



Indian Island 2021

The background image shows a rocky beach with a crab on the left and seaweed on the right. A semi-transparent grey box is overlaid on the center of the image, containing text.

Overview

In 2021, an intense midsummer heat wave added to the stressors affecting marine life in Fishing Bay exacerbating a trend towards loss of biodiversity, mainly affecting species that are residents in the bay rather than highly mobile

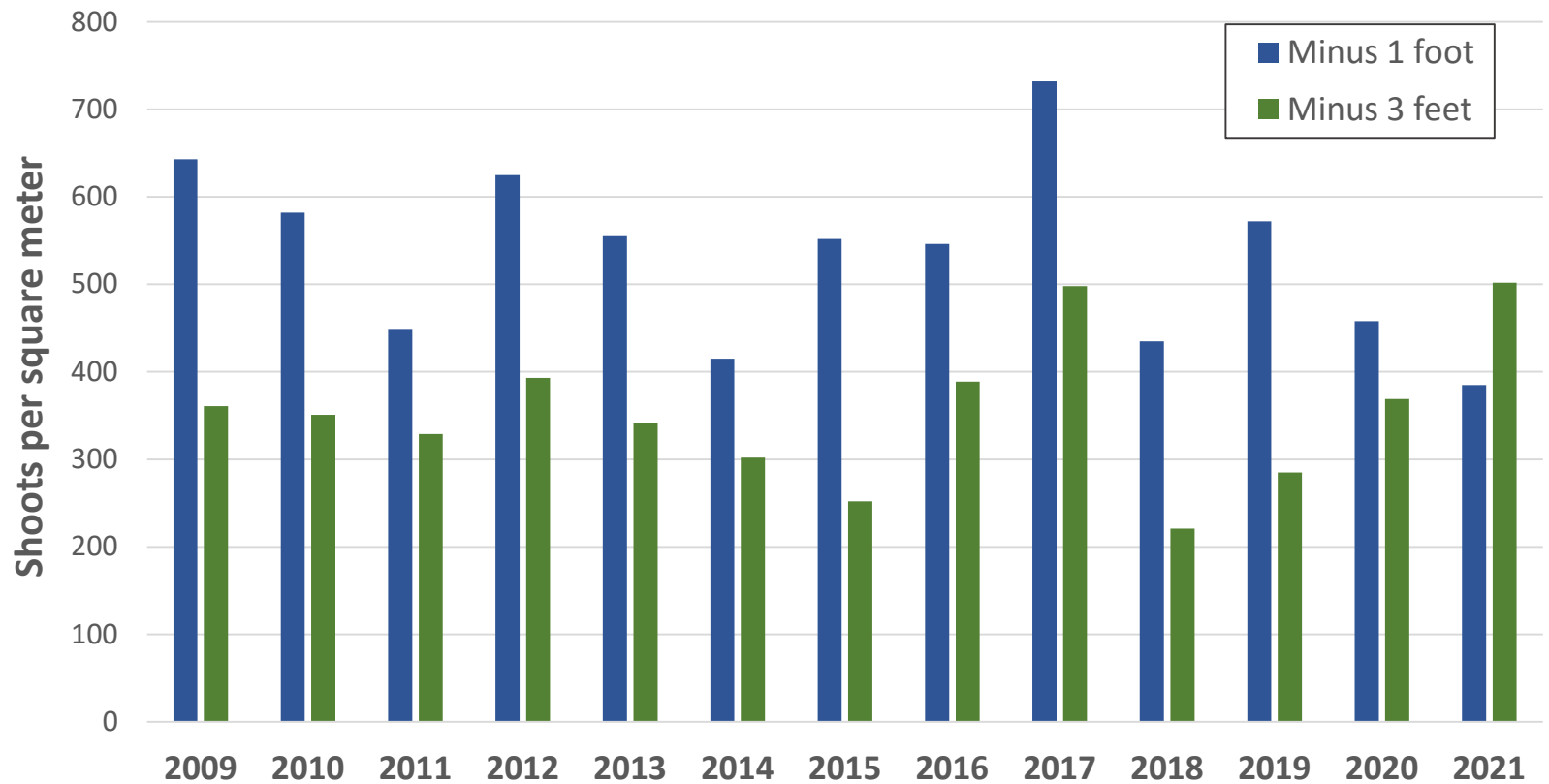


Taylor's Sea Hare

Habitat conditions

Eelgrass density has fluctuated from year to year since 2009 with no clear trend. Deeper eelgrass has always been less dense, since sunlight is absorbed by water, and the water in Fishing Bay is often cloudy from road runoff.

