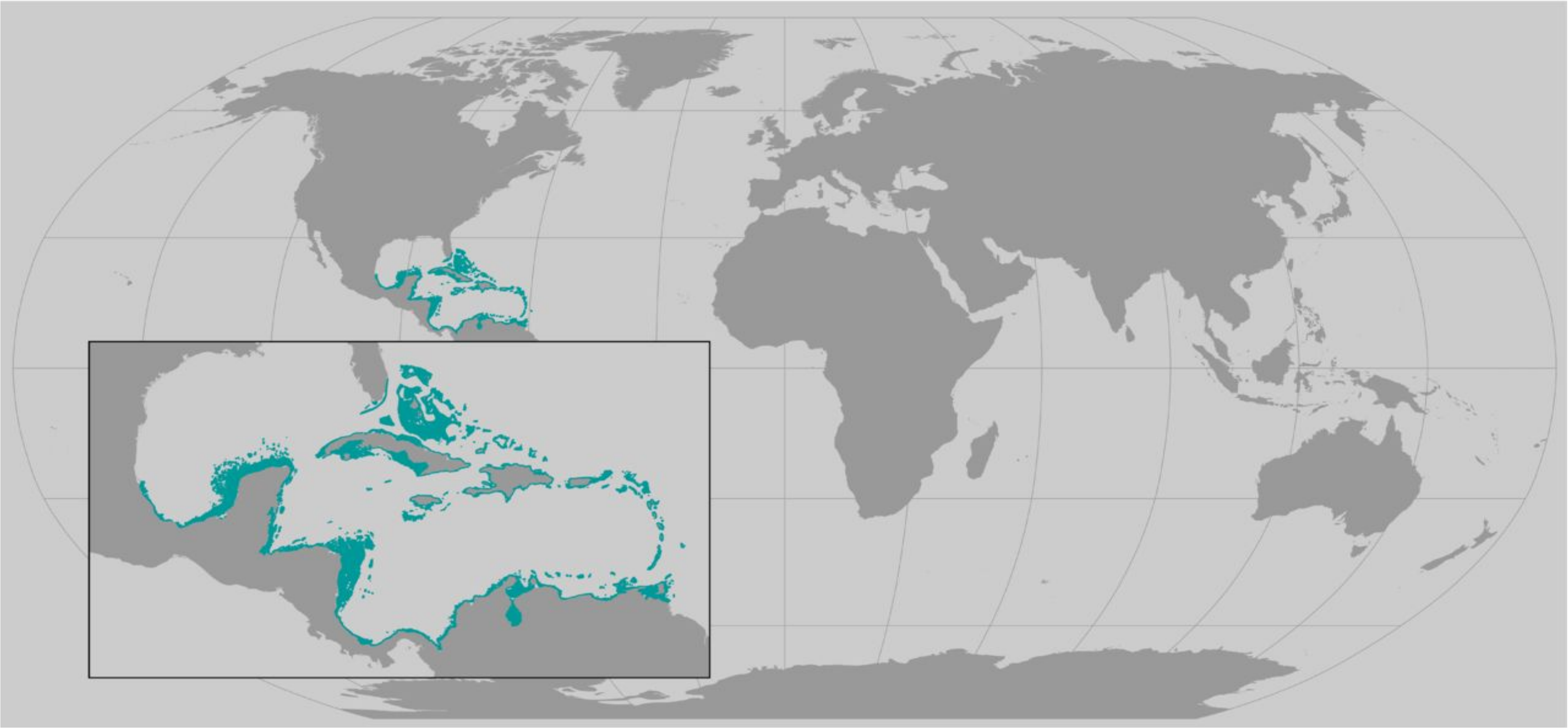
(3) Marine water with levels of temperature, aragonite saturation, nutrients, and water clarity that have been observed to support any demographic function; and

(4) Marine water with levels of anthropogenically-introduced (from humans) chemical contaminants that do not preclude or inhibit any demographic function.

