Rockin' Around the Clock:
Exploring diel activity differences in Young of Year Rockfish in the Salish Sea

South Sound Science Symposium 2024

Presented By:
Stena Troyer, Science Director
Harbor WildWatch

Harbor WildWatch

MISSION & MOTTO

Education & Outreach

Participatory Science

Marine Life Center

Learn.
Have Fun.

Mission

Harbor WildWatch is dedicated to inspiring stewardship of the Puget Sound and greater Salish Sea by providing learning opportunities to the people of our local community and beyond.

Rockfish

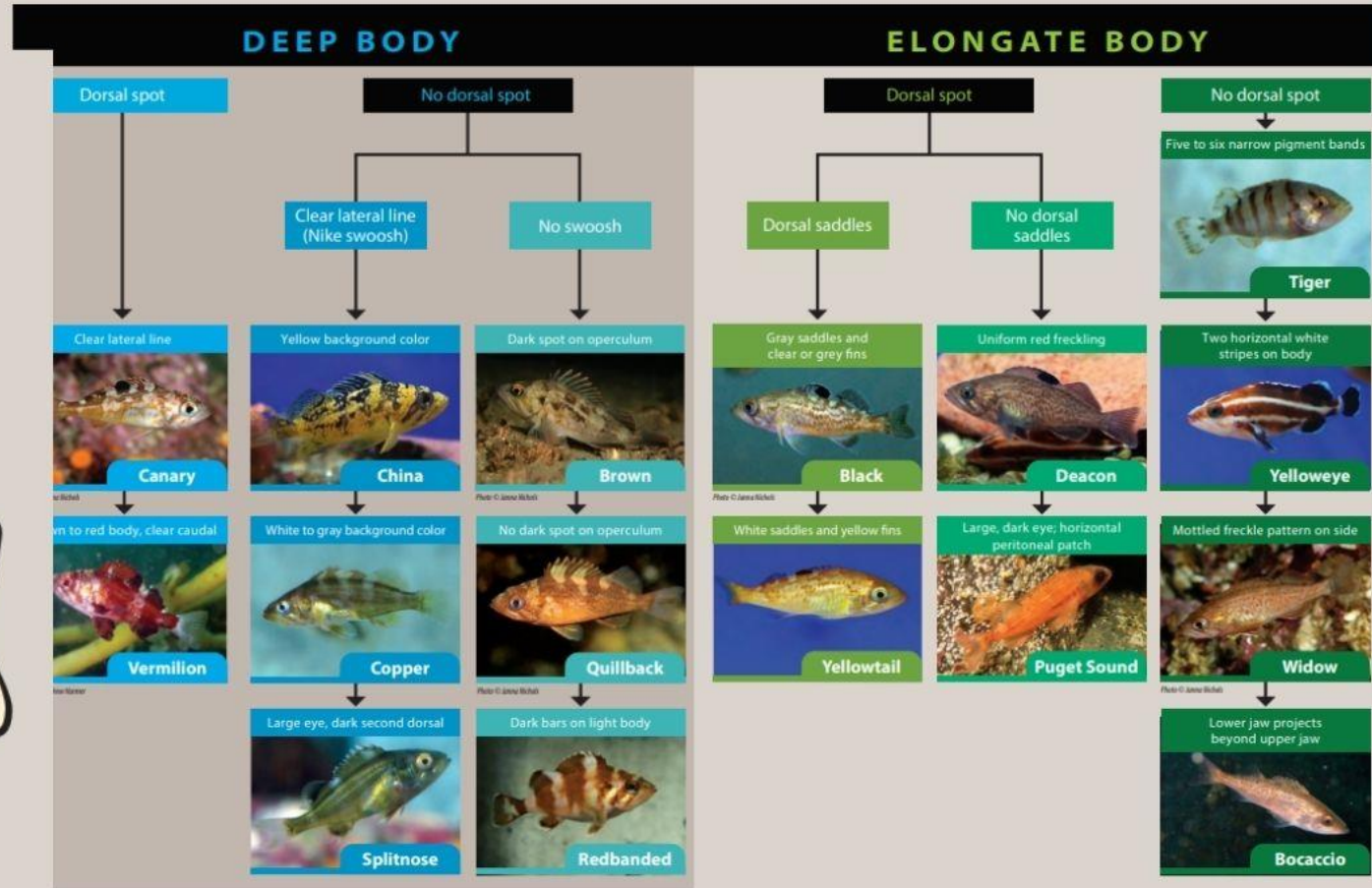**28 Species in the Salish Sea**
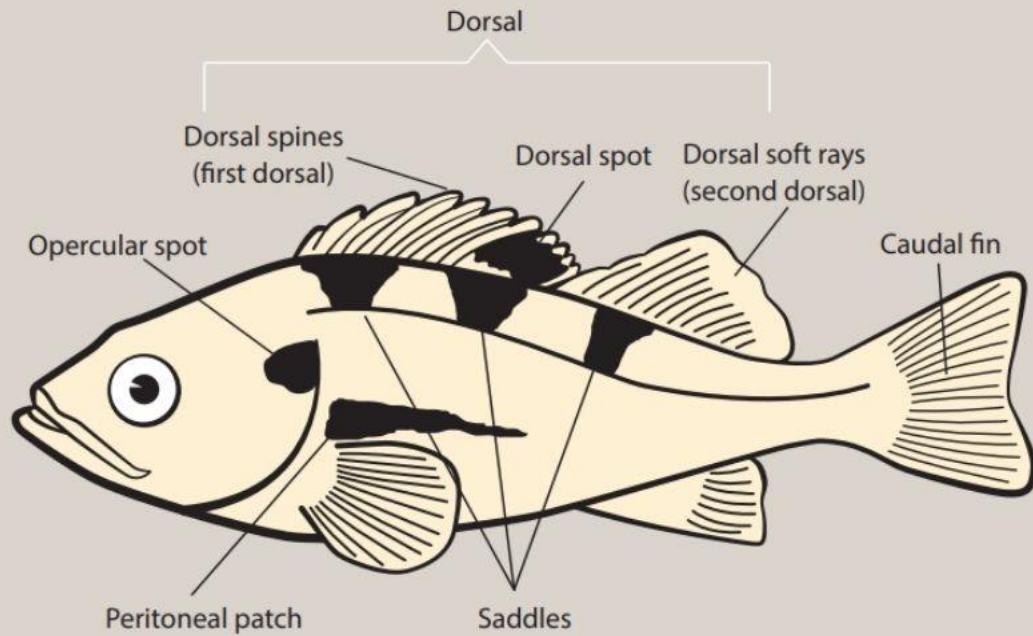
Long lived and slow to reproduce