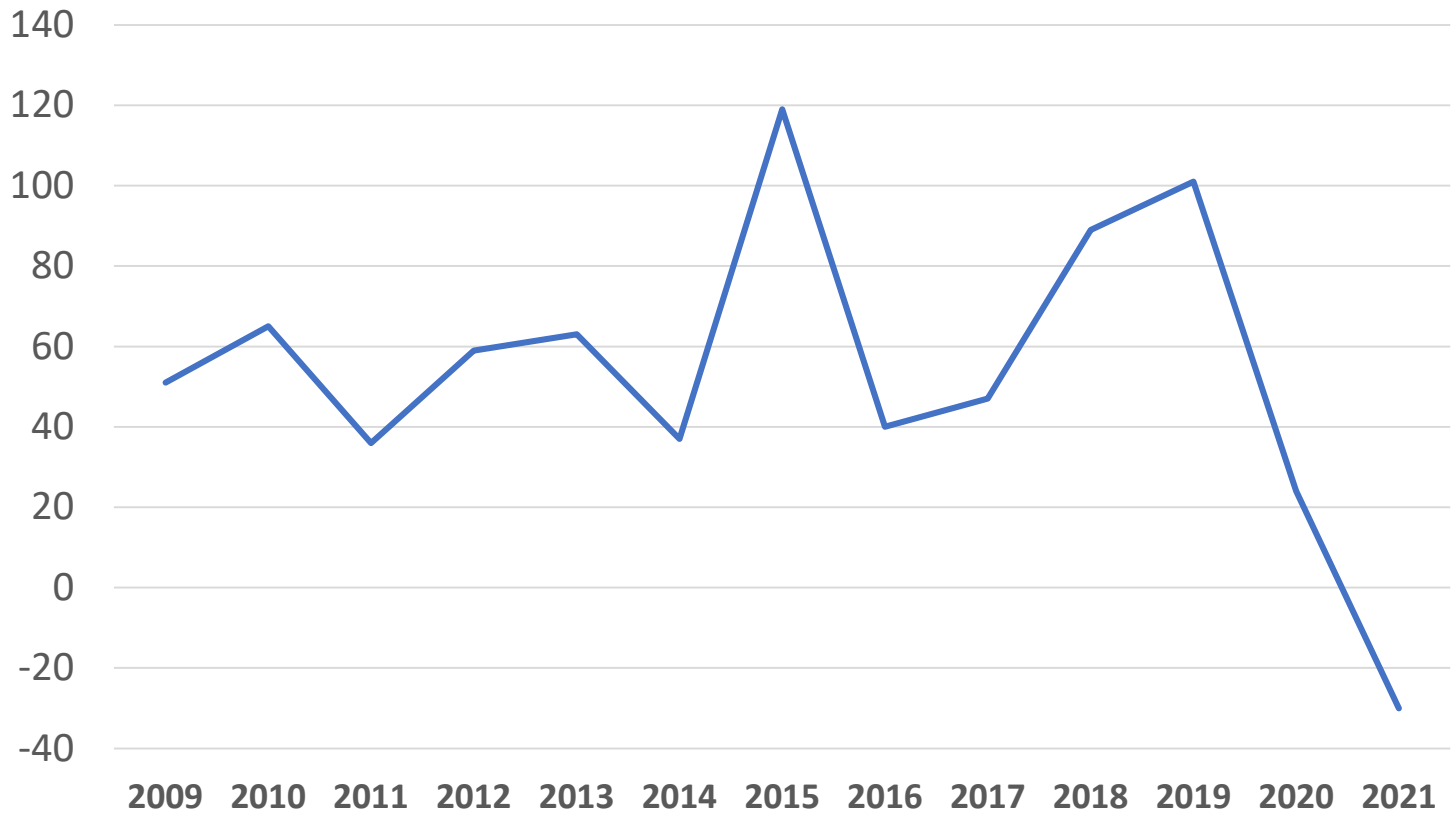
Indian Island eelgrass density 2009-2020



Habitat conditions

In 2021, for the first time, there was a significant loss of shallow eelgrass, which is more sensitive to temperature than eelgrass in deeper water. It is also affected by people, during low tides.

