



Workshop Outline

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3. [Most Days Fished](#)
4. [Recaptures](#)
5. [Marine Heatwaves Study](#)
6. [Vermilion Rockfish](#)
7. [IGF1 \(Hormone\) Study](#)
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11. [Smallest Fishes Caught](#)
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Goals Of CCFRP

- ➡ To collaborate with commercial and recreational anglers, resource managers, and other stakeholders to collect fisheries data
- ➡ Use this fisheries data to better inform resource management decisions about California fisheries
- ➡ To evaluate the effect of California's MPAs on groundfish populations relative to areas open to fishing
- ➡ Explore the relationship between oceanographic conditions and groundfish ecology



Summary of the 2019 Fishing Season

- Total caught fishes: 4,706
- Total number of trips: 12
- Total number of anglers: 45



Where Are They Now

- Rose Dodgen, M.Sc., Graduated March 2020, SeaGrant Fellowship with the Fish and Game Commission



- Deanna Kelsey, B.S., Graduated June 2019, CDFW port sampler, working locally

- Peter Vanderbloomer, B.S., June 2019, scientist for Tenera Environment Inc.



Total Fishes Caught

Angler	Total Number Fishes Caught
Phil Ellis	3602
Jim Webb	3539
Marcy Dorflinger	3369
Bill McKinney	2520
Ralph Boone	2495
Cal Poly	2199
Tim Davis	1880
Mike Blackstone	1809
Eddie Gomez	1737
Jason Anderson	1584

Total Fishes Caught

3602



3539



3369



2520



1809



1880



2459



1737



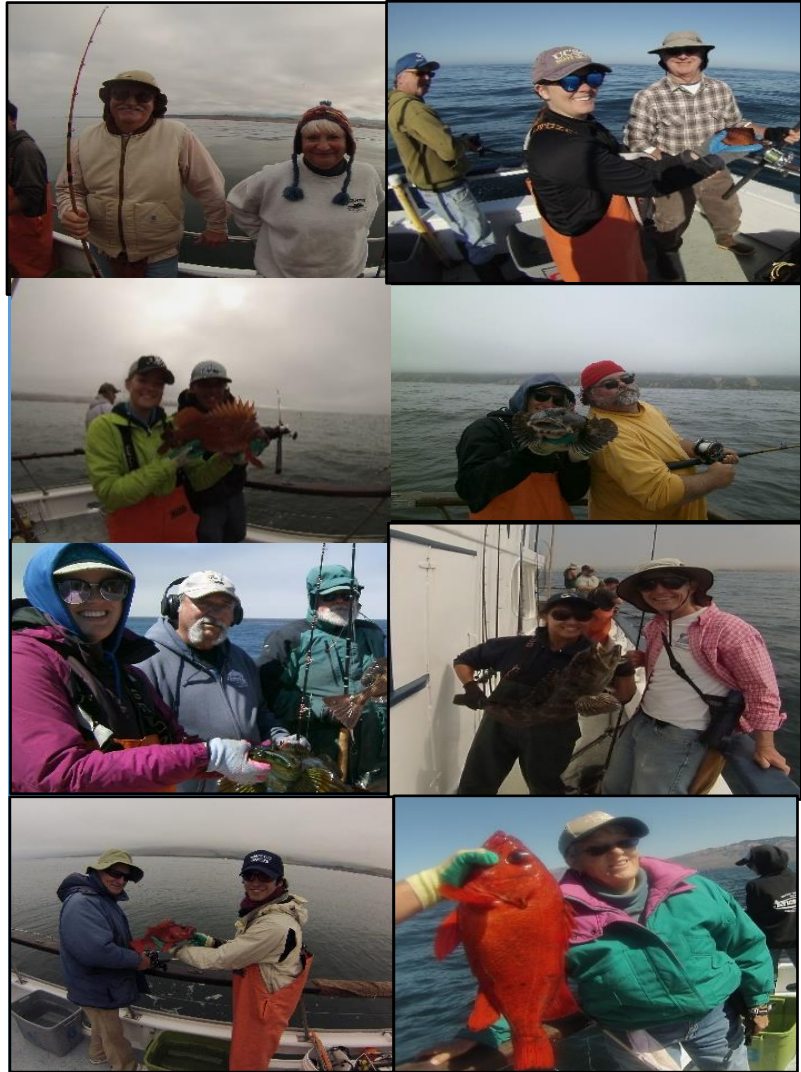
1584



Most Days Fished

Angler Name	Days Fished	CPUE (# fishes/ day)
Marcy Dorflinger	130	25.9
Jim Webb	94	37.6
Bill McKinney	82	30.7
Phil Ellis	69	52.2
Cal Poly	66	33.3
Gary Aubuchon	63	18.6
Jeremy Harkins	61	20.3
Tim Davis	61	30.8
Ralph Boone	60	41.5
Ron Gabel	60	24.9
Nancy Aubuchon	55	15.5