Commercially Important

Overharvest has led to listings of certain species

Young-of-Year Rockfish

DEEP BODY

ELONGATE BODY

Anatomy Diagram

inch

0   1   2   3

Dorsal

Dorsal spines
(first dorsal)

Dorsal spot

Dorsal soft rays
(second dorsal)

Caudal fin

Opercular spot

Peritoneal patch

Saddles

DEEP BODY

Dorsal spot

- Clear lateral line → **Canary**
- wn to red body, clear caudal → **Vermilion**

No dorsal spot

- Clear lateral line (Nike swoosh)
  - Yellow background color → **China**
  - White to gray background color → **Copper**
  - Large eye, dark second dorsal → **Splitnose**
- No swoosh
  - Dark spot on operculum → **Brown**
  - No dark spot on operculum → **Quillback**
  - Dark bars on light body → **Redbanded**

ELONGATE BODY

Dorsal spot

- Dorsal saddles
  - Gray saddles and clear or grey fins → **Black**
  - White saddles and yellow fins → **Yellowtail**
- No dorsal saddles
  - Uniform red freckling → **Deacon**
  - Large, dark eye; horizontal peritoneal patch → **Puget Sound**

No dorsal spot

- Five to six narrow pigment bands → **Tiger**
- Two horizontal white stripes on body → **Yelloweye**
- Mottled freckle pattern on side → **Widow**
- Lower jaw projects beyond upper jaw → **Bocaccio**

Young-of-Year Monitoring

Diel Comparisons

Roving Surveys

Time Lapse Cameras

SCUBA SURVEYS

Timed roving surveys based on depth and habitat type
Involving recreational divers since 2014!

You can help save endangered rockfish!

NOAA is trying to learn about long-term trends in juvenile rockfish and needs the help of citizen divers to collect data.