Density of eelgrass at -1 foot compared to -3 feet





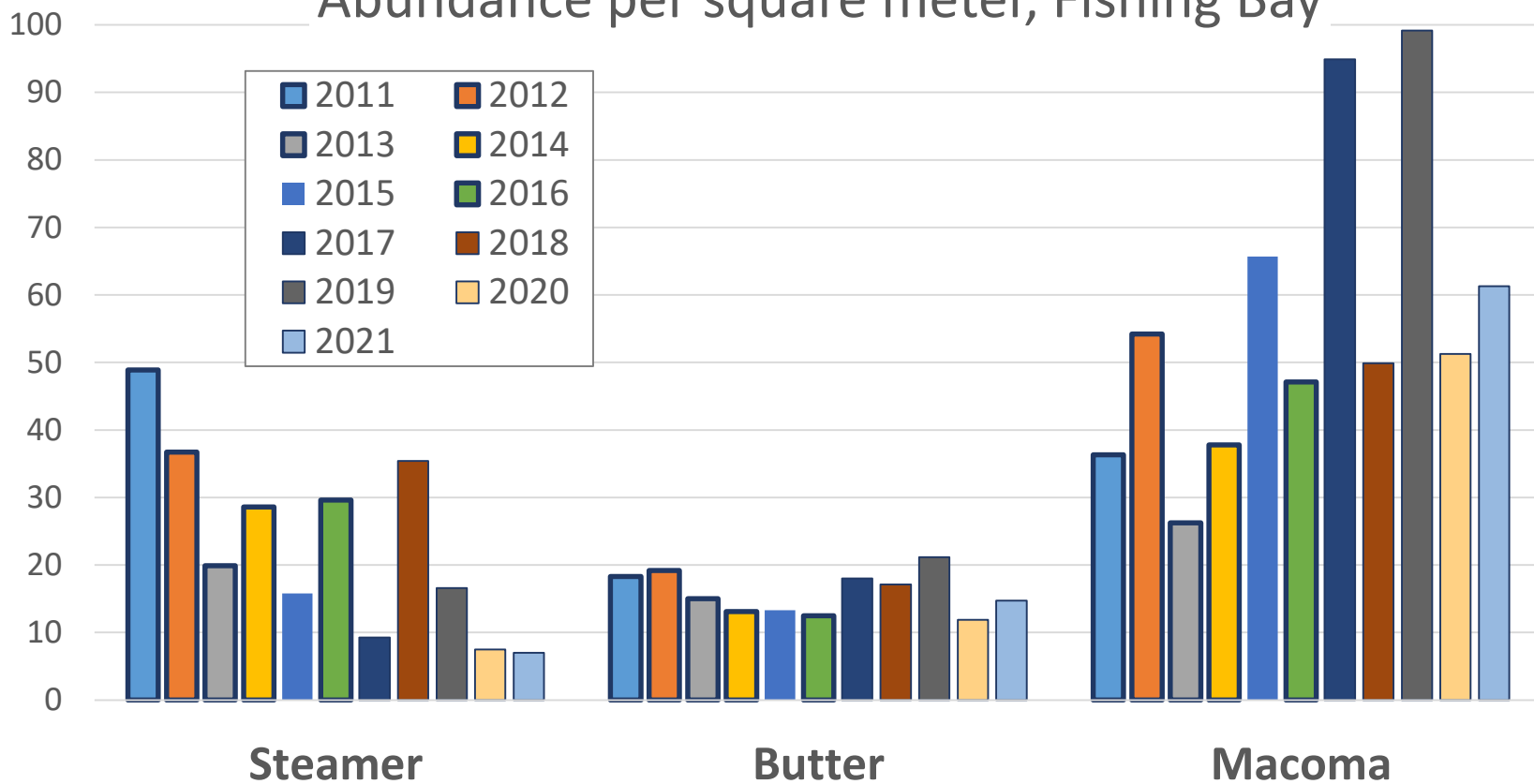
Butter clams

Habitat conditions

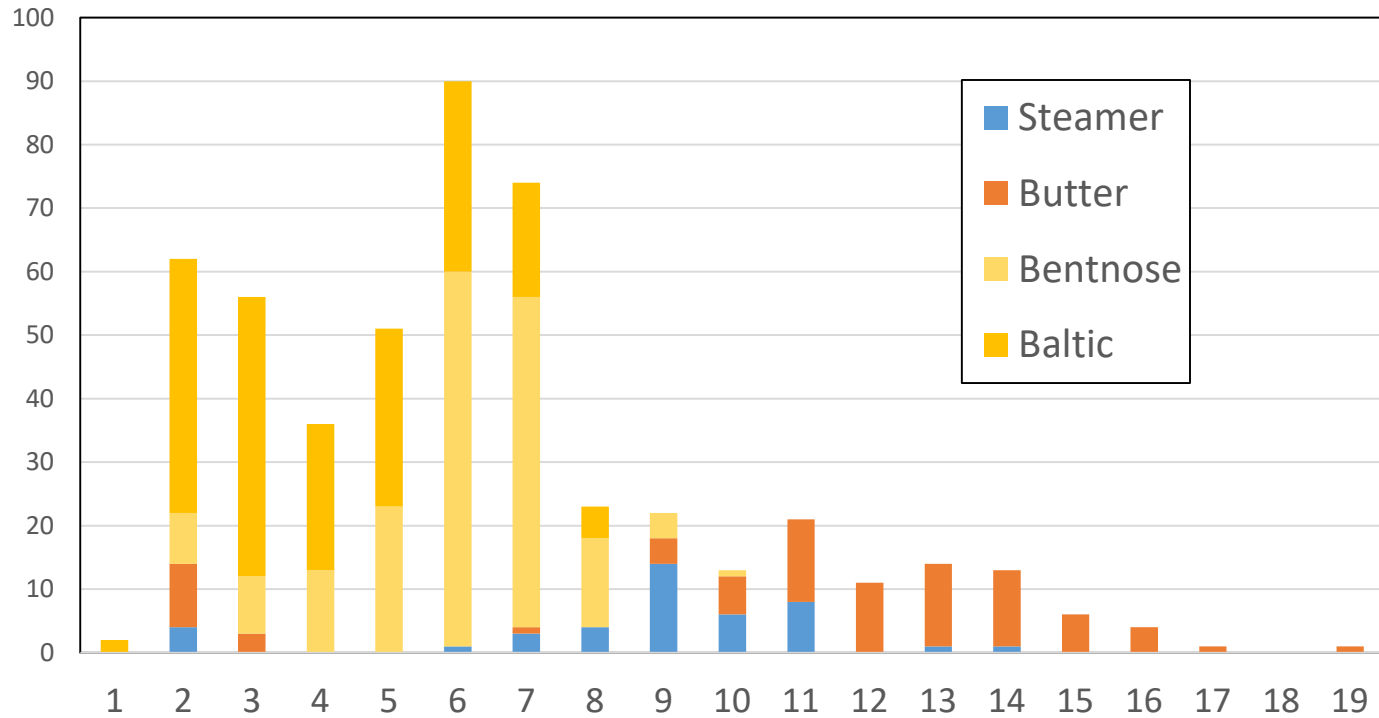
Fine sands and mud continue to accumulate within Fishing Bay as much as a half-inch per year. This is ideal for soft-shell clams (genus *Macoma*) but so-called Steamers and Butter Clams are declining.

