

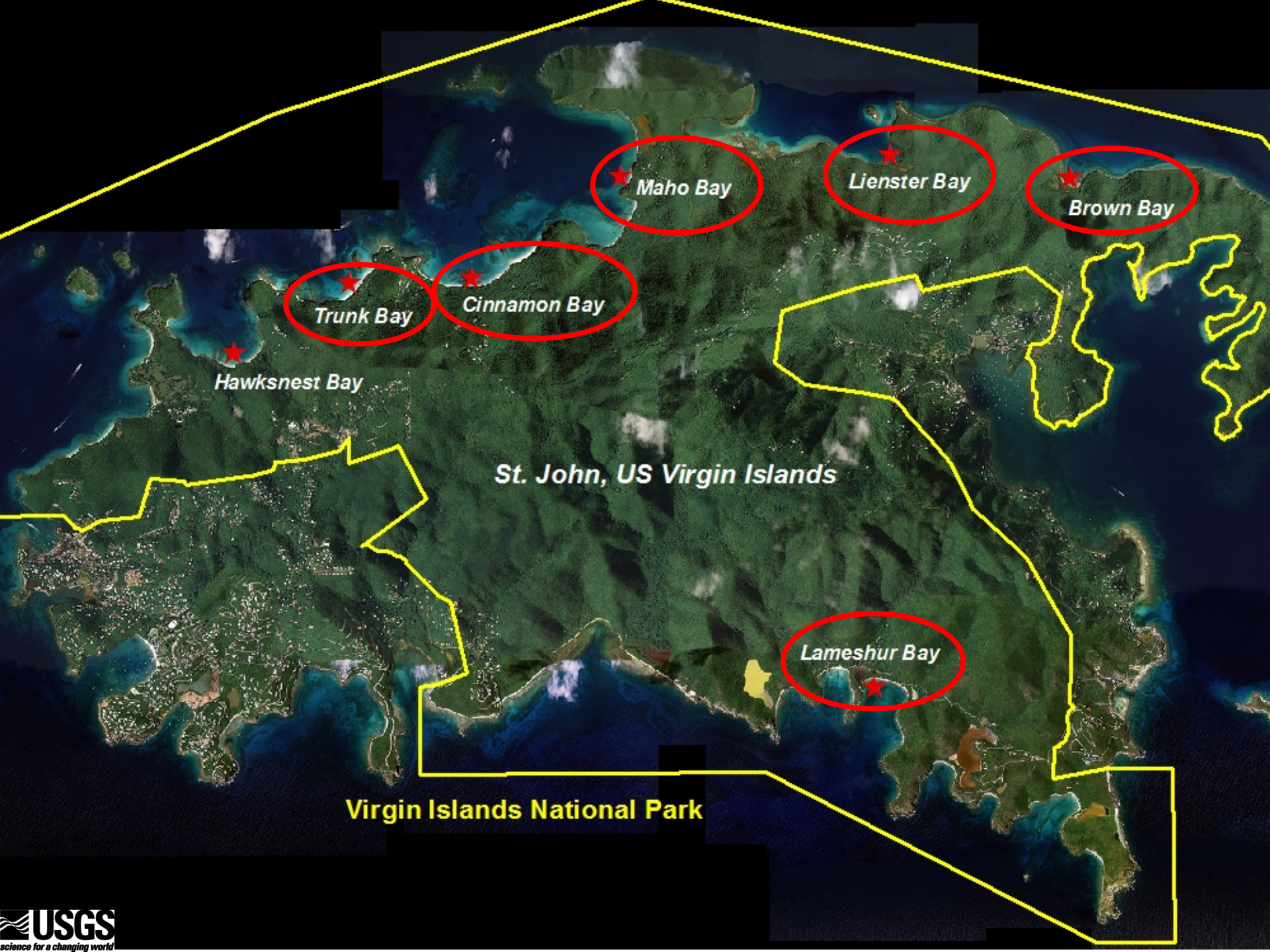


Ultraviolet Light Filtering Chemical (Sunscreen) Presence in Marine Surface Waters of Bays within the Virgin Islands National Park

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¹ U.S. Geological Survey;
Wetland and Aquatic Research Center;
Gainesville, Florida