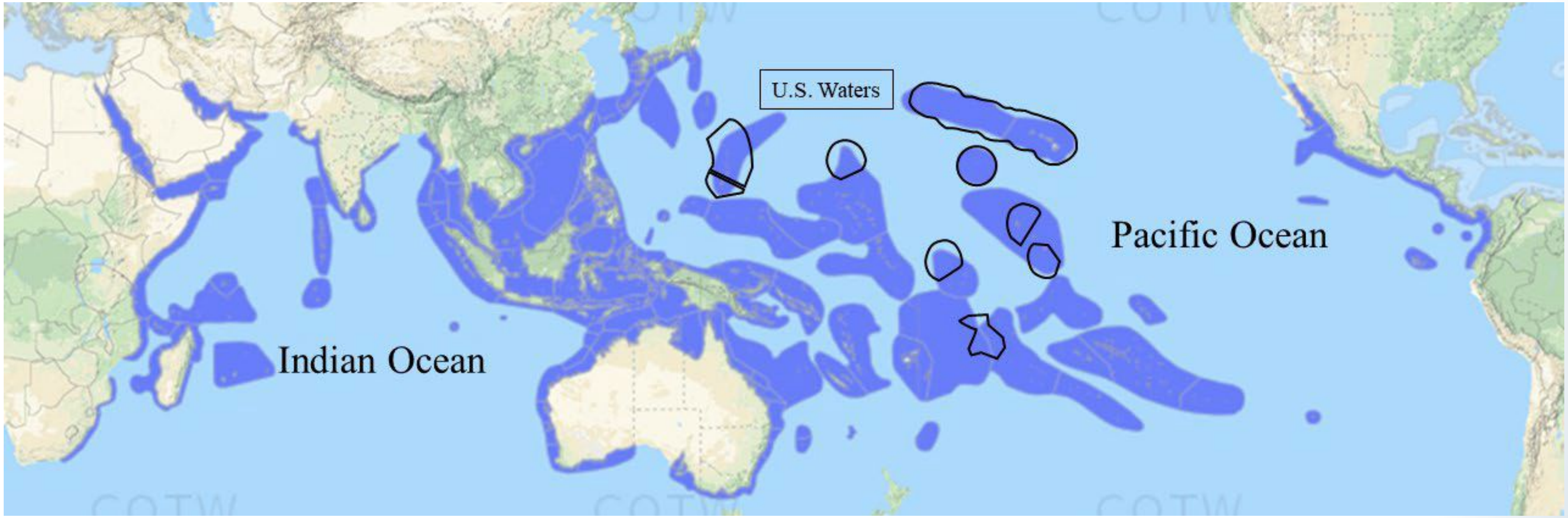
ESA Section 7 Interagency Consultation

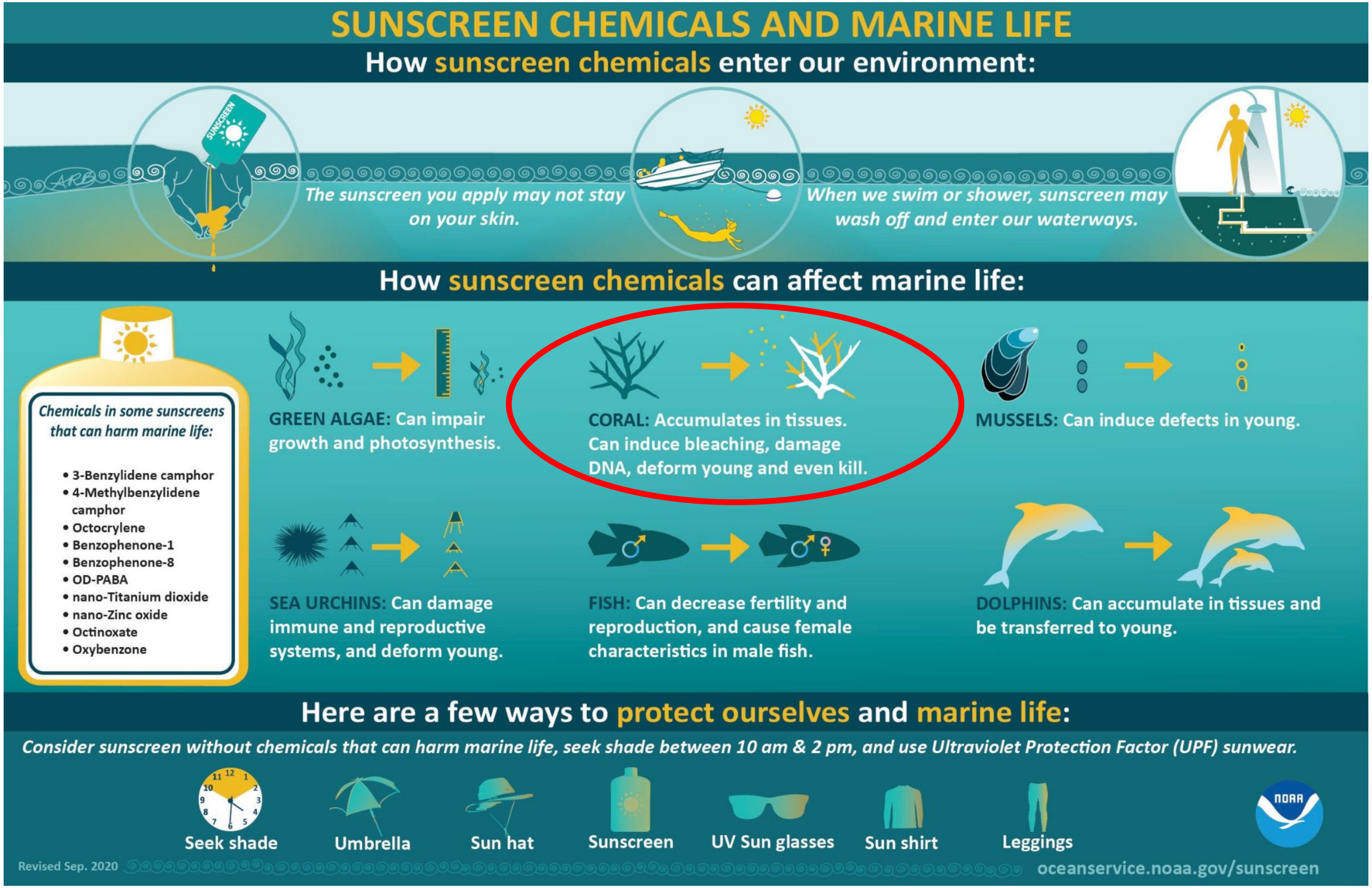
Section 7 of the Endangered Species Act requires federal agencies to ensure that actions they authorize, fund, or carry out do not jeopardize the existence of any species listed under the ESA, or destroy or adversely modify designated critical habitat of any listed species.

Ranges of Caribbean corals



Ranges of Indo-Pacific corals





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Oxybenzone on the Reef

Oxybenzone can enter the marine environment directly from swimmers and wastewater discharges (municipal, residential, and vessels), and indirectly from landfill leachates.

Oxybenzone on the Reef

Reef embayments with high visitation (i.e., 100’s to 1000’s per day) are particularly vulnerable to high concentrations of oxybenzone

USVI: 75-95 µg/L Hawksnest
580-1395 µg/L Trunk Bay

HI: 5-2947 µg/L Kahalu'u Bay, Hawai'i Island

Oxybenzone in Corals

Toxicity from exposure to oxybenzone and enhanced photo-toxicity have been documented in *Acropora tenuis, Stylophora pistillata, Seriatopora caliendrum* and *Pocillopora damicornis* larvae.

Lethal effects were observed in *S. pistillata* larvae exposed to oxybenzone (LC50=799 µg/L in darkness; 139 µg/L in light 24 h)