Annual change in bivalve abundance

Abundance per square meter, Fishing Bay



Age structure of infaunal bivalves Fishing Bay 2021



**Flattop Porcelain
Crab**

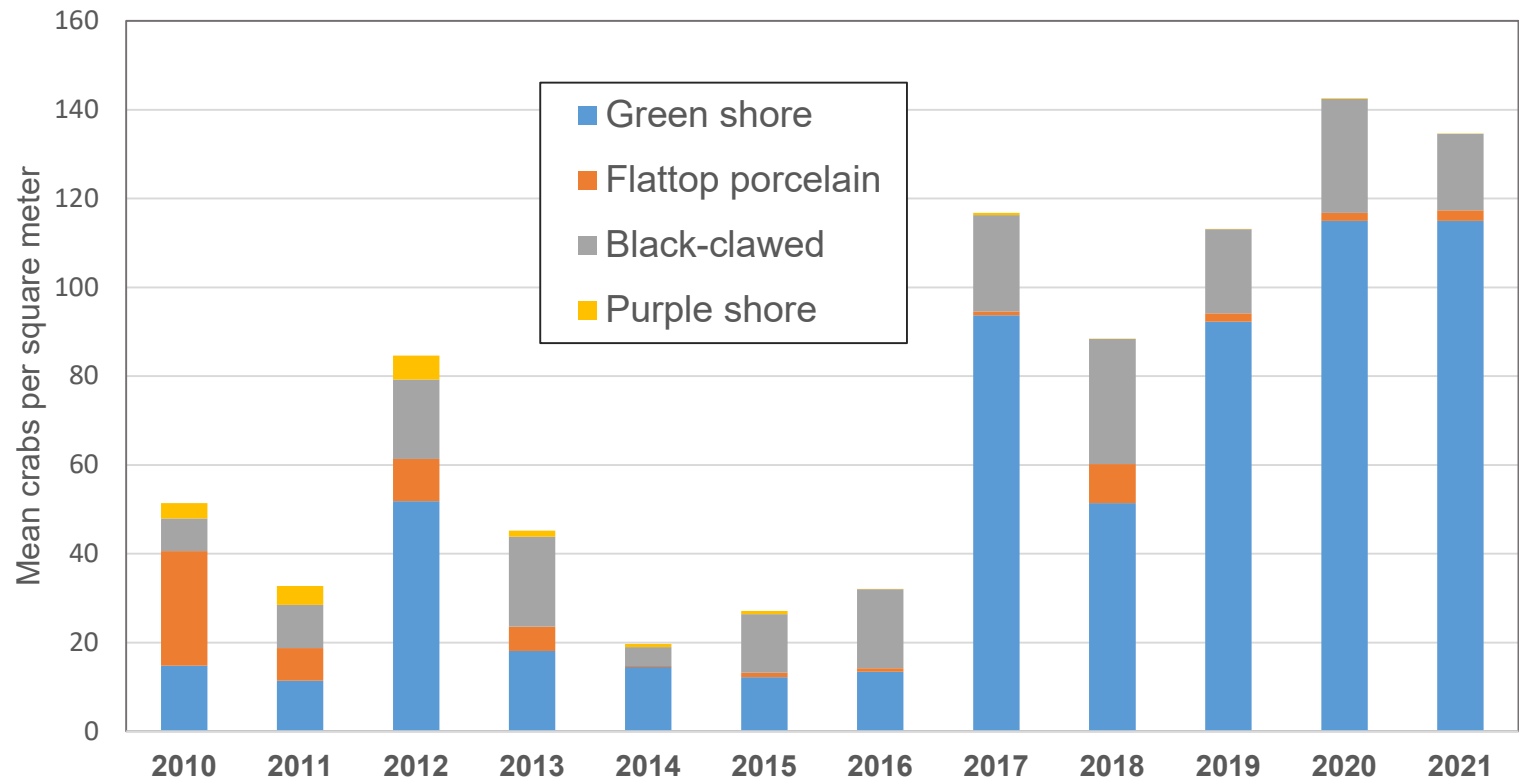


The background image shows a rocky beach with tide pools. A crab is visible in the upper left corner. The text is overlaid on a semi-transparent grey rounded rectangle.

Habitat conditions

Thousands of people visit Indian Island tide pools each summer, walking over cobble beaches that are nurseries for juvenile crabs. Crab numbers have grown but diversity has declined.