Hawksnest Bay

Trunk Bay

Cinnamon Bay

Maho Bay

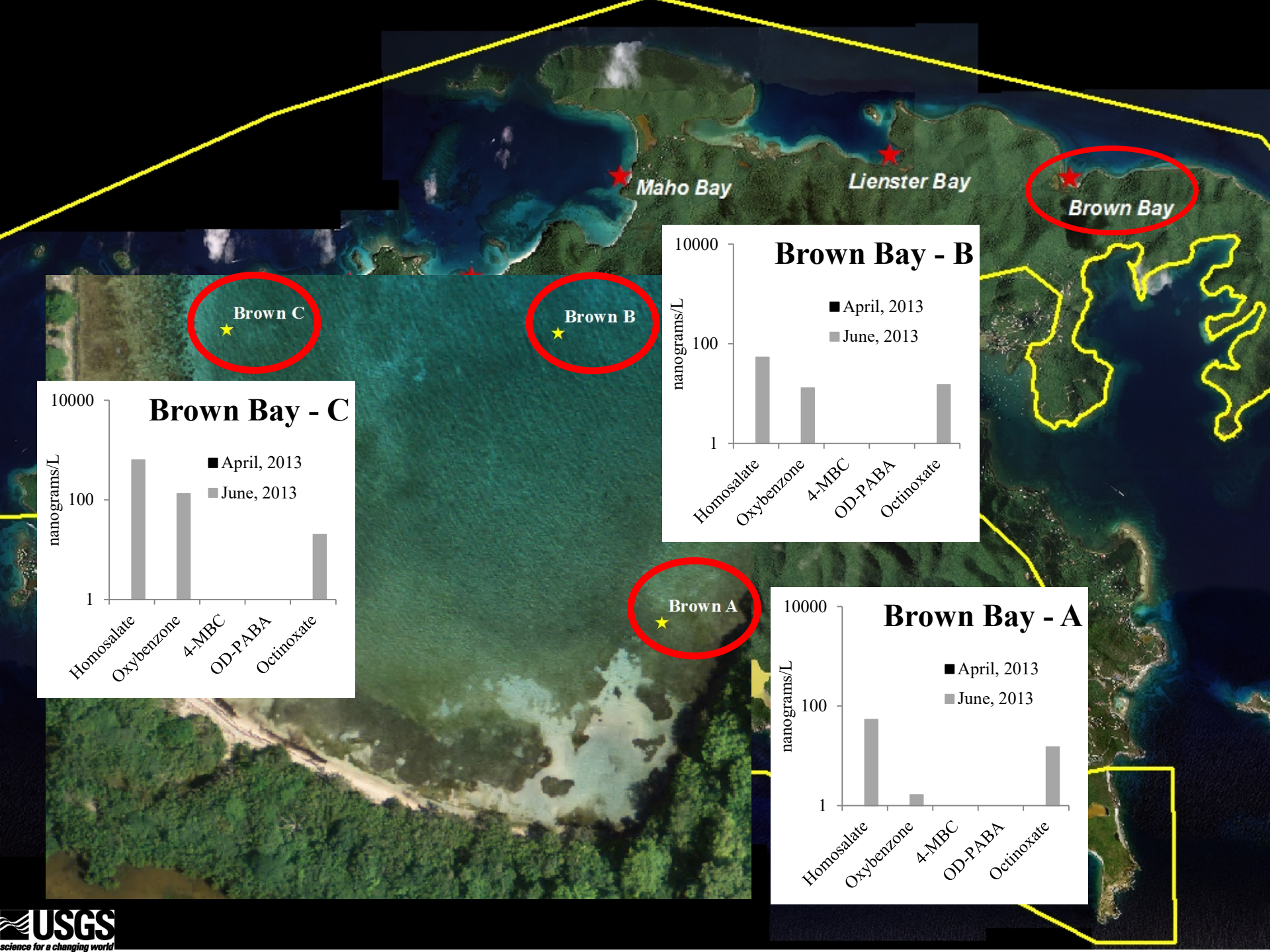
Lienster Bay

Brown Bay

St. John, US Virgin Islands

Lameshur Bay

Virgin Islands National Park



Maho Bay

Lienster Bay

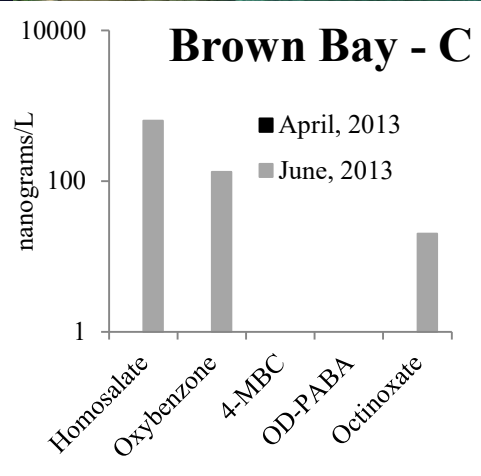
Brown Bay