Most Days Fished



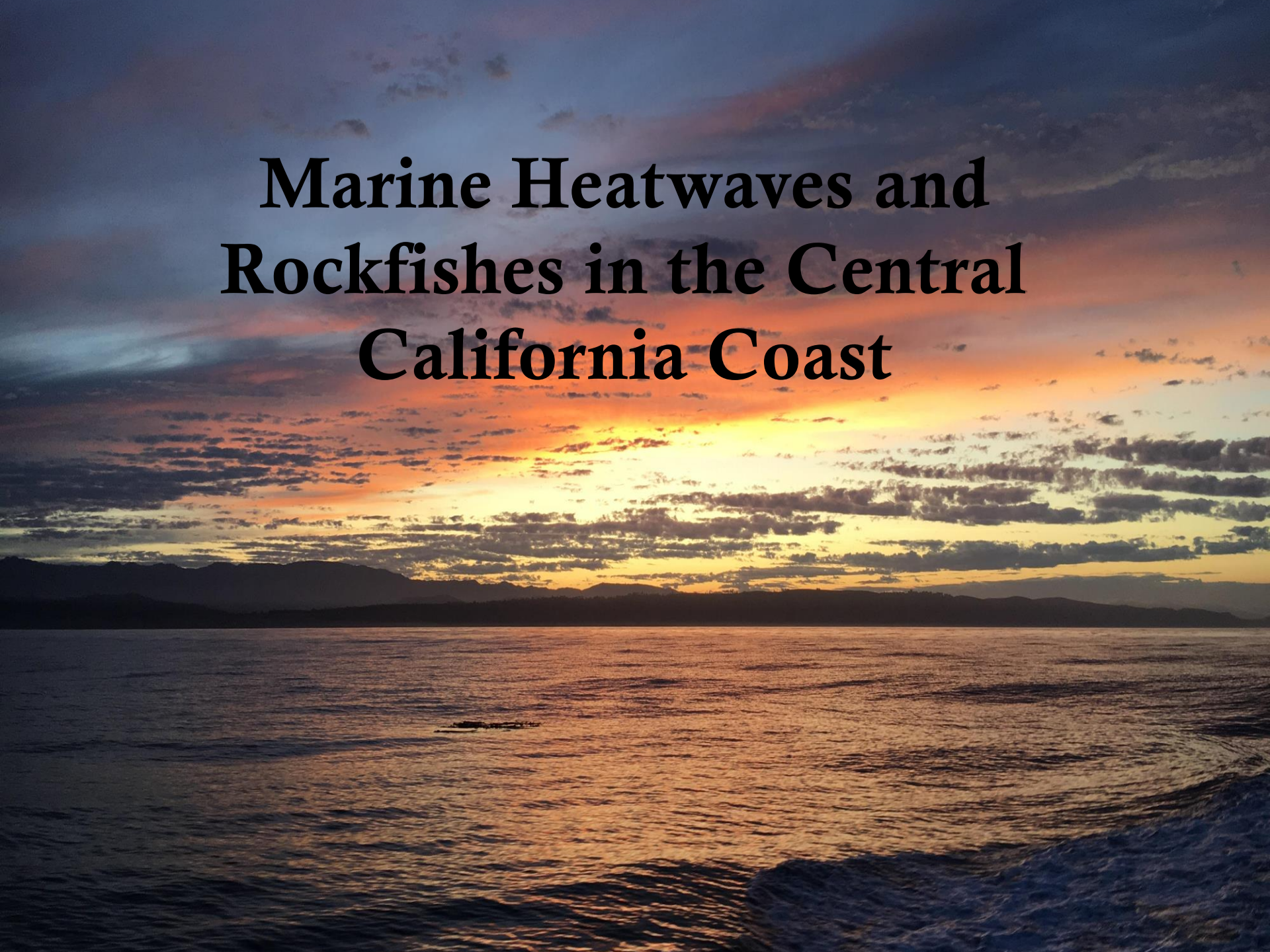
Recaptured Fish

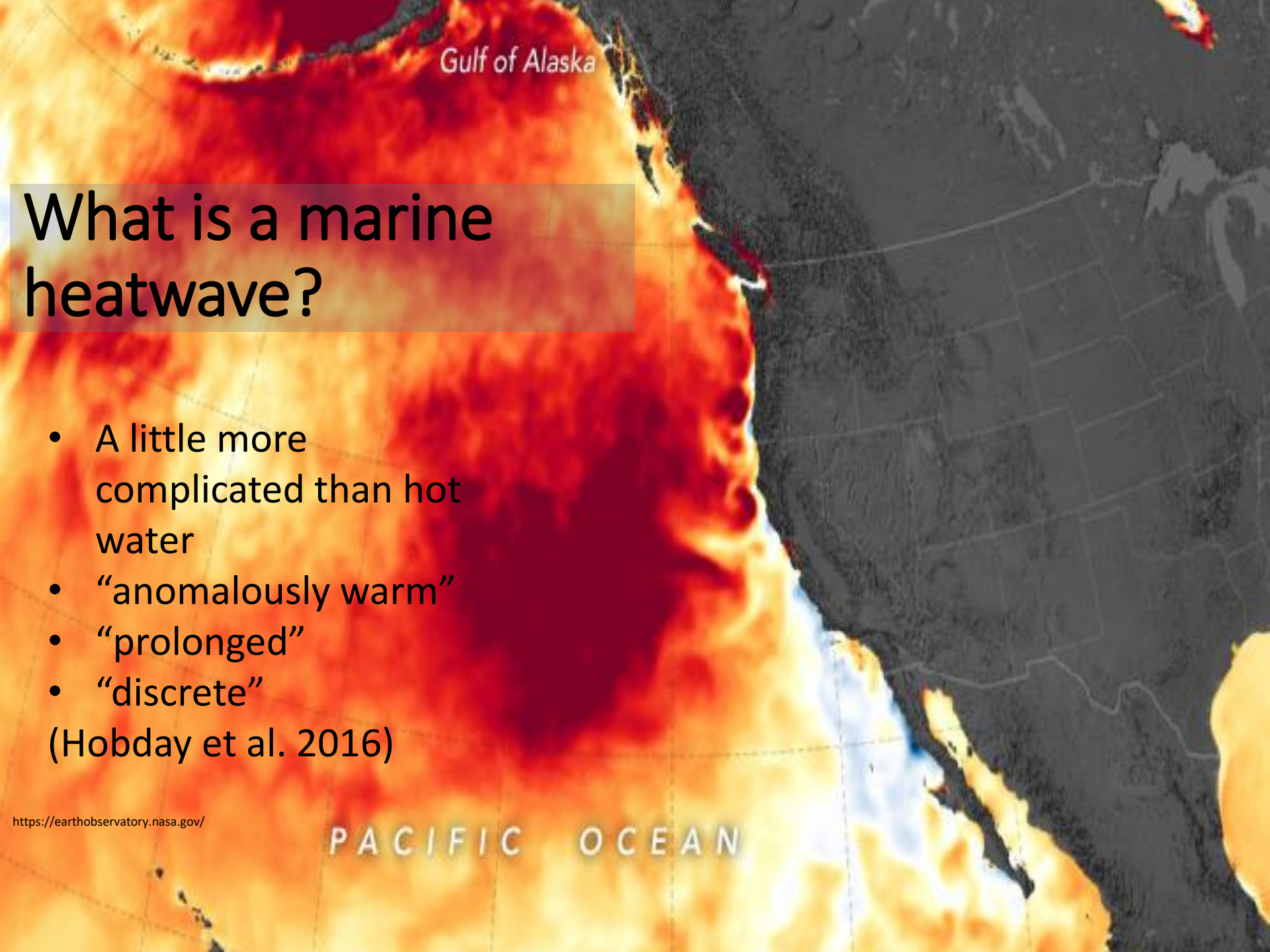
Angler	All Fish	Fish Recaptured
Tim Davis	1880	4
Phil Ellis	3602	3
Marcy Dorflinger	3369	3
Ralph Boone	2495	3
Jim Webb	3539	2
Bill McKinney	2520	2
Mike Blackstone	1809	2
Duane Goudy	1393	2
Gary Aubuchon	1176	2
Virg's	1111	2
Ray Li	543	2
Gary Parks	274	2
Melissa Daugherty	101	2

Recaptured Fish



Marine Heatwaves and Rockfishes in the Central California Coast



A satellite map of the Pacific Ocean showing a large area of warm water (red/orange) off the coast of North America, indicating a marine heatwave. The Gulf of Alaska is labeled at the top. The text 'PACIFIC OCEAN' is visible at the bottom.

Gulf of Alaska

What is a marine heatwave?

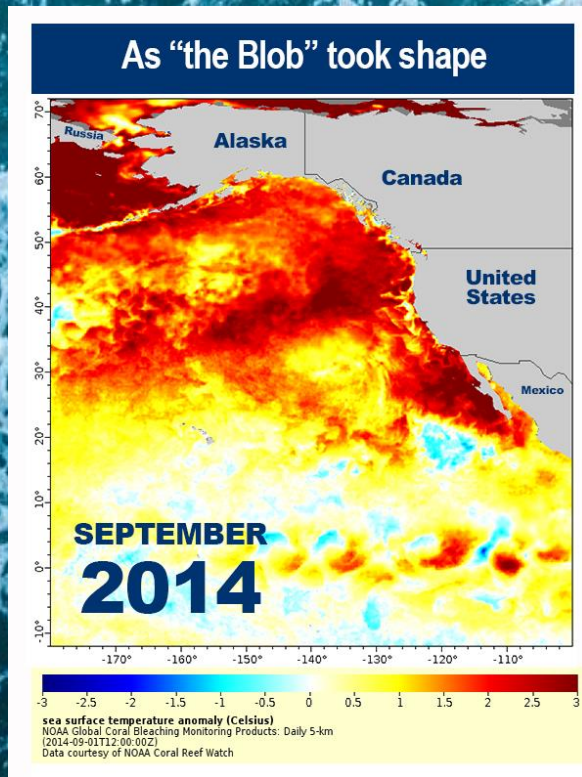
- A little more complicated than hot water
- “anomalously warm”
- “prolonged”
- “discrete”

(Hobday et al. 2016)