Juvenile crabs beneath beach cobbles Indian Island, 2010-2021





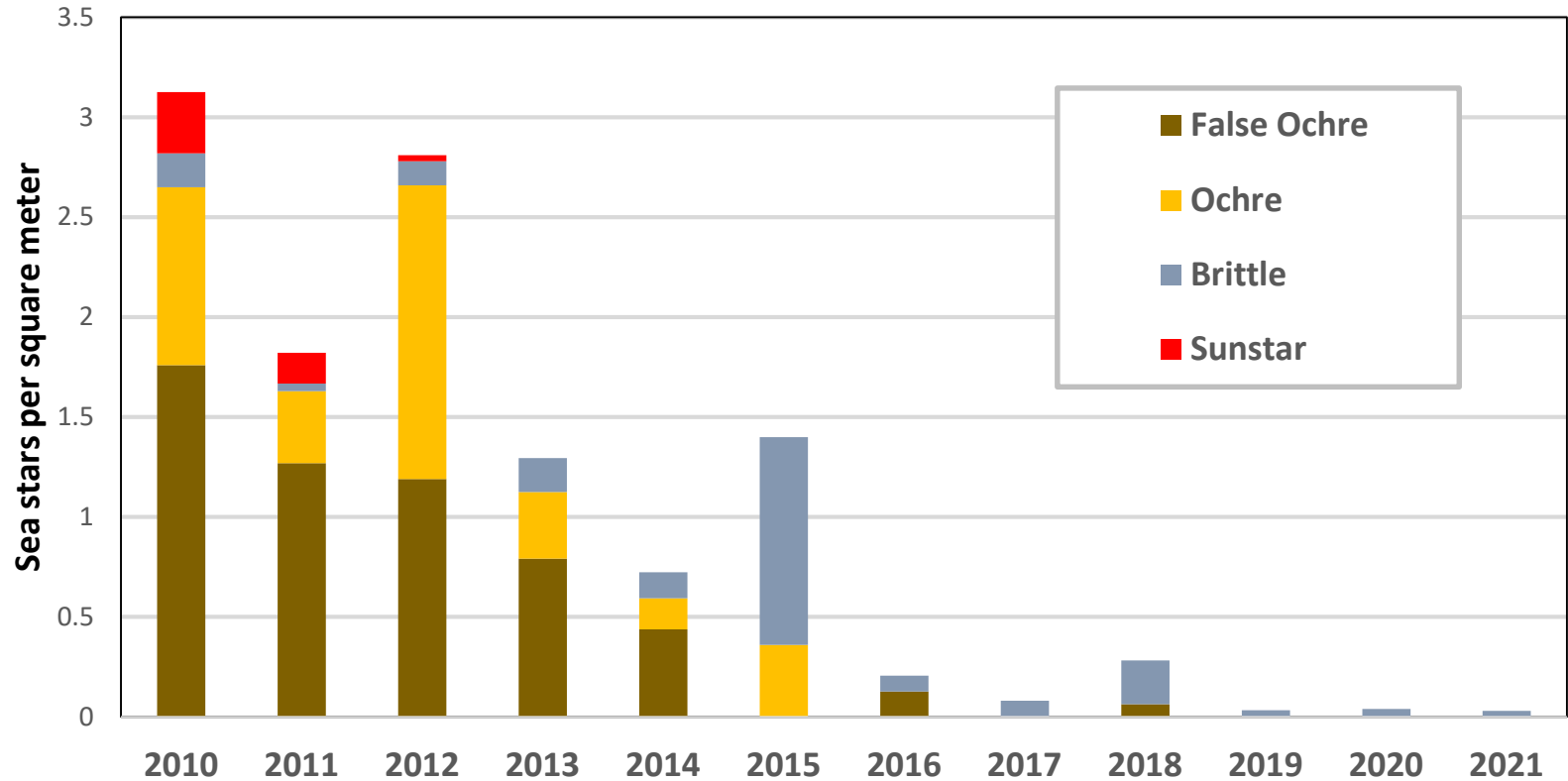
False Ochre Star

Habitat conditions

During the same period, juvenile sea stars in the cobble beaches at Indian Island have declined in numbers as well as diversity – at least in part for the same reason, which is disturbance by visitors. Sea slug diversity also fell.

Seastars beneath beach cobbles

Mean annual per square meter, Indian Island



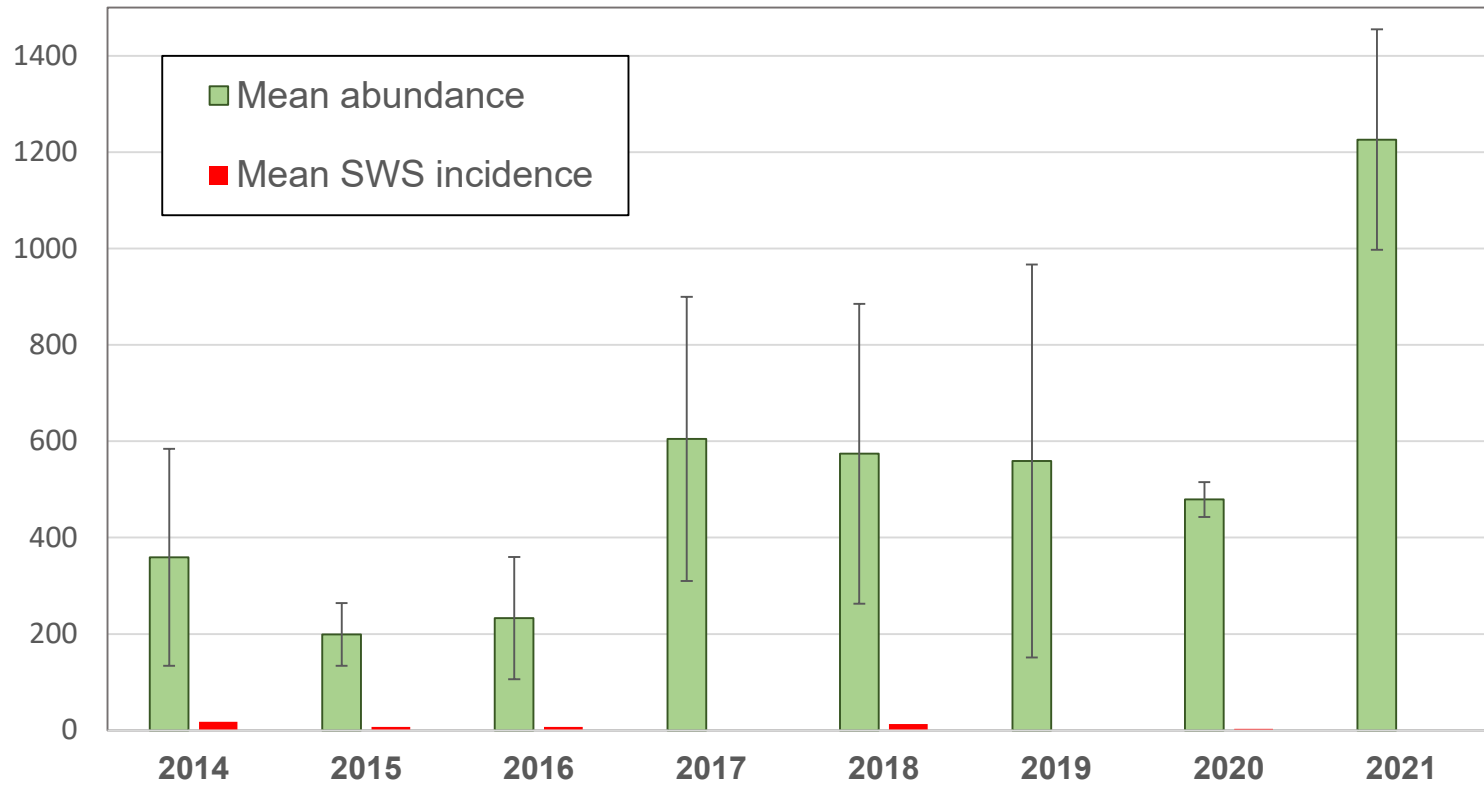
Short-Spined Star



Climate and marine disease

Sea star numbers and diversity were also presumably affected by warmer water as well as Seastar Wasting Syndrome (SWS). But Ochre Stars, which are adapted to being exposed between tides, recovered fully from SWS.