Brown C

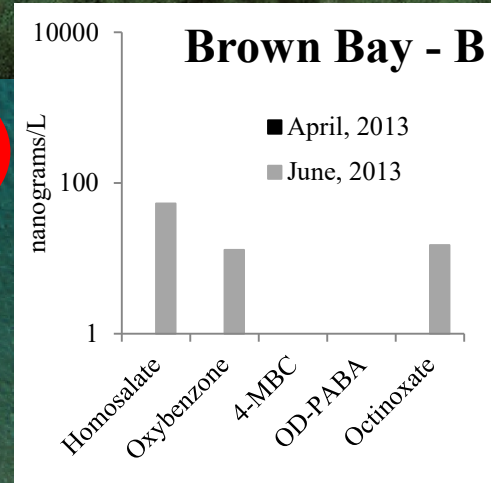
Brown B

Brown A

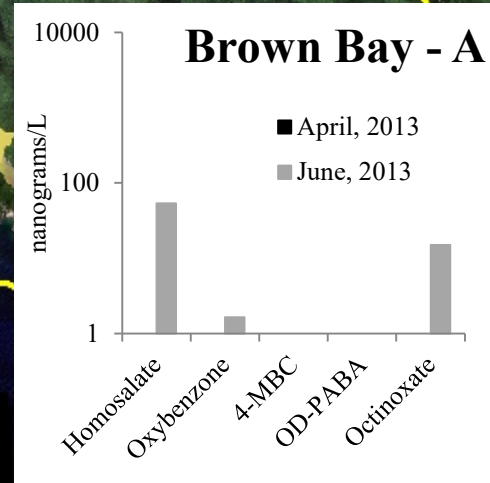
Brown Bay - C

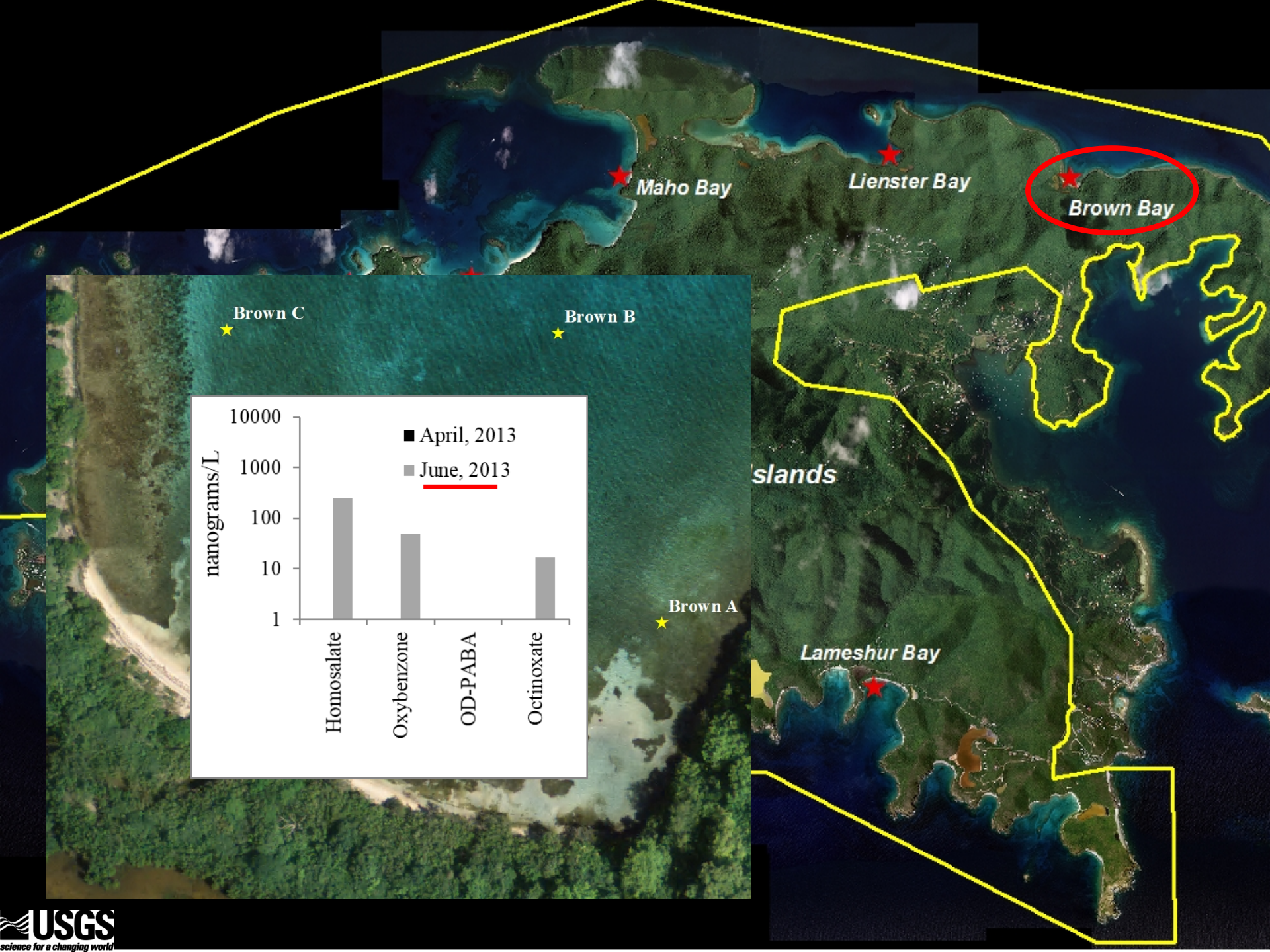


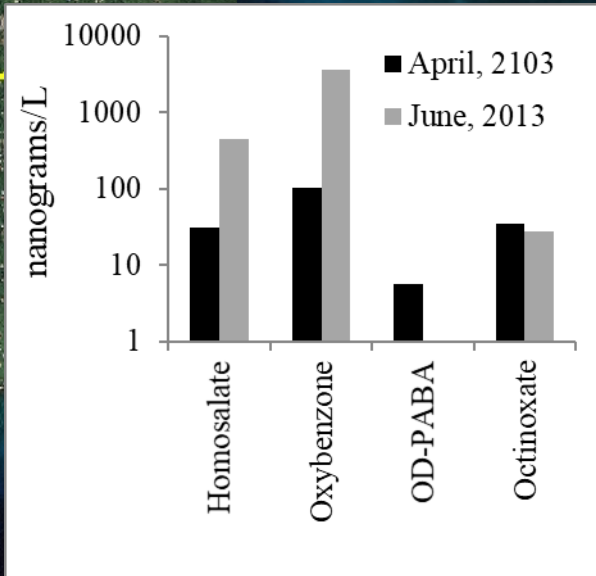
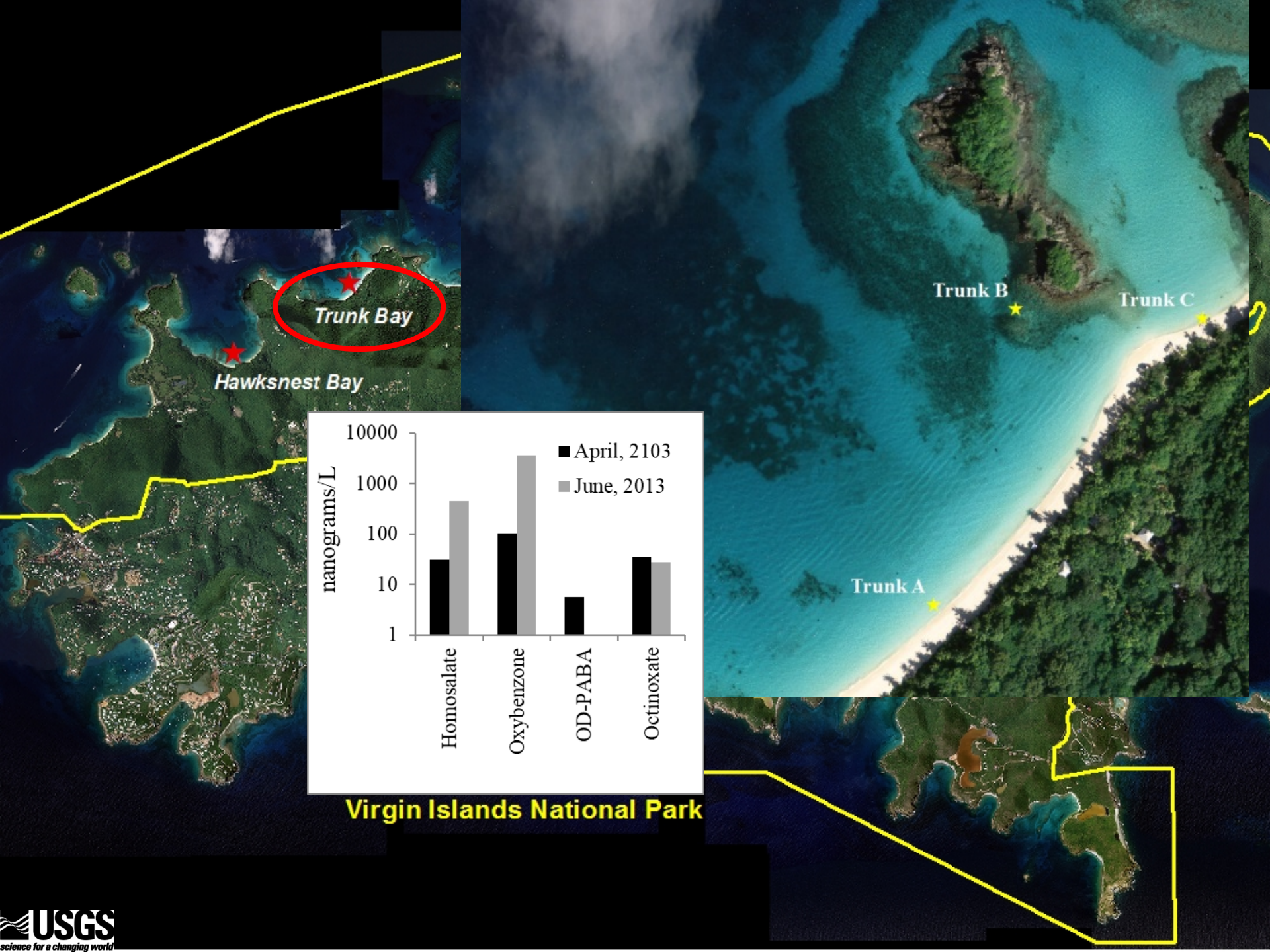
Brown Bay - B