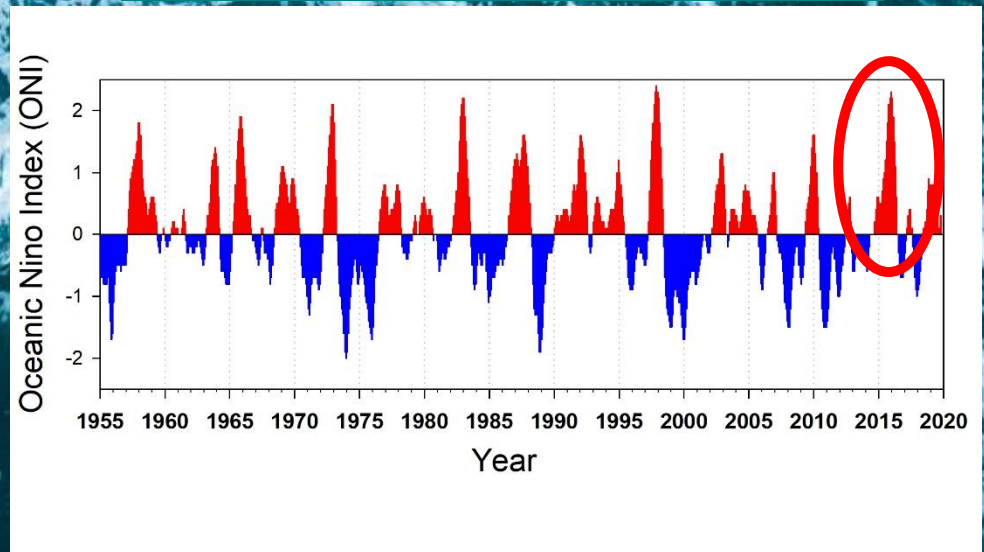
PACIFIC OCEAN

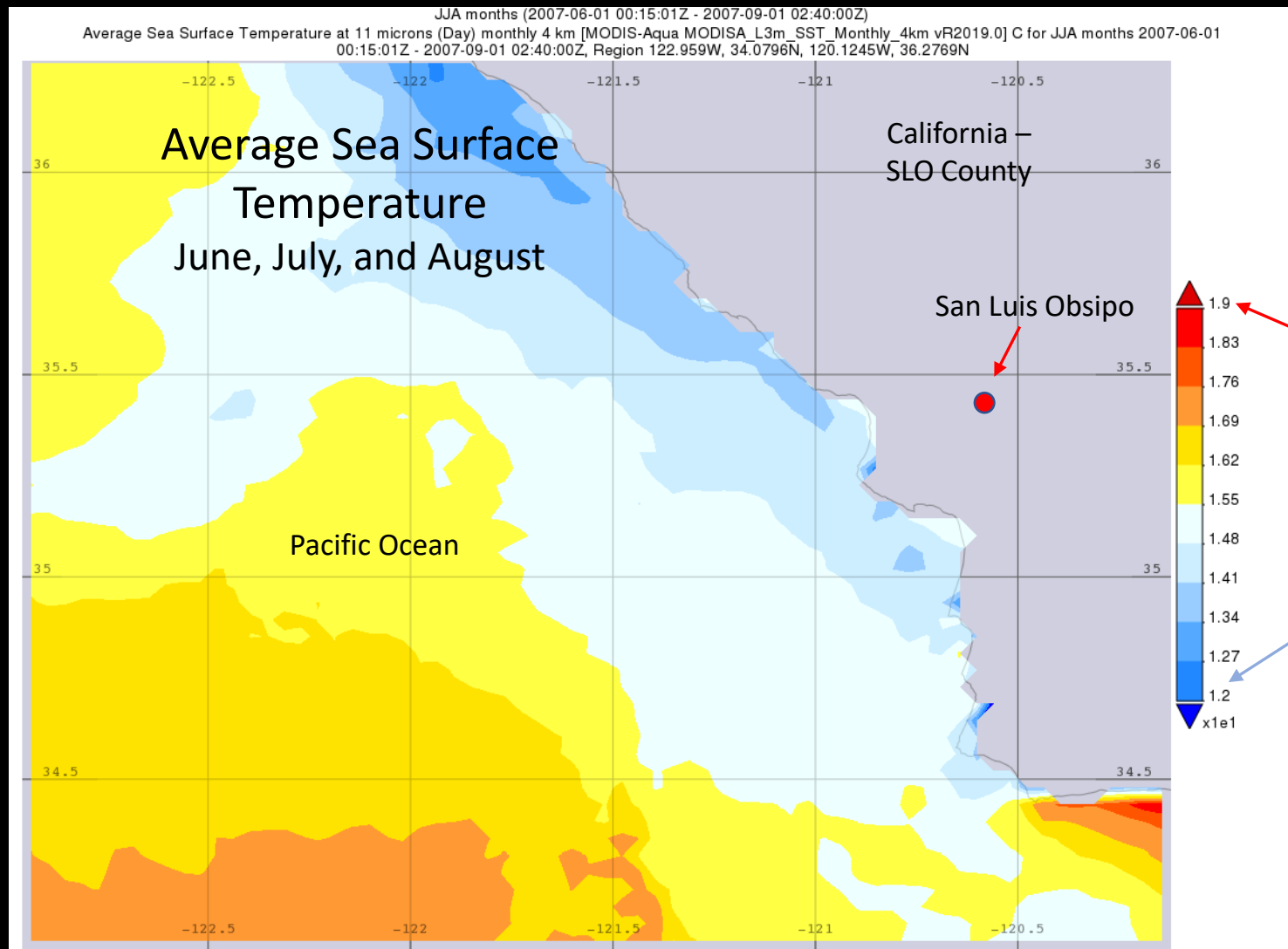
Two events may have contributed

The Blob



El Niño–Southern Oscillation (ENSO)





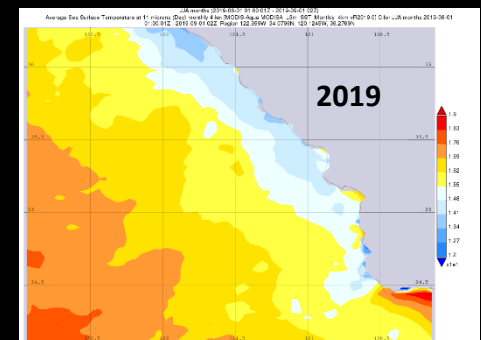
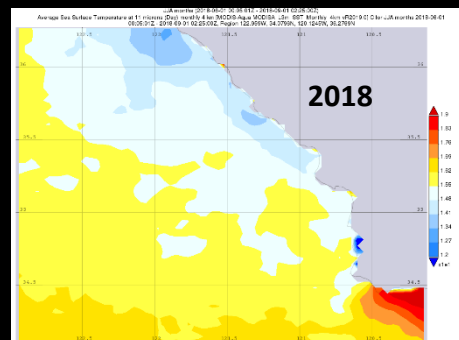
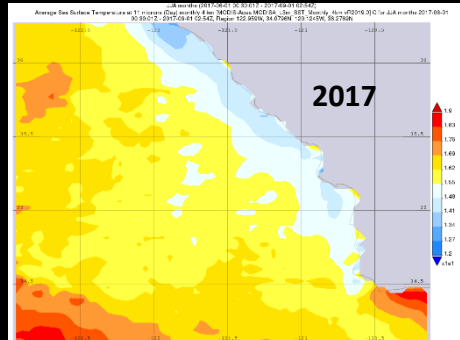
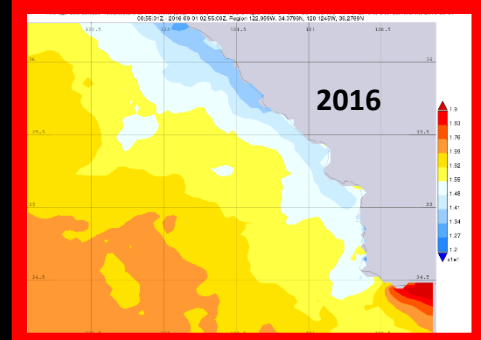
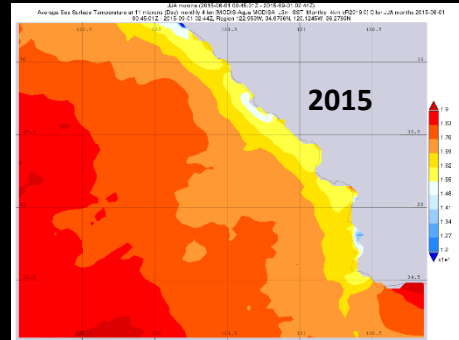
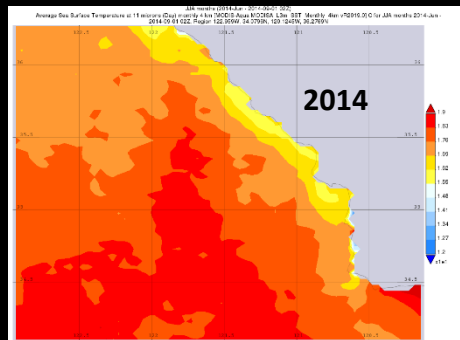
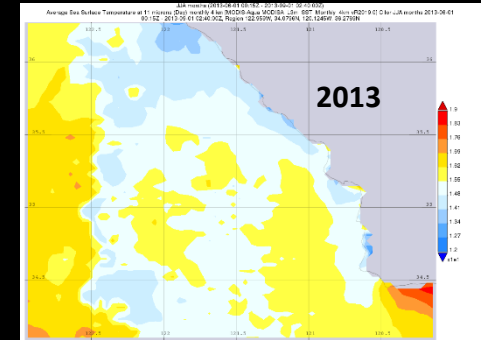
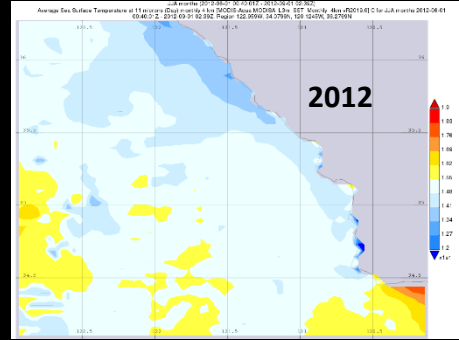
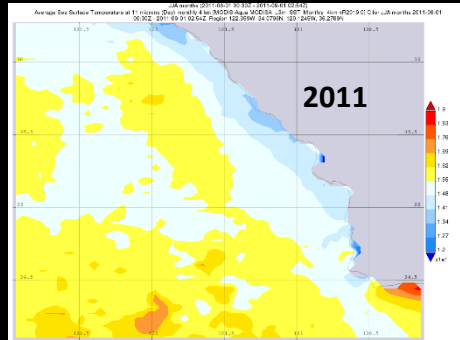
Temperature