Ochre star abundance and SWS Indian Island 2014-2021



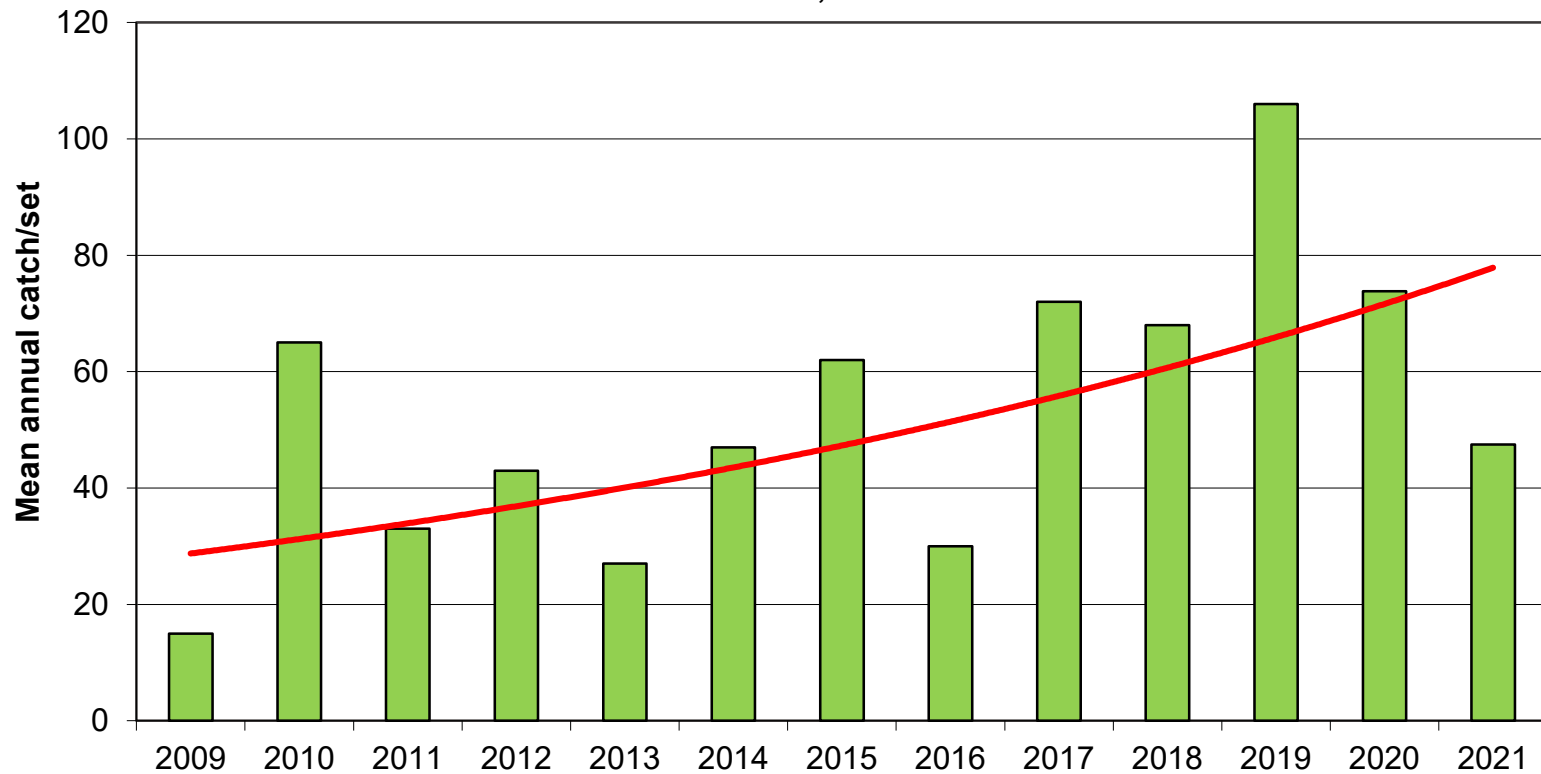
Climate change and fish

In 2021, extreme heat appears to have reversed the upward trend of fish species that visit Indian Island each summer to spawn in eelgrass meadows or in the rocky subtidal zone.