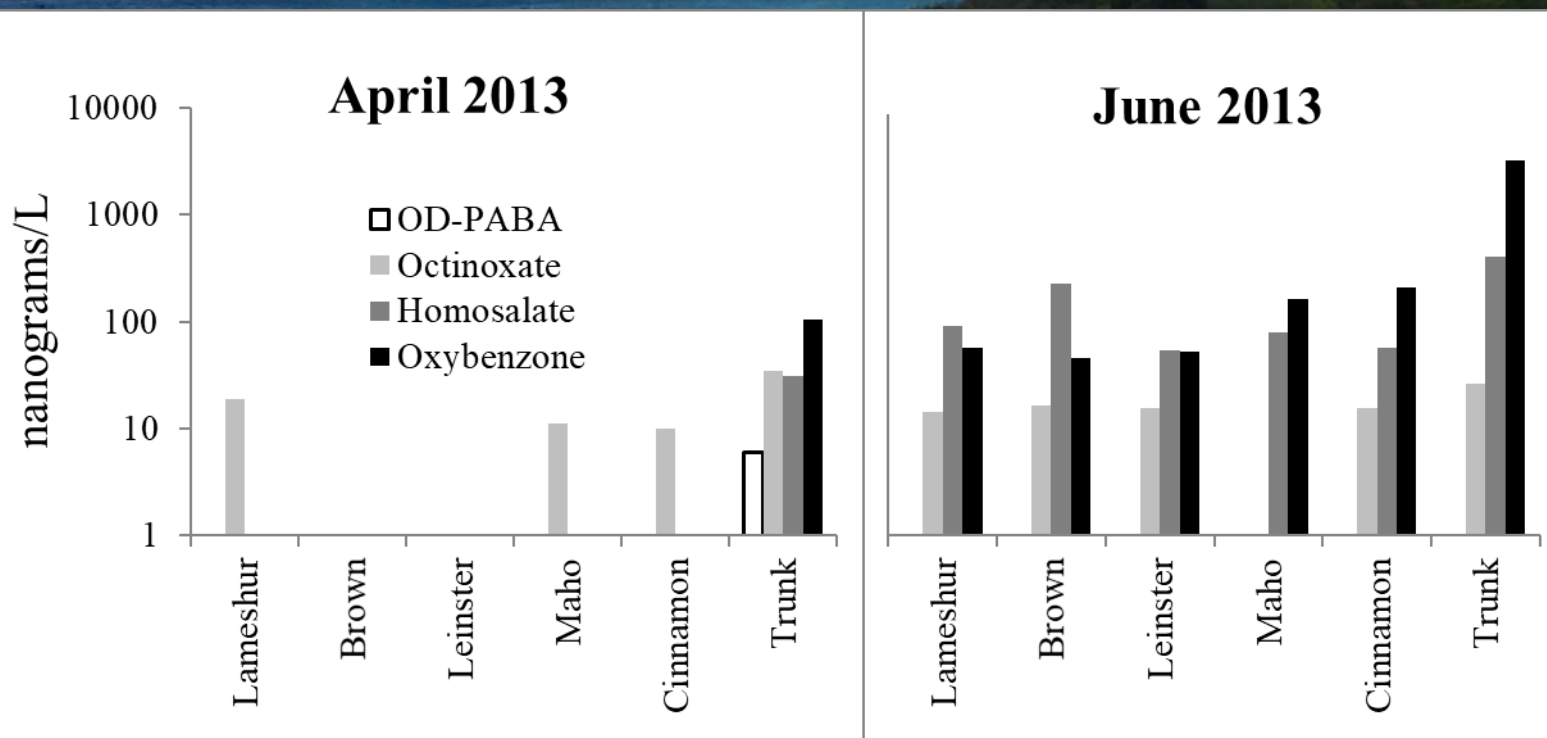
Brown Bay - A







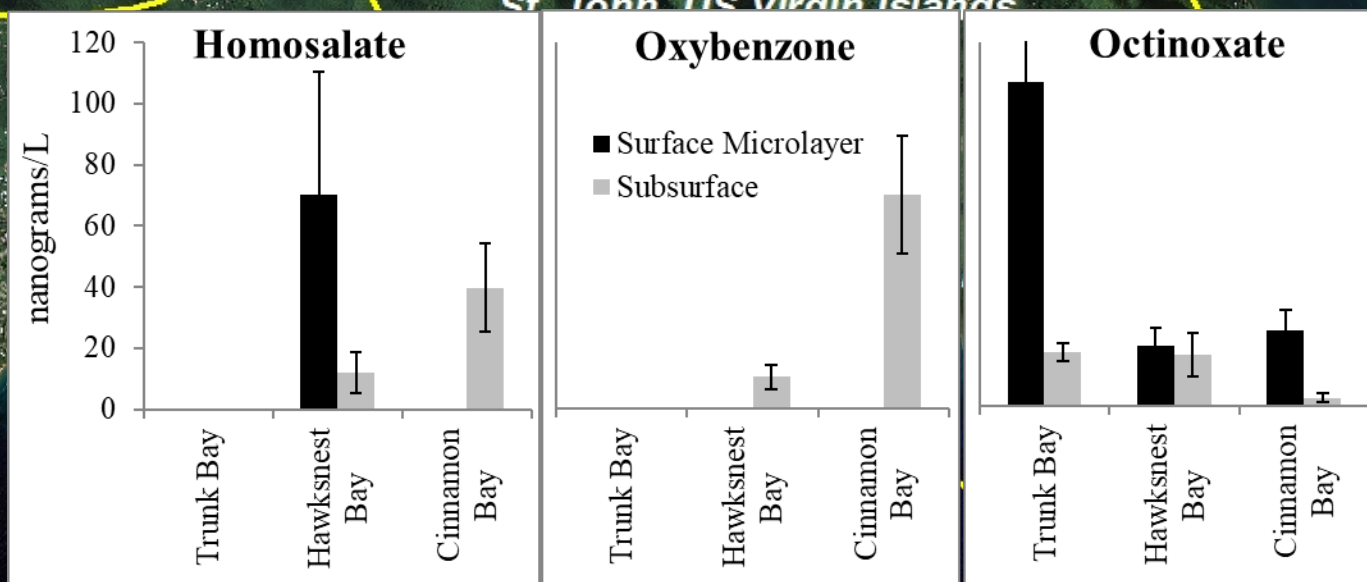
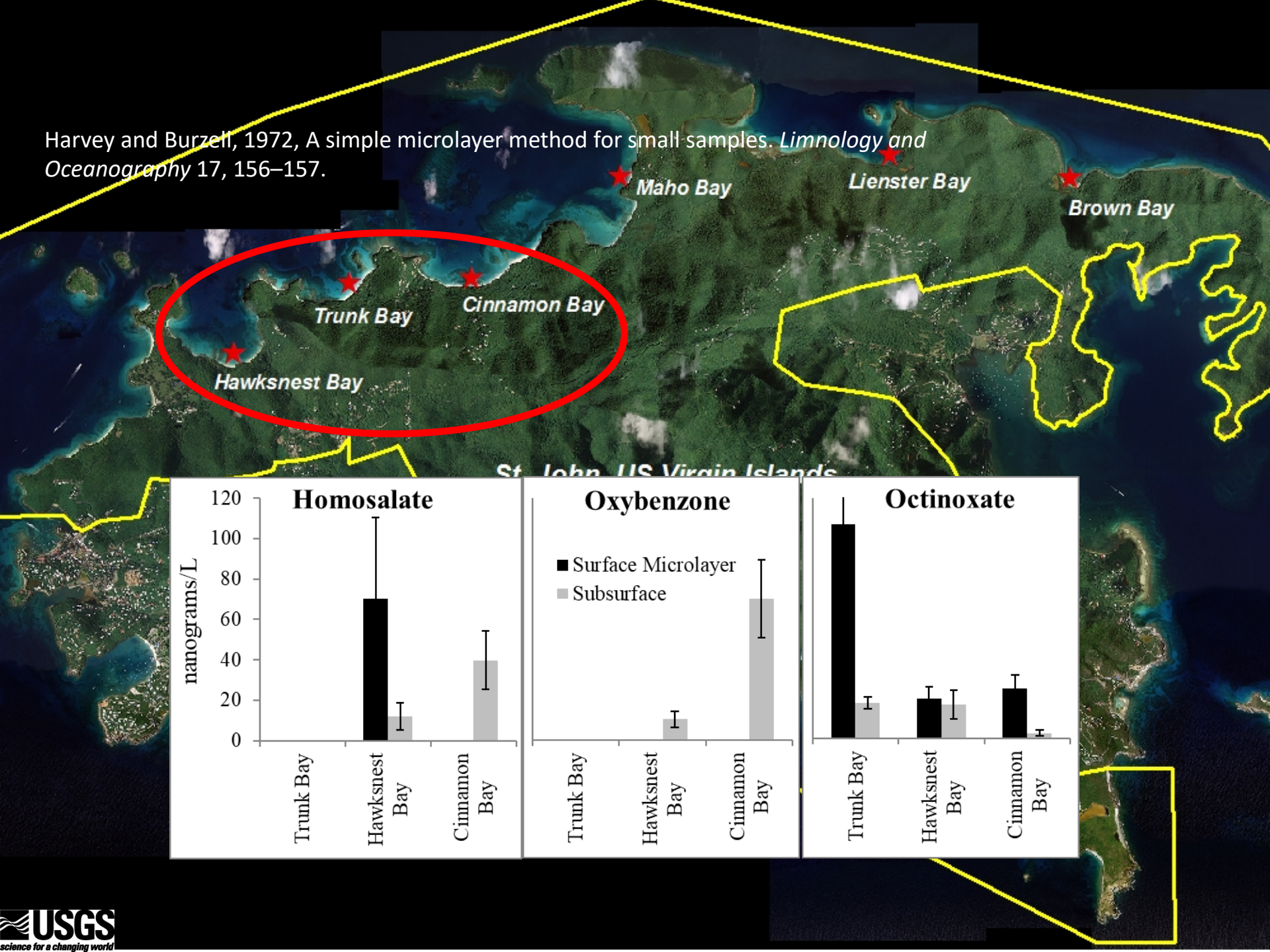
Virgin Islands National Park