19°C ~
66°F

12°C ~
53°F

Average summer
temperatures – June,
July, & August

The Cool Phase



The Post El
Nino Phase

What can our data tell us about changes in catch per unit effort (CPUE) before, during, and after a marine heatwave?

Blue rockfish



Lingcod



Vermilion rockfish



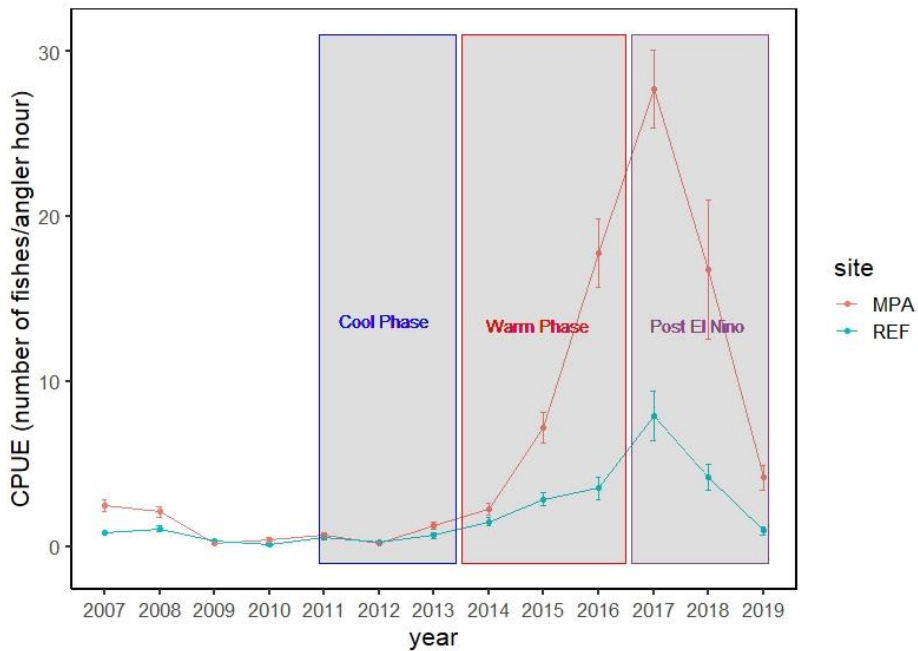
Gopher rockfish



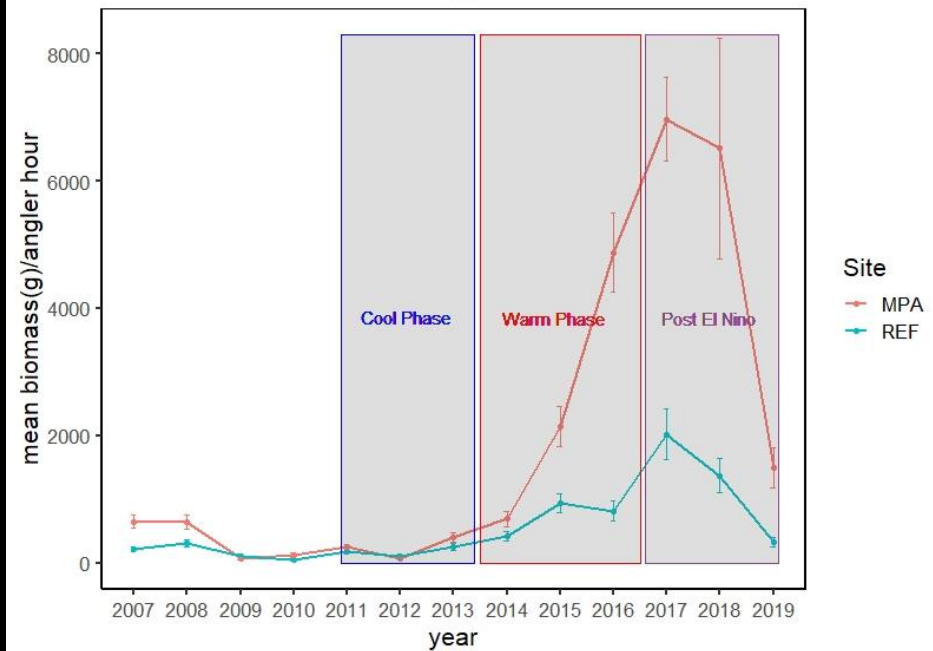


Blue rockfish

Blue Rockfish CPUE Point Buchon



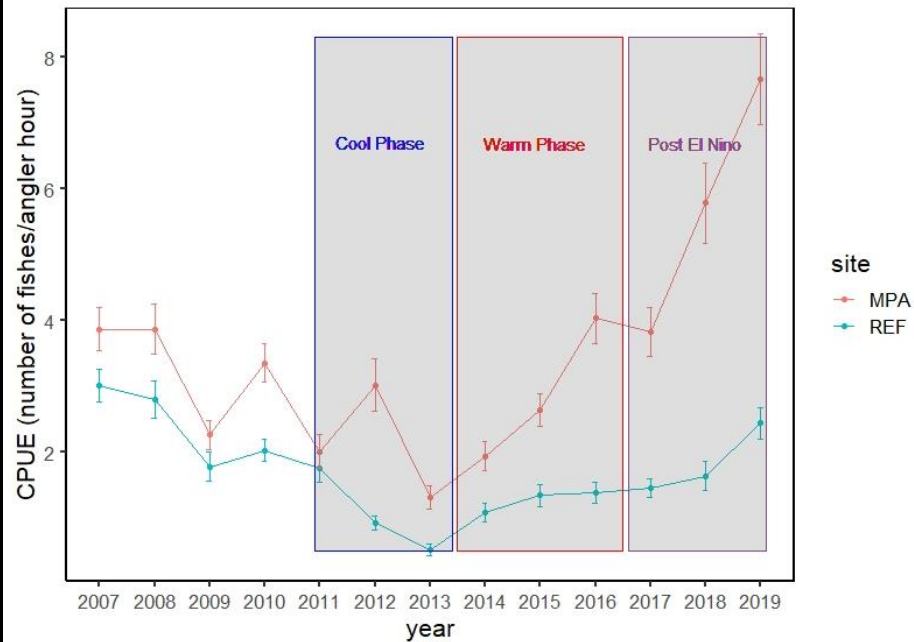
Blue Rockfish Biomass/Angler Hour Point Buchon