You can help in one of two ways:

- Report any sightings of bocaccio, yelloweye or canary rockfish to **rockfishID@noaa.gov** and include picture, location and date information.
- Participate in the broader monitoring program outlined in this pamphlet and collect data during your regular dive trips in Puget Sound.

SAFETY FIRST! Participation is purely voluntary and not affiliated with the NOAA dive program.

SAMPLING METHOD:

Surveys are completed using a timed roving dive survey: Divers swim through a single habitat type and record young-of-year (YOY) rockfish by two morphological traits (body shape and dorsal spot presence/absence), basic habitat information and the survey duration.

A more detailed methods document and datasheets are available on the NOAA website at **westcoast.fisheries.noaa. gov/protected_species/rockfish/citizen_science_yoy_ rockfish_photo.html**, or scan the QR code on the back.

**SURVEY ZONE:**
One habitat type and depth bin.

SURVEY PATH:
One meter on each side of swimming path and one meter off the substrate.

Share your results at rockfishID@noaa.gov

TIP For surveys in kelp habitats that reach the surface, a survey should be run through the canopy (<2m from surface) for every survey along the bottom.

If kelp doesn't reach the surface, do a second survey at that depth.

📹 Diver 1 records all YOY (< 10 cm)
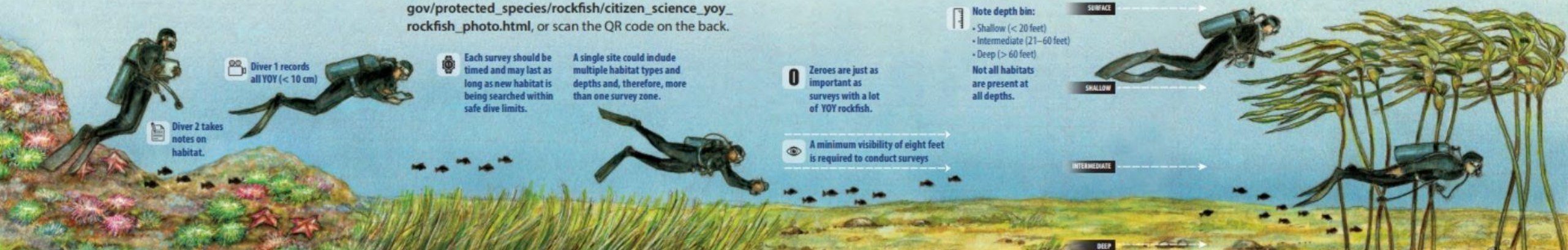
📄 Diver 2 takes notes on habitat.

⏱ Each survey should be timed and may last as long as new habitat is being searched within safe dive limits.

A single site could include multiple habitat types and depths and, therefore, more than one survey zone.

0 Zeroes are just as important as surveys with a lot of YOY rockfish.

👁 A minimum visibility of eight feet is required to conduct surveys

📏 Note depth bin:
- Shallow (< 20 feet)
- Intermediate (21–60 feet)
- Deep (> 60 feet)

Not all habitats are present at all depths.