Bay Pipefish

Bay pipefish abundance Indian Island, 2009-2021

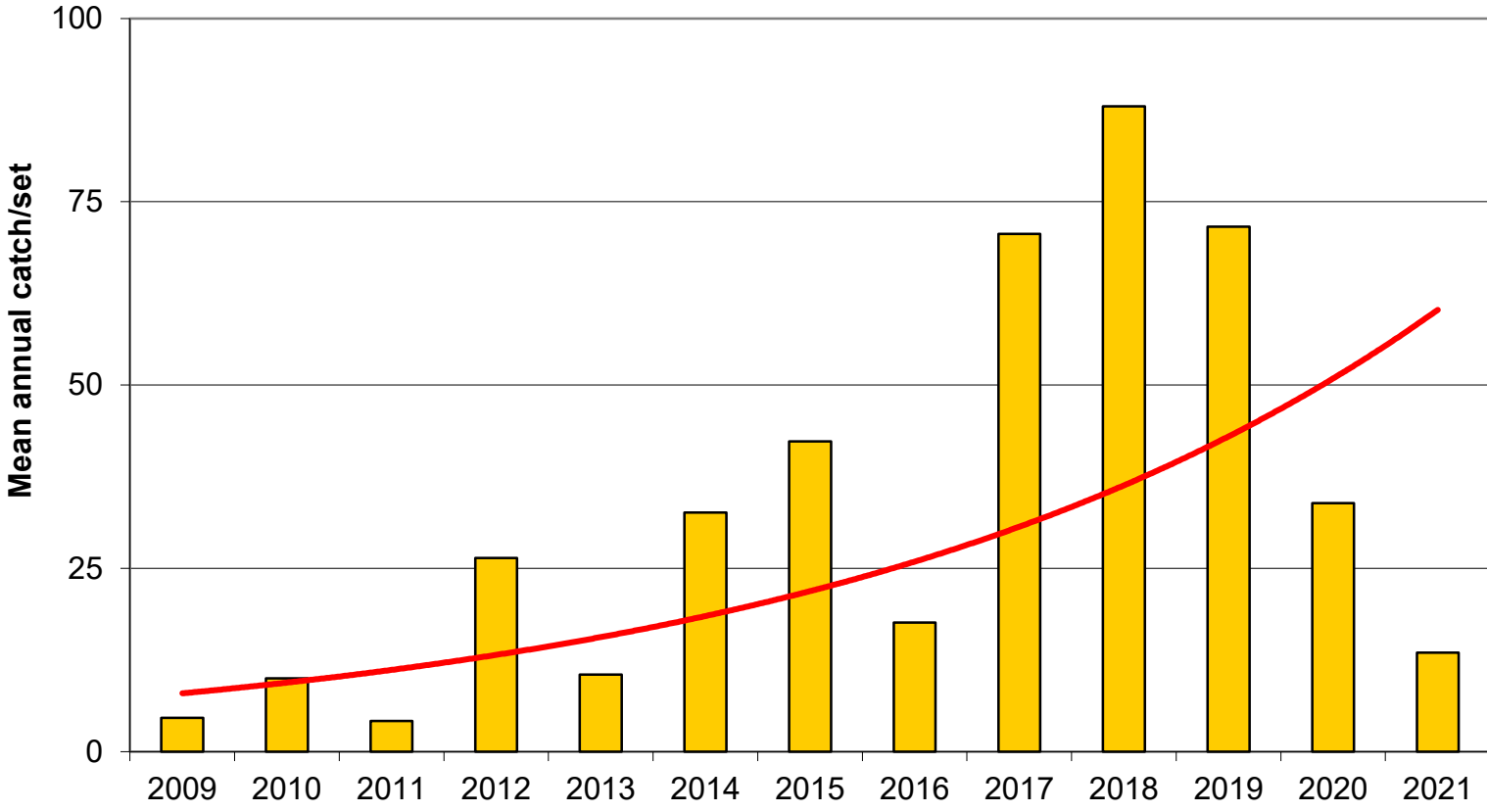




Plainfin Midshipman

Plainfin Midshipmen abundance

Indian Island, 2009-2021

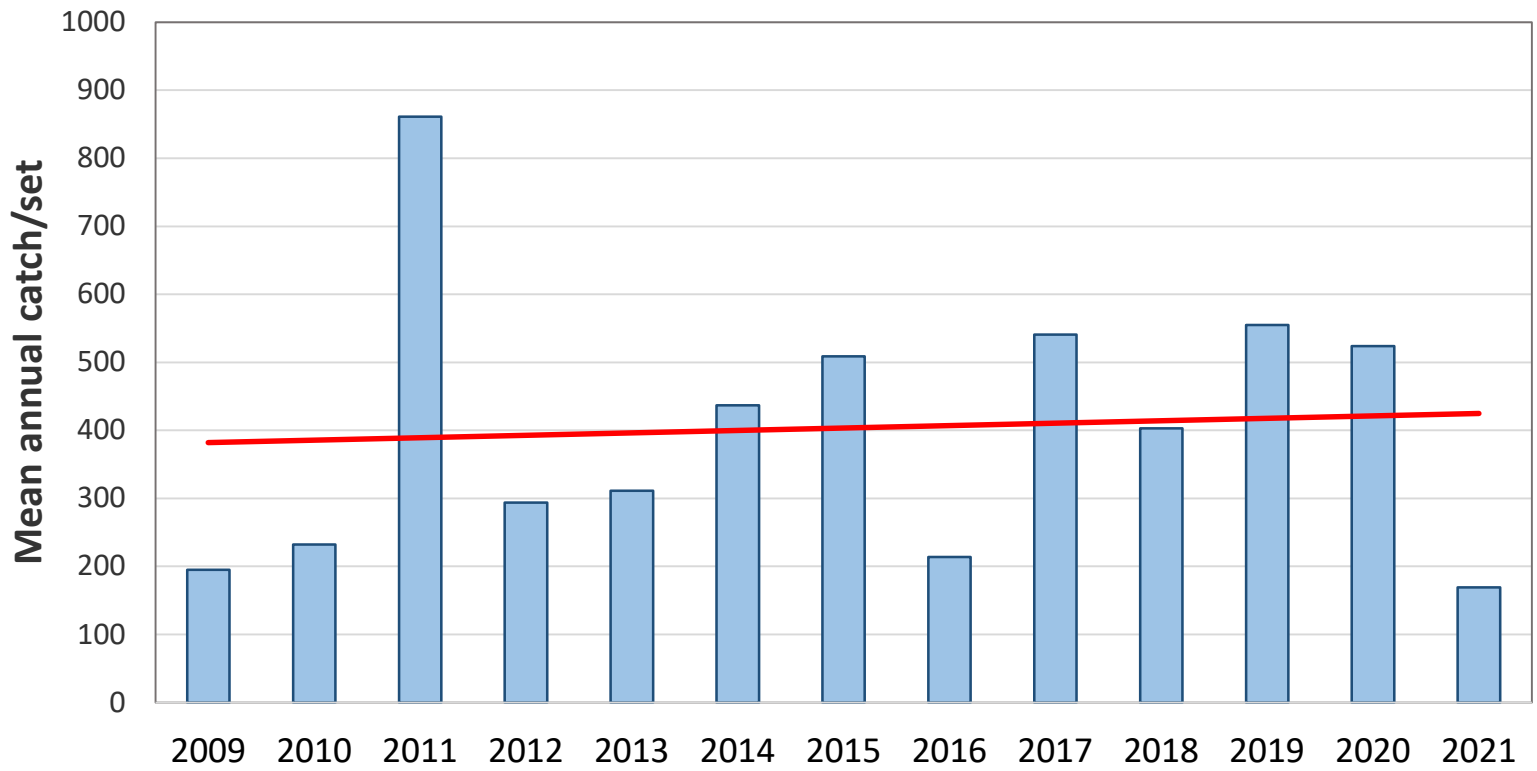


Shiner Perch



Shiner perch abundance

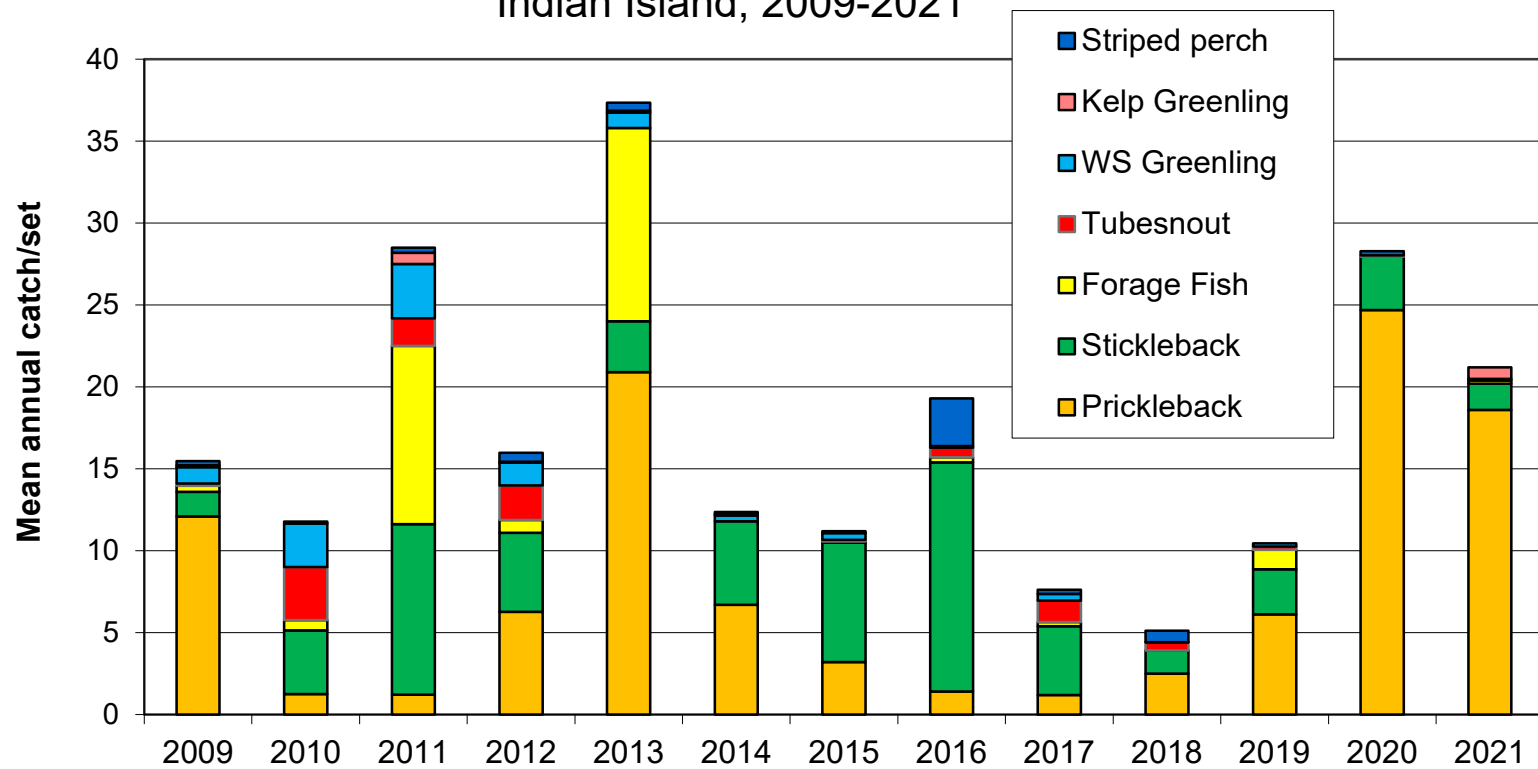
Indian Island, 2009-2021



Climate change and fish

Overall, the diversity of fishes in Fishing Bay has declined since monitoring began in 2009. This includes resident species as well as migratory species that only visit Fishing Bay to spawn.

Fish diversity and abundance Indian Island, 2009-2021



Herring



**Striped
Perch**



Tubesnout



**White-spotted
Greenling**





Grunt Sculpin

6/29/2008

N



Image U.S. Geological Survey

Google earth



1998

Imagery Date: 5/31/2008 48° 41.547' N 122° 54.481' W elev 21 ft eye alt 363 ft

Terrestrial biodiversity

Human disturbance continues to be a concern for the wildflowers and birds of Indian Island, as well, despite a marked trail, signs, and over 300 person hours of docent “presence” every summer.



Drivers of change

- **Warming seas, heat waves**
Reduced diversity of fishes
Emigration of sea stars, sea slugs
- **Urban runoff, contaminants, turbidity**
Thinning of deeper eelgrass
Decline of “hard-shell” clams
- **Increasing human activity, trampling**
Decline of crab nurseries
Stress on all intertidal organisms



Challenges

- **Multiple jurisdictions**
BLM, WDNR, Land Bank, Parks, Public Works, Lummi Nation, private owners
- **Lack of an bay-scale goal or plan**
Inconsistencies over what is protected...
and for whose benefit
- **Lack of adequate financial resources**
Reliance on annual donations, volunteers



What can we do?

**Improve upstream filtration of
Eastsound road runoff**

**Provide better signage and guidance
for visitors to the beaches and island**

**Seek Aquatic Reserve status for the
bay and beaches as a whole**