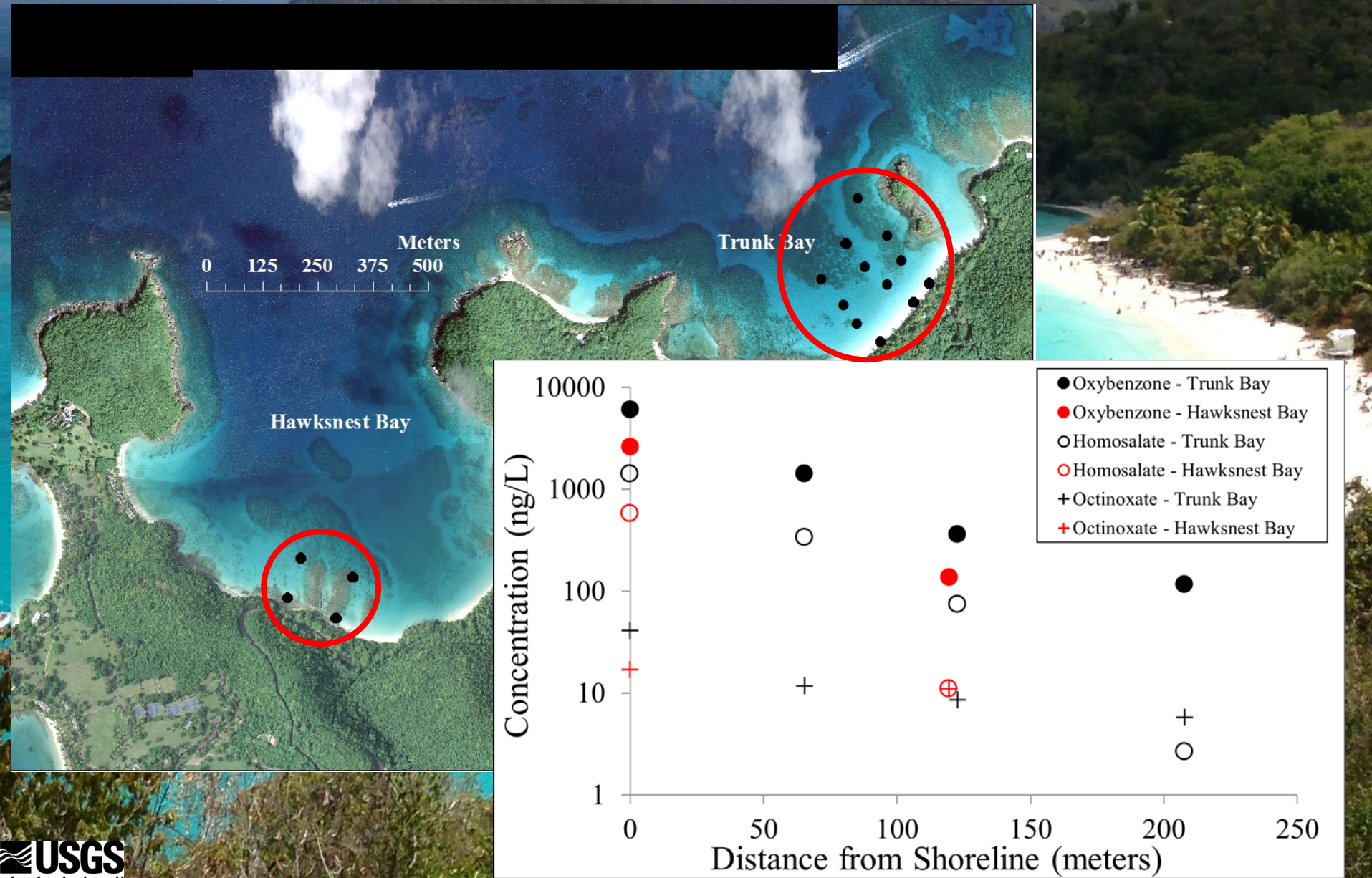
Sea Surface Microlayer

- Wurl and Obbard, 2004, A review of pollutants in the sea-surface microlayer (SML): a unique habitat for marine organisms. *Marine Pollution Bulletin* 48, 1016–1030.
- Guitart et al., 2004. Evaluation of sampling devices for the determination of polycyclic aromatic hydrocarbons in surface microlayer coastal waters. *Marine Pollution Bulletin* 48, 961–968.
- Liu and Dickhut, 1997. Surface microlayer enrichment of polycyclic aromatic hydrocarbons in southern Chesapeake Bay. *Environmental Science and Technology* 31, 2777–2781.
- Tovar-Sanchez et al., 2013, Sunscreen Products as Emerging Pollutants to Coastal Waters. *Plos One* 8, e65451.

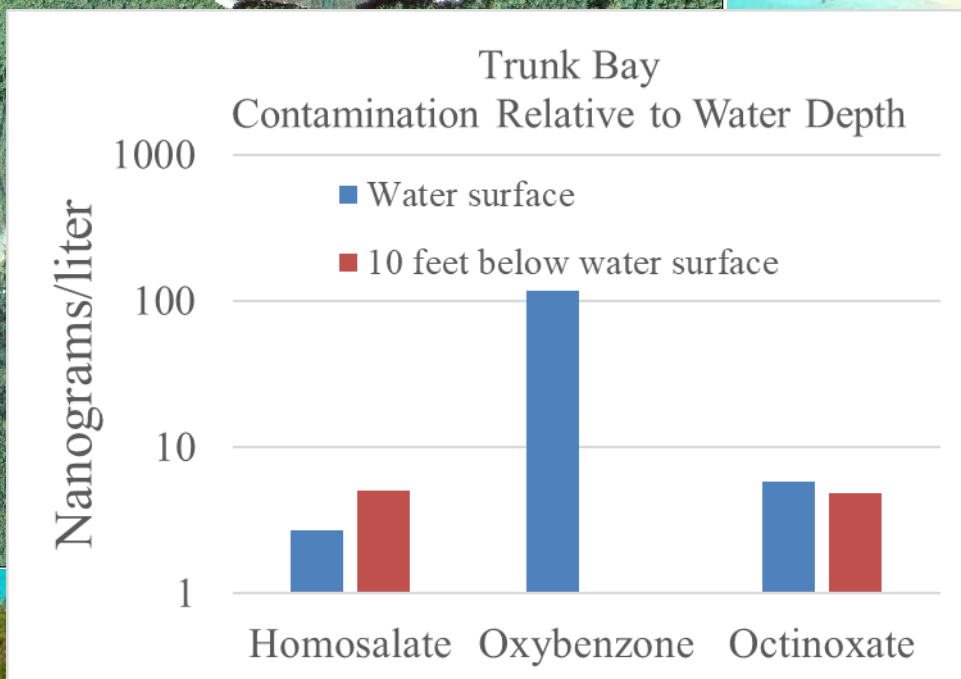
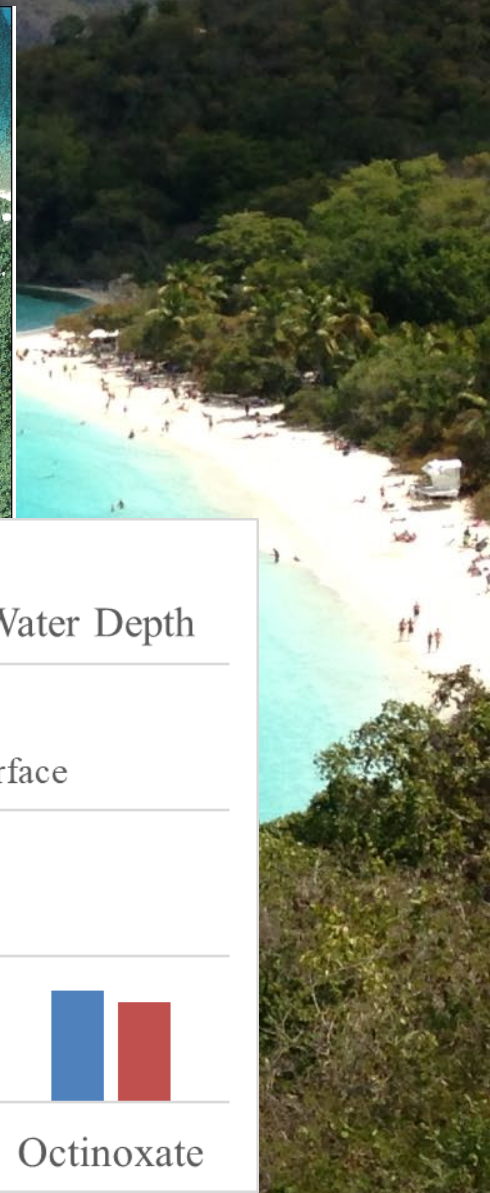
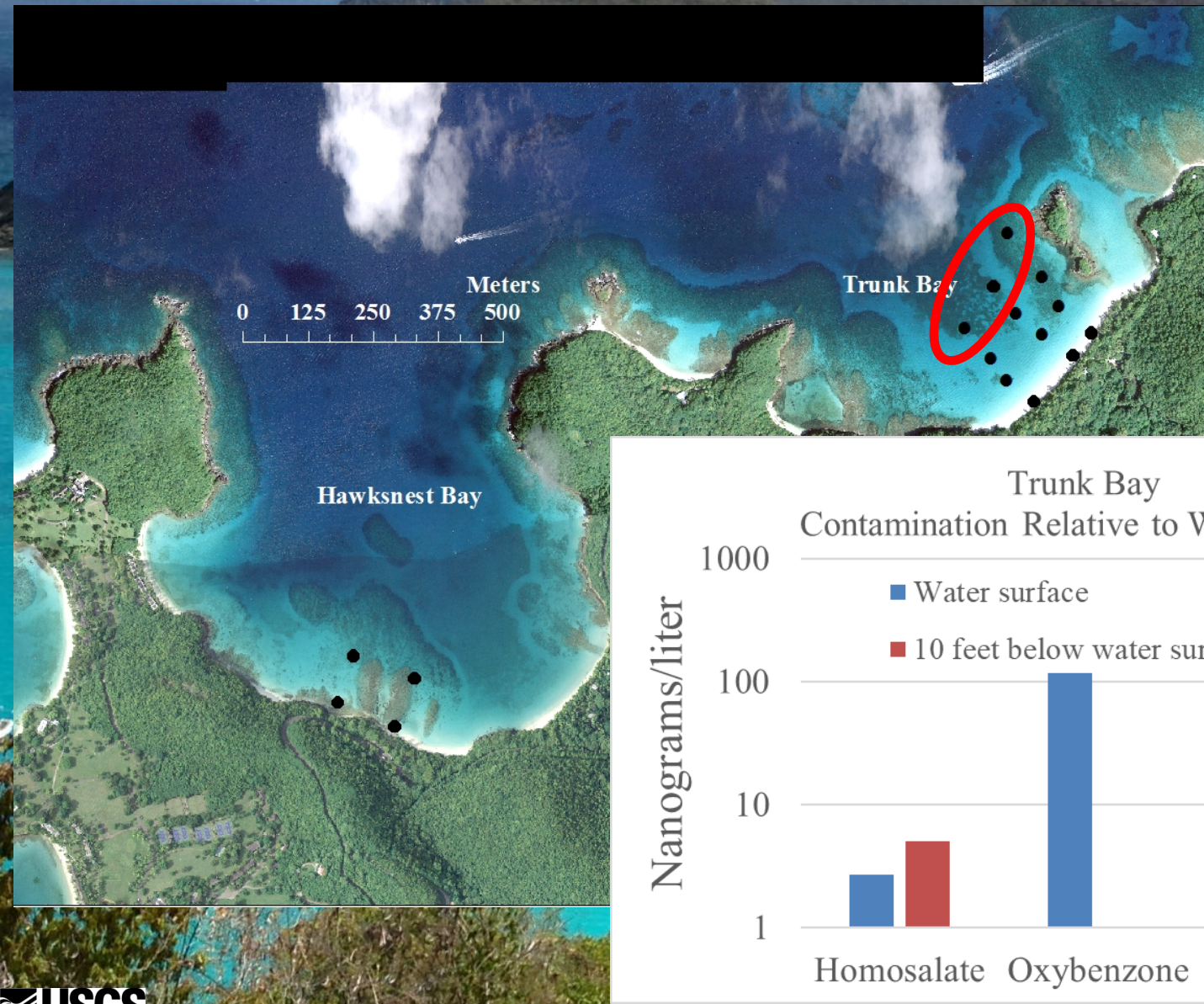
Harvey and Burzell, 1972, A simple microlayer method for small samples. *Limnology and Oceanography* 17, 156–157.