SURFACE

SHALLOW

INTERMEDIATE

DEEP

ROCKY REEF SURVEY ZONE | **EELGRASS SURVEY ZONE** | **SOFT BOTTOM SURVEY ZONE** | **KELP FOREST SURVEY ZONE**

SCUBA Surveys
As of end of September 2024

Total Survey Minutes

Year	Minutes
2015	210
2016	270
2017	791
2018	1684
2019	4015
2020	3774
2021	11348
2022	15498
2023	31781
2024	23467
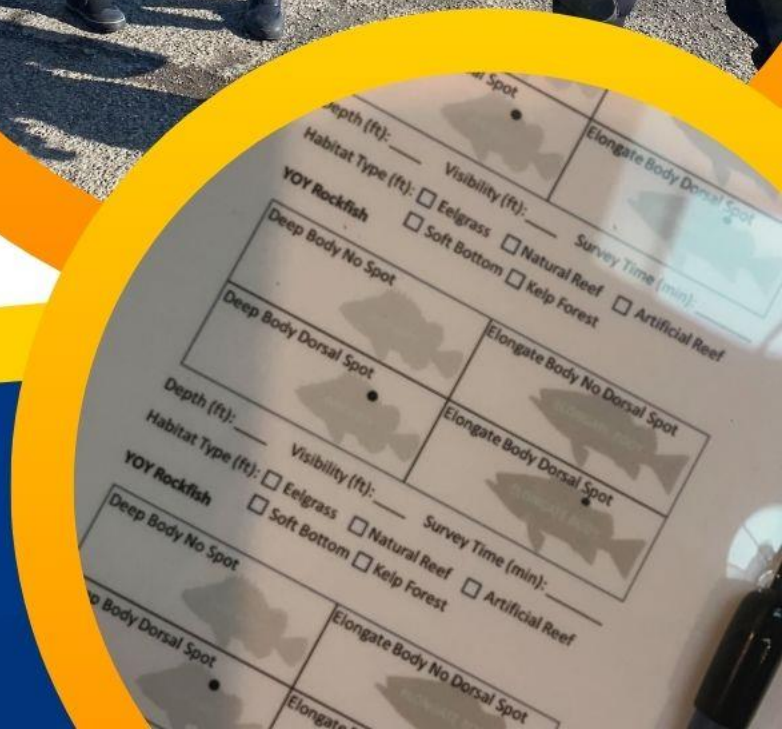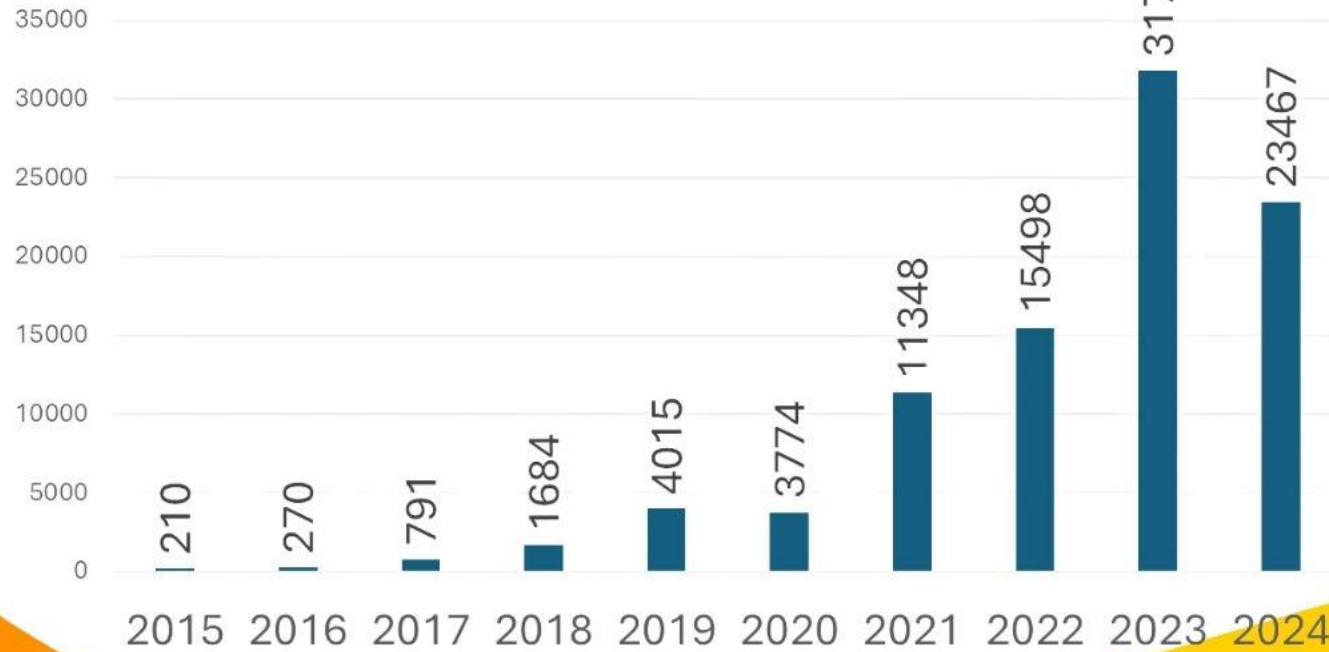
Quantifying the Investment Period in a novel Citizen Science Program:
A Case Study from Cold Water SCUBA Surveys

Diel Dives

Comparing fish activity at sites in the day vs night

DAY TIME

NIGHT TIME...