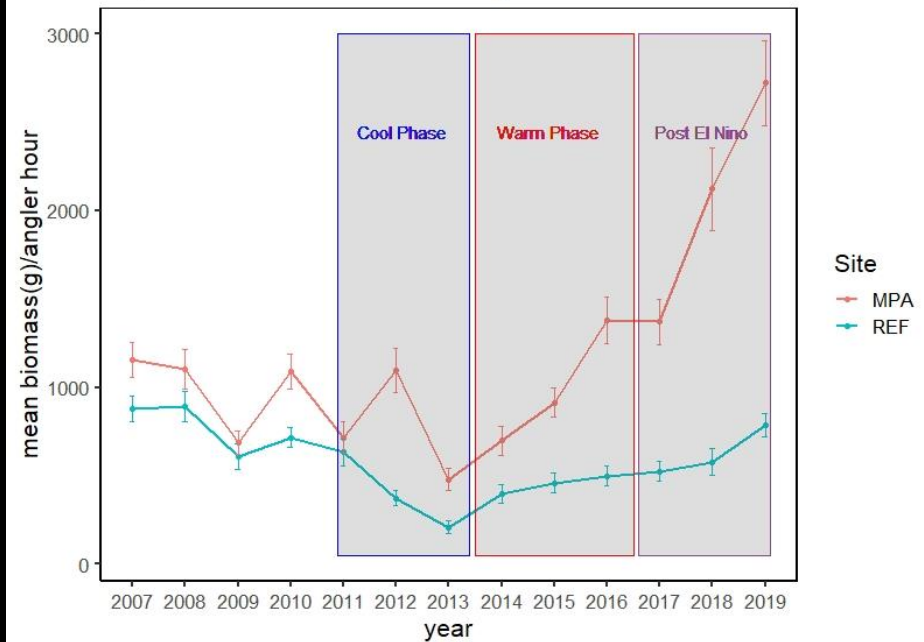


Gopher rockfish

Gopher Rockfish CPUE Point Buchon



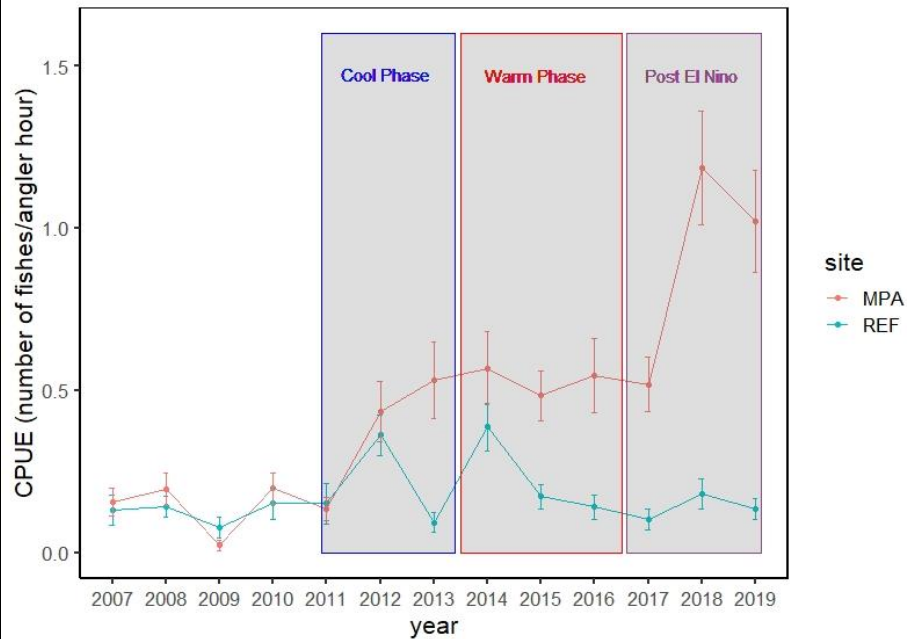
Gopher Rockfish Biomass/Angler Hour Point Buchon



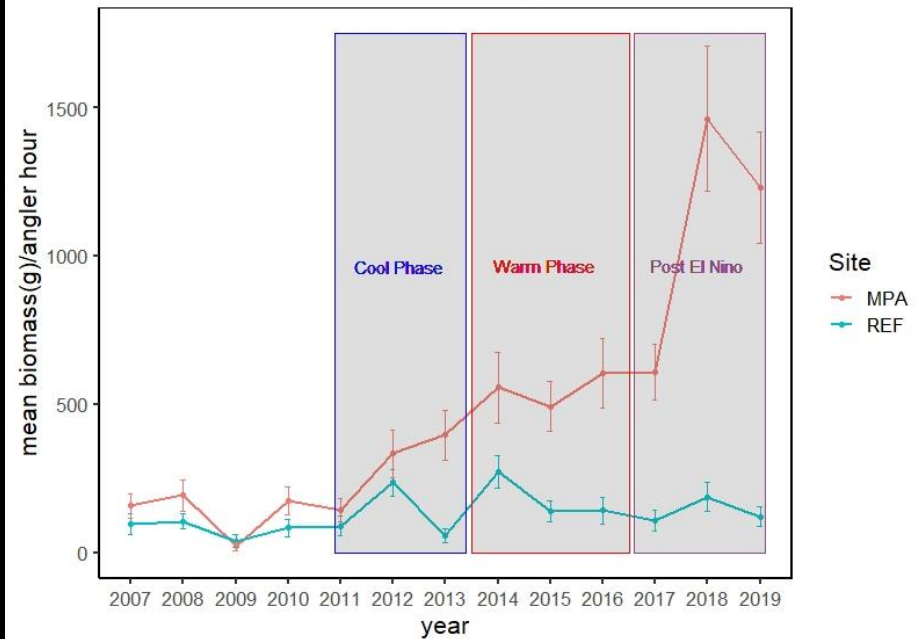


Vermilion rockfish

Vermilion Rockfish CPUE Point Buchon



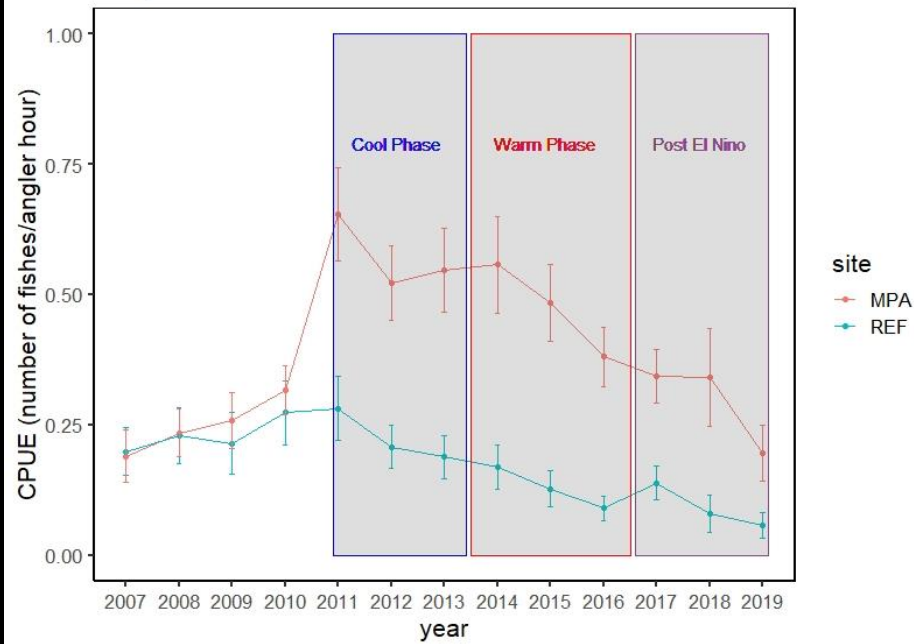
Vermilion Rockfish Biomass/Angler Hour Point Buchon