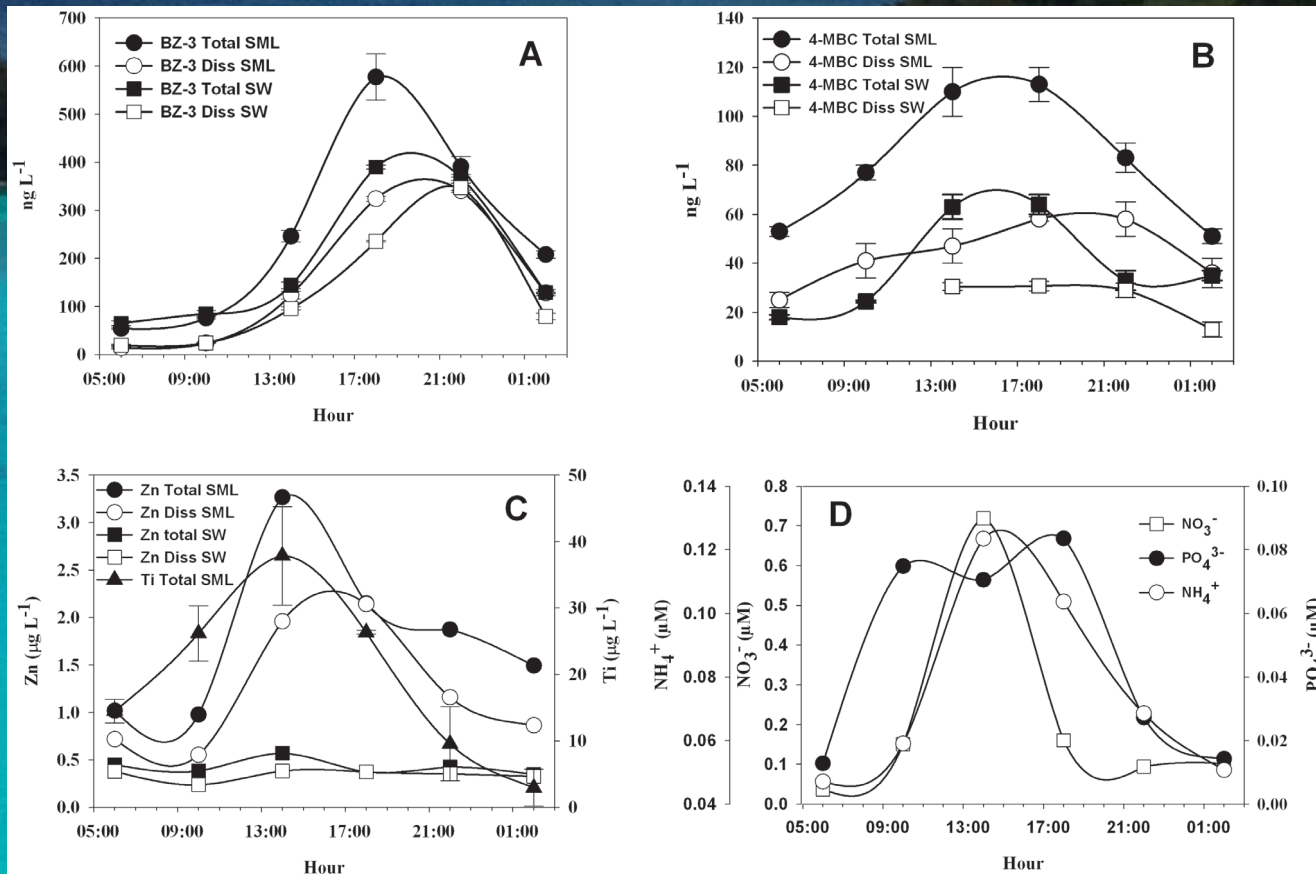
Sunscreen Chemical Source



Sunscreen Chemical Source



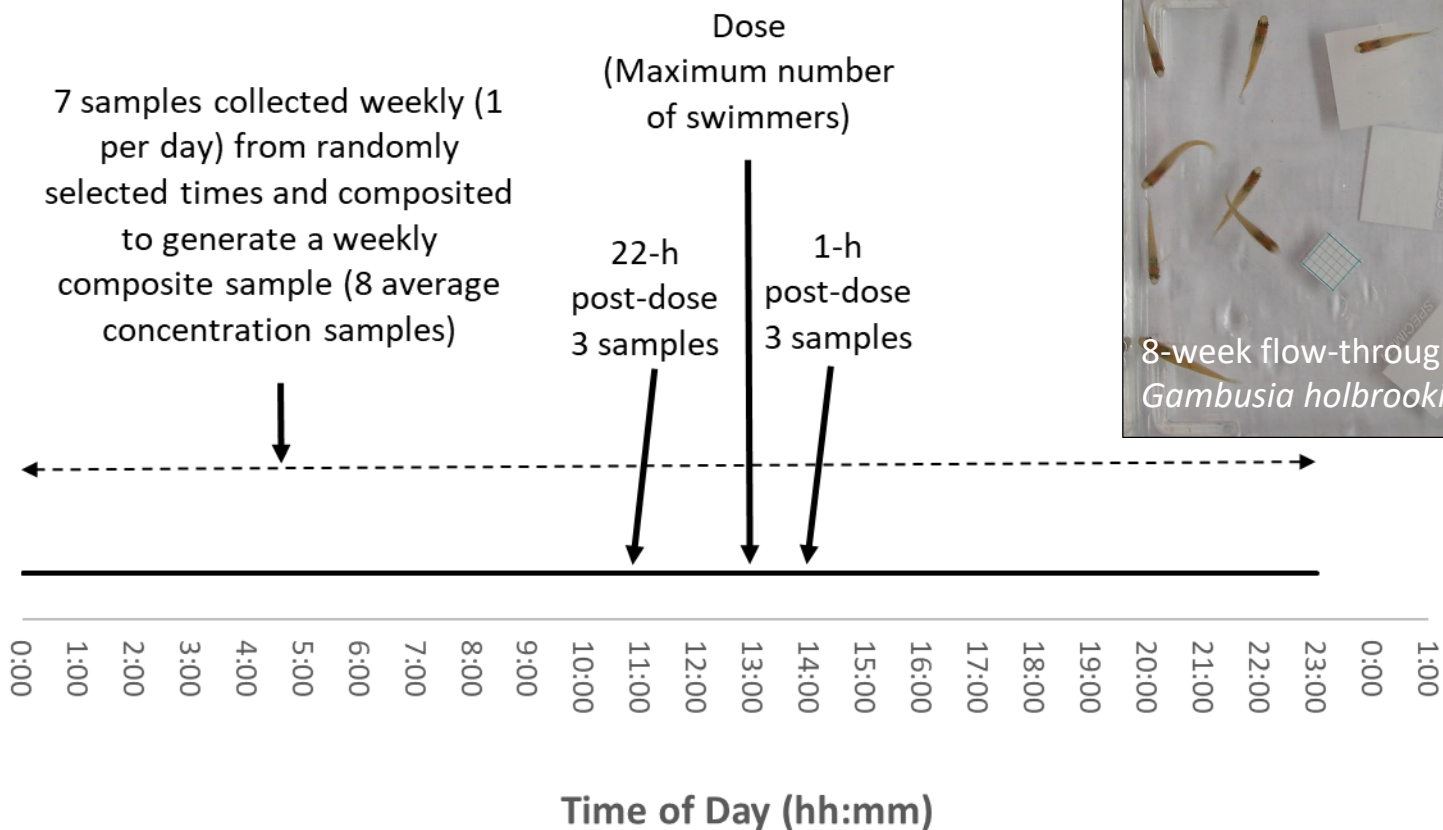
Effect of Diurnally Varying Exposure



Tovar-Sanchez et al., 2013, Sunscreen Products as Emerging Pollutants to Coastal Waters. *Plos One* 8, e65451.

Effect of Diurnally Varying Exposure

Dosing and Sampling Plan



Effect of Diurnally Varying Exposure

Dosing and Sampling Plan

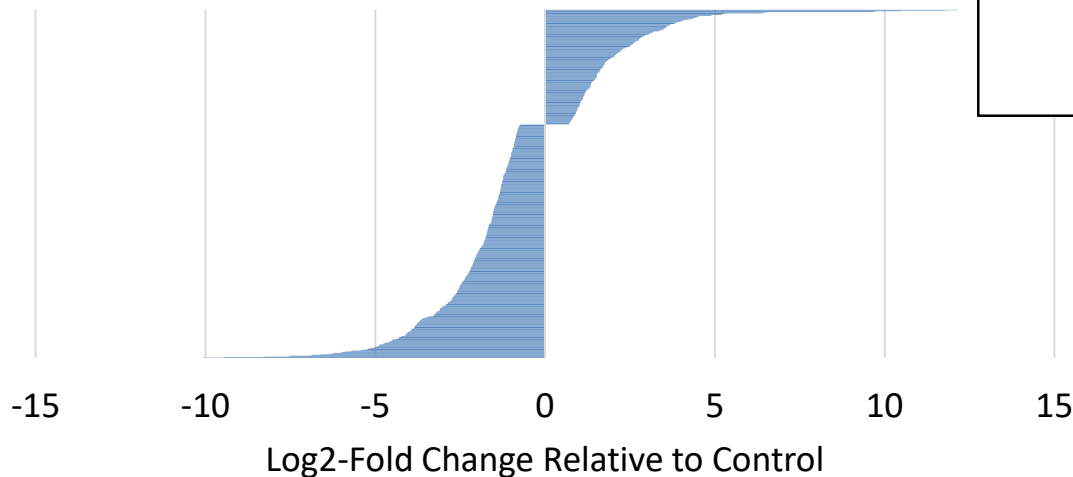
7 samples collected weekly (1 per day) from randomly selected times and composited to generate a weekly composite sample (8 average)

Dose
(Maximum number of swimmers)

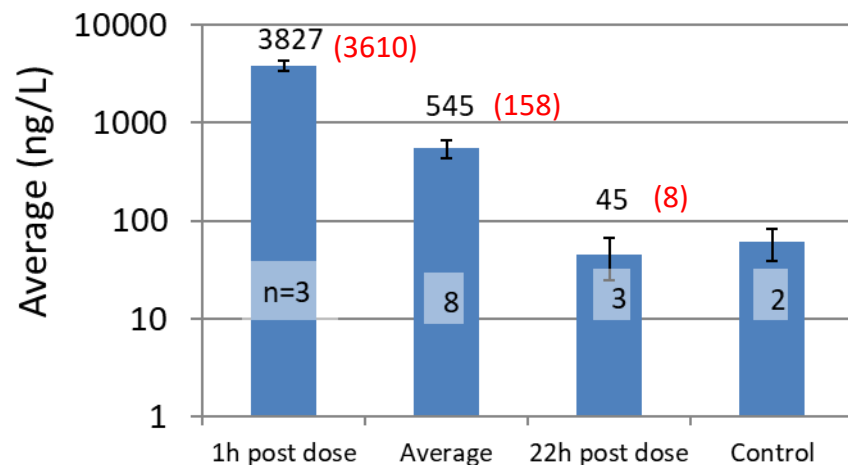
22-h

1-h

Change in Gene Expression in Liver after Oxybenzone Exposure



Oxybenzone Concentration



1:00
0:00
23:00
22:00
21:00
20:00
19:00

Sunscreen Ban Efficacy

- Lawmakers in U.S. Virgin Islands approve bill banning certain sunscreen ingredients (Karma Allen, ABC News, June 26, 2019)
“The U.S. Virgin Islands Legislature on Monday unanimously passed bill number 33-0043, which bans sale, distribution and import of sunscreen products containing oxybenzone and octinoxate.”

Questions?

TA Bargar, DA Alvarez, VH Garrison, 2015, Synthetic ultraviolet light filtering chemical contamination of coastal waters of Virgin Islands national park, St. John, U.S. Virgin Islands, *Marine Pollution Bulletin* 101:193-199, <http://dx.doi.org/10.1016/j.marpolbul.2015.10.077>

Acknowledgements

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