Diel Dives
As of end of September 2024

30 Diel Dives at 13 Sites

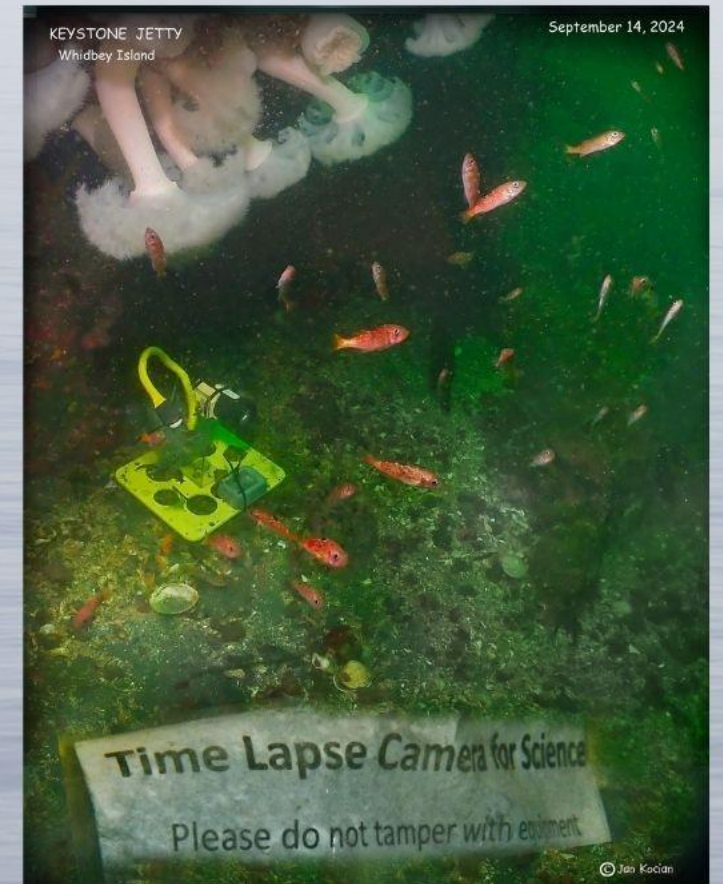**318 transects**

Over 2665 survey minutes

Significant difference for certain species

Time Lapse Cameras

Capture a photo every ten minutes for duration of deployment

Time Lapse Cameras
As of end of September 2024

13 out of 39 deployments processed

Over 19,000 images reviewed to date

No difference in encounter rate detected across diel periods

Washington Department of FISH and WILDLIFE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION · NOAA · U.S. DEPARTMENT OF COMMERCE

Cheers to camera guru Bill too!

Preliminary Results

Teamwork makes the dream work - increased involvement, increases data

- **This work REQUIRES a Buddy**
  Volunteers ROCK

- **Diel Dives**
  Significant difference for certain species

- **13/39 TLC Deployments Analyzed**
  No difference in encounter rate detected across diel periods

- **Informing Rockfish Recovery**
  Results will improve the long-term monitoring protocol

Conclusion

Results will refine quantitative analyses and improve the long-term monitoring protocol as it informs rockfish recovery in the Salish Sea.

Pacific Ocean

Desolation Sound

Salish Sea Basin

Vancouver Island

N. Gulf Islands

Strait of Georgia

Vancouver

Fraser River

The

S. Gulf Islands

Strait of Juan de Fuca

Skagit River

San Juan Islands

Puget Sound

Olympic Peninsula

Seattle

Cascade Range

Nisqually River

Salish Sea

Salish Sea

Pacific Ocean

Vancouver Island

Desolation Sound

N. Gulf Islands

Salish Sea Basin

Strait of Georgia

Vancouver

Fraser River

S. Gulf Islands

The

Strait of Juan de Fuca

Skagit River

San Juan Islands

Olympic Peninsula

Puget Sound

Seattle

Cascade Range

Nisqually River

Primary Habitat
- Artificial Reef
- Eelgrass
- Kelp Forest
- Natural Reef
- Soft Bottom

Total Survey Events
- 1
- 20
- 40
- 64