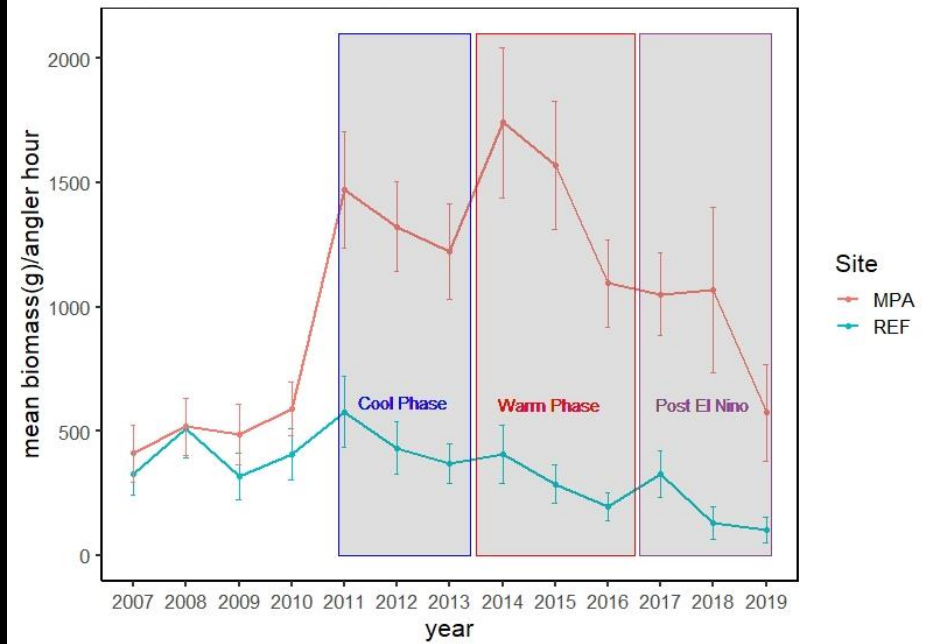


Lingcod

Lingcod CPUE Point Buchon



Lingcod Biomass/Angler Hour Point Buchon



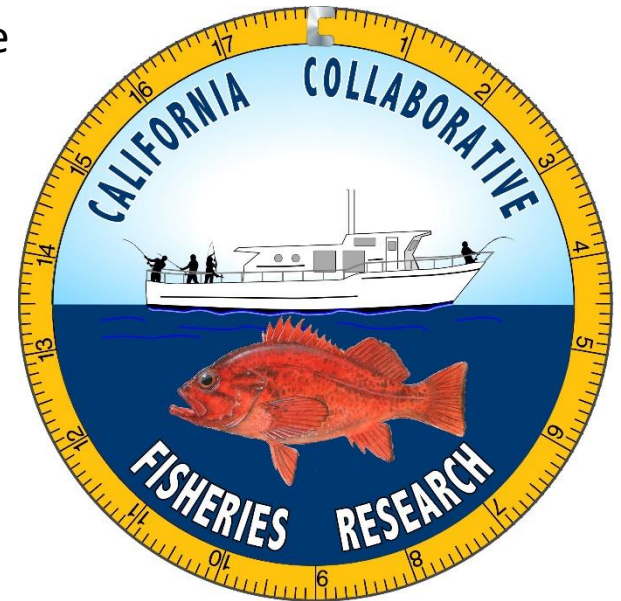
What does this all mean??

The Importance

- Marine heatwave events are expected to increase
- Fisheries management & stock assessments

The Plan

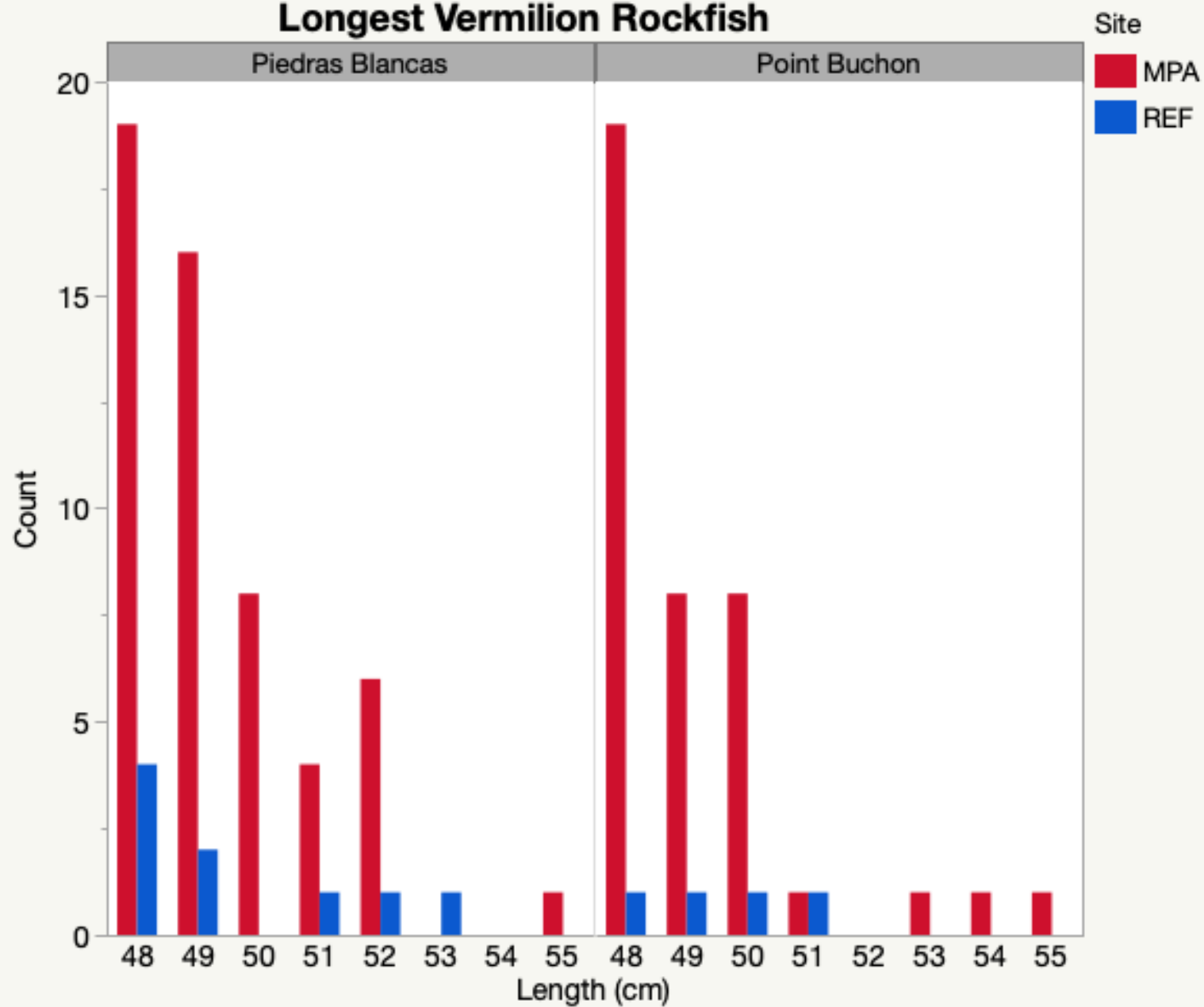
- Oceanographic parameters, food availability
- Look at other fishing areas
- Growth rates



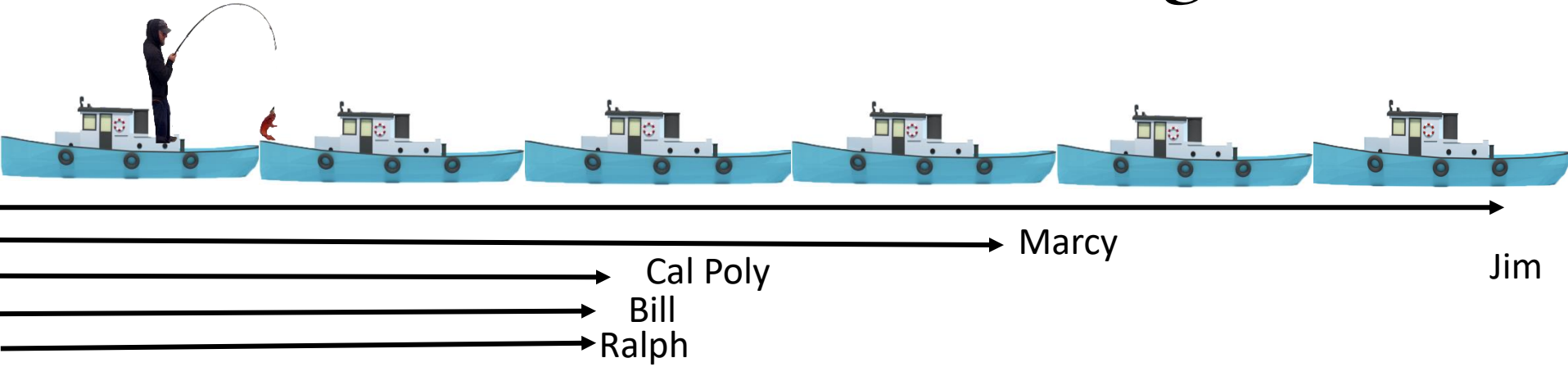
Max Vermilion Rockfish Length

Angler	Year	Site	Area	Max Vermilion RF Length (cm)
Bill Ford ★	2011	MPA	BL	55
Richard Dorflinger ★	2015	MPA	PB	55
Gary Parks ★	2008	MPA	PB	54
Frank Orazio ★	2008	REF	BL	53
Greta Girard ★	2017	MPA	PB	53
Bill McKinney	2014	MPA	BL	52
Bill Walters	2008	REF	BL	52
George Helms	2008	MPA	BL	52
Jim Webb	2008	MPA	BL	52
Jim Webb	2014	MPA	BL	52
Nancy Aubuchon	2013	MPA	BL	52
Roger Yount	2018	MPA	BL	52

Longest Vermilion Rockfish



Total Vermilion Rockfish Length



Angler	Sum of Vermilion RF Length (ft)
Jim Webb	309.53
Marcy Dorflinger	212.77
Cal Poly	123.59
Bill McKinney	121.92
Ralph Boone	120.27



Using the Hormone IGF1 to Explore Variation in Growth Rates of Blue Rockfish

Ellie Brauer



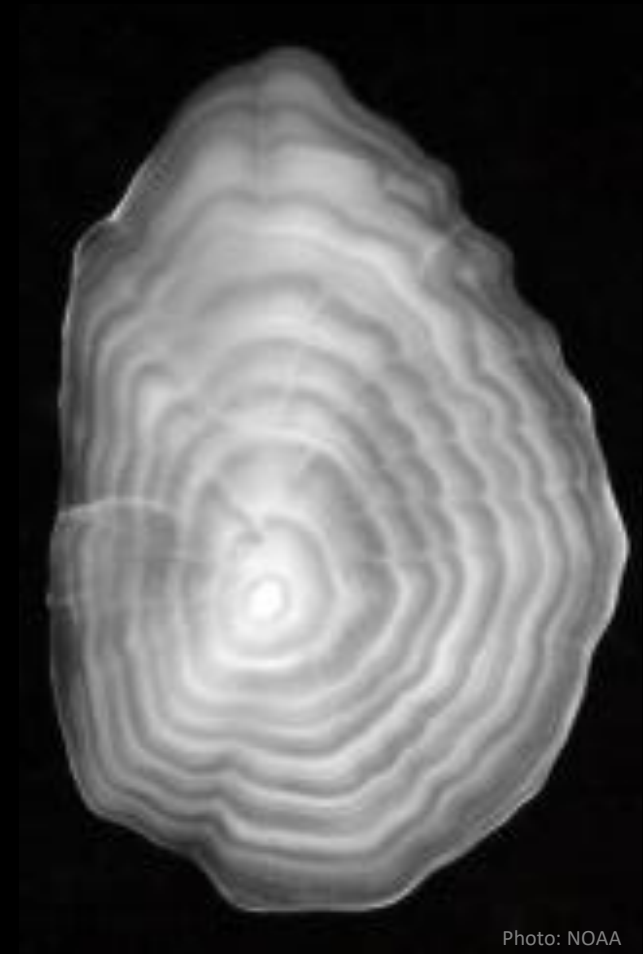
Outline

- Background
 - Growth Rate in Fish
 - Growth Rate Biomarker: IGF1
- Methodology
 - Blood Sample Collection
 - Analysis
- Results
- Future Directions

How do we measure growth rate in fish?

Otoliths (ear bone)

- Rings of otoliths are counted to produce an age at a specific length
- Allows researcher to explore growth rate over entire life of the fish
- Drawbacks: Time consuming, terminal, specific to species



How do we measure growth rate in fish?

Mark Recapture

- Fish are caught, marked, and released with the hope of capturing them again.
- Drawbacks: Rate of recapture is incredibly low in marine environment



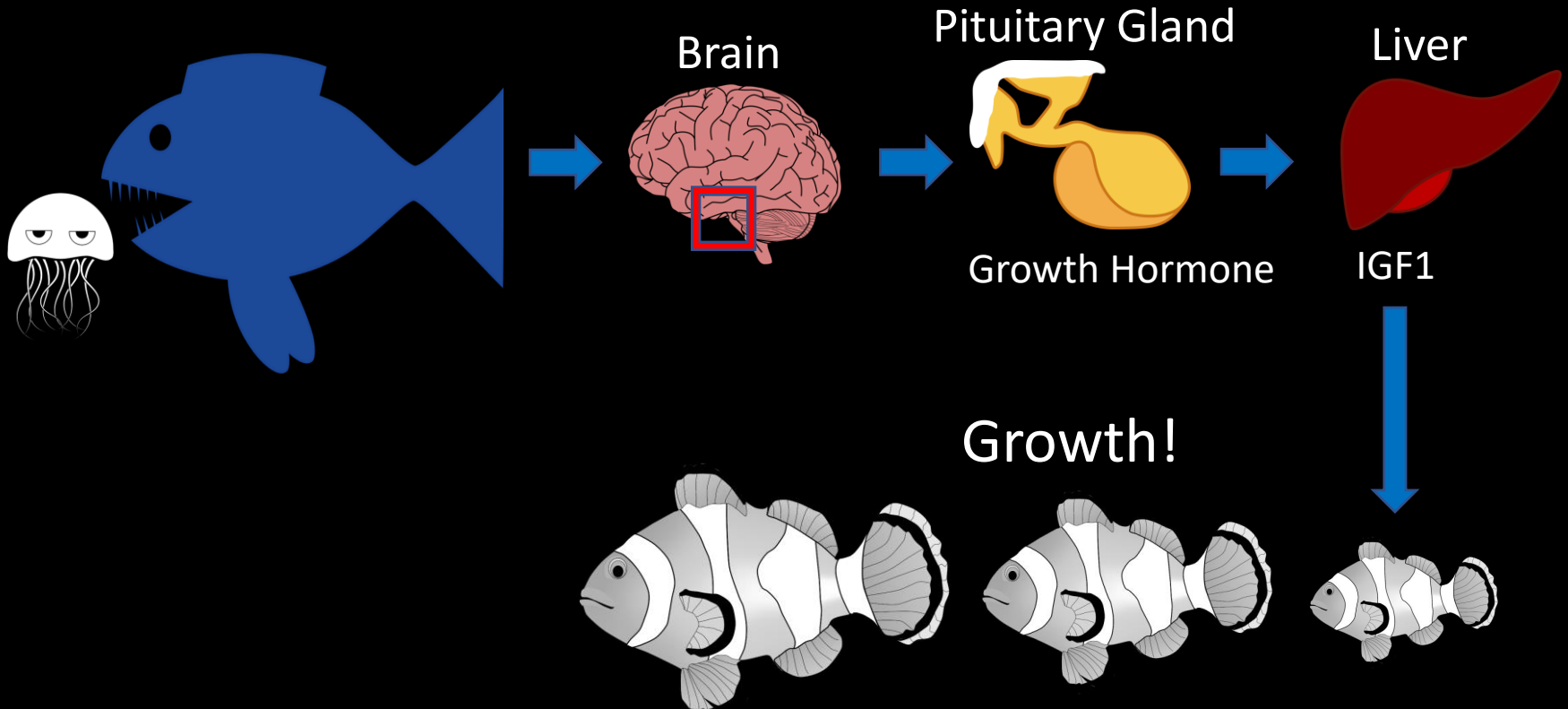
How do we measure growth rate in fish?

Why Growth Hormones?

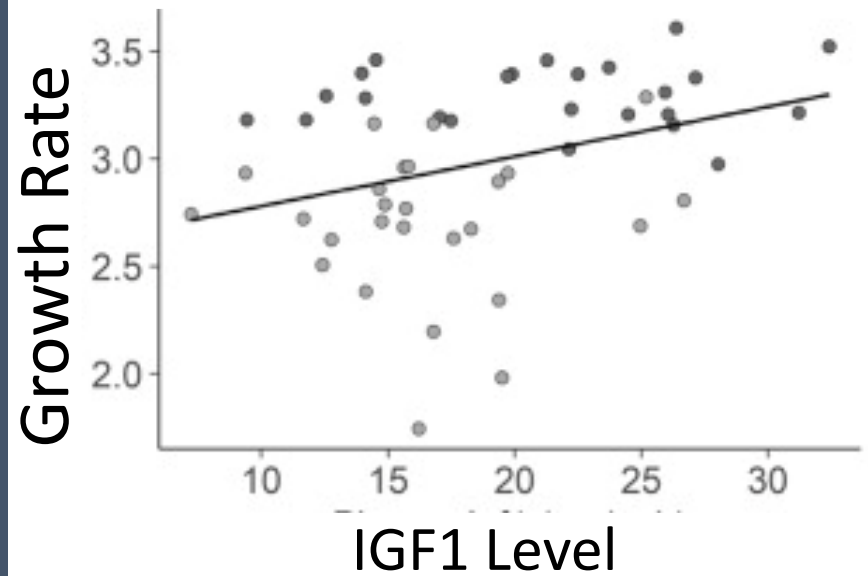
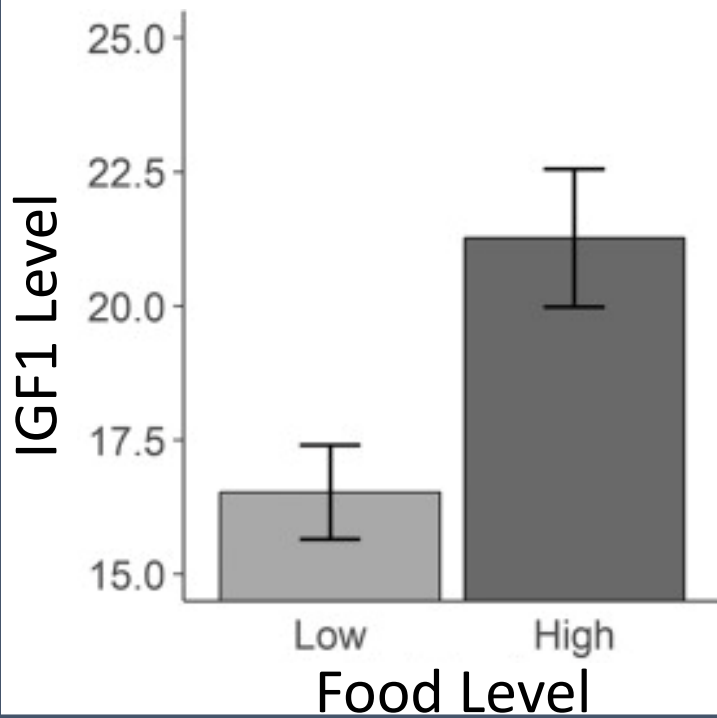
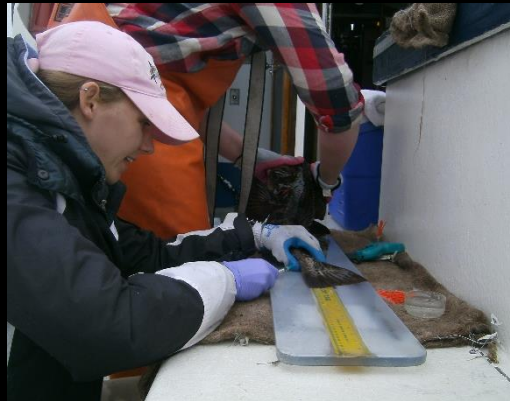


- Hormones can serve as biomarkers (indicators) for growth rate in fish
- Non-lethal, fast, and relatively inexpensive
- Insulin-like growth factor I (IGF1) is a reliable biomarker for growth in many fish species

IGF1 Production



IGF1 in rockfish



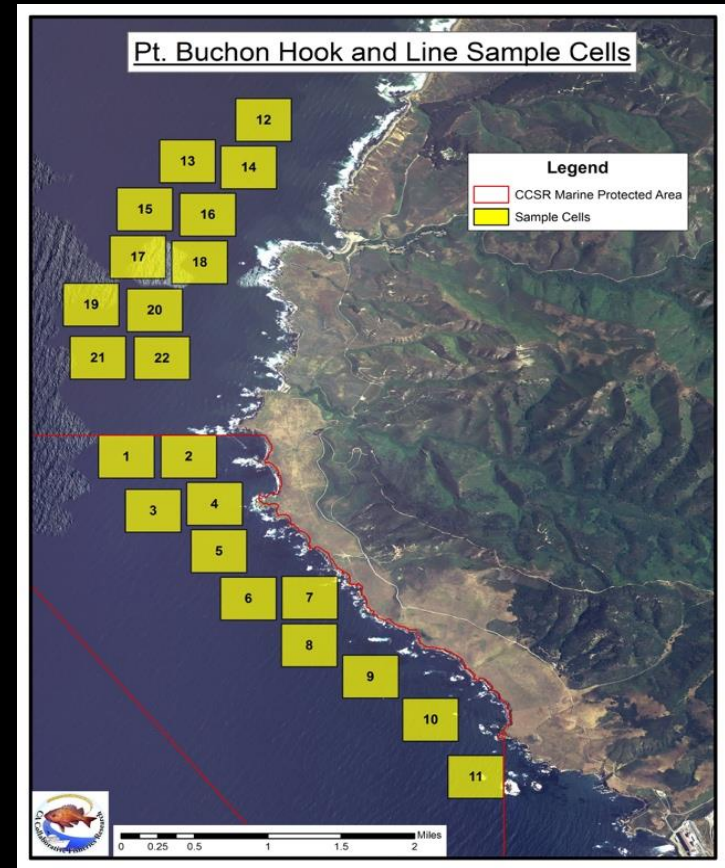


Project Goals: IGF1 in the wild

- Identify locations where fish are growing relatively fast
- Assess changes in growth rates over time
- Explore the effect that marine protected areas have on growth rate

Methods

- Collected ~ 2,000 blood samples from juvenile Blue Rockfish from 2016 through 2018
- Obtained levels of the hormone IGF1 in a laboratory using fluorescence



Methods

- Explored the differences in IGF1 levels between:
 - Point Buchon and Piedras Blancas
 - marine protected areas and reference areas
 - years

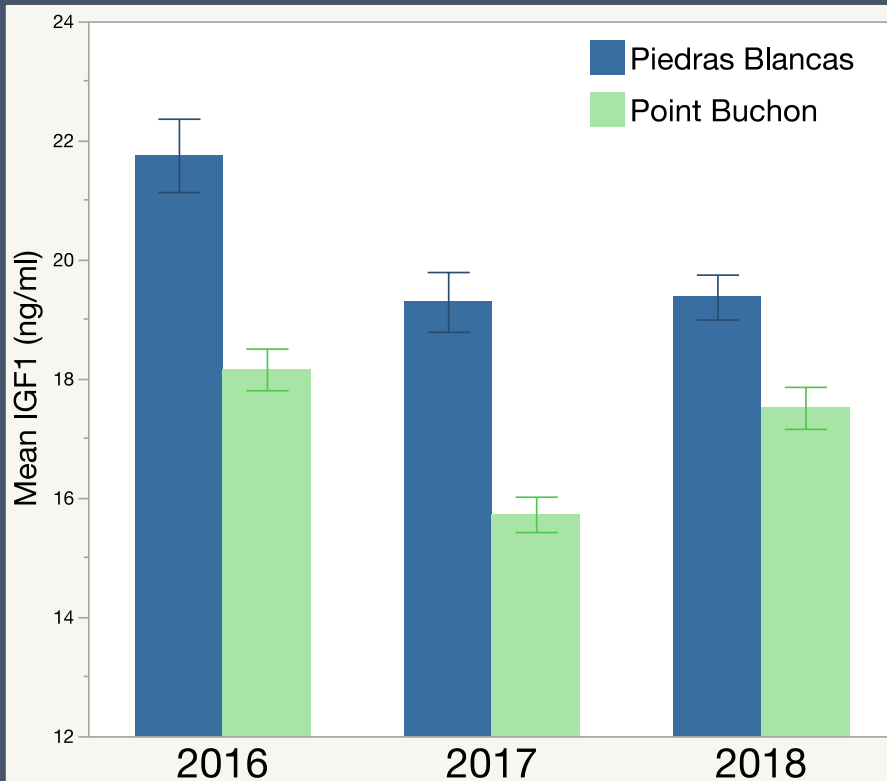


Results:

Point Buchon vs. Piedras Blancas