Sublethal effects of oxybenzone exposure included developmental anomalies, bleaching, genotoxicity, reduced larval settlement, polyp retraction

Oxybenzone in Corals

Median lethal concentrations (LC50s) of oxybenzone for seven different coral species:

Stylophora pistillata 42 µg/L
Montastraea cavernosa 52 µg/L
Orbicella annularis 74 µg/L***
Porites astreoides 340 µg/L
Acropora cervicornis 9 µg/L***
Pocillopora damicornis 8 µg/L
Porites divaricata 36 µg/L

Octinoxate on the Reef

USVI: Avg 41 ng/L Trunk Bay

HI: Not detected in water, sediments, or coral tissues

Octinoxate in Corals

Toxicity of octinoxate has been tested in two coral species, *Seriatopora caliendrum* and *Pocillopora damicornis* alone and also exposed to dilutions of a 'wash-off' of a sunscreen product (7% octinoxate, 3.6% octocrylene)

Sunscreen product (5% of sunscreen 'wash-off' 422.34 µg/L octinoxate and 33.50 µg/L octocrylene) exposures were significantly more toxic than individual chemical exposures, high mortality occurred in both species within 24 h

Sublethal effects of octinoxate exposure included bleaching, partial mortality, polyp retraction


THANK YOU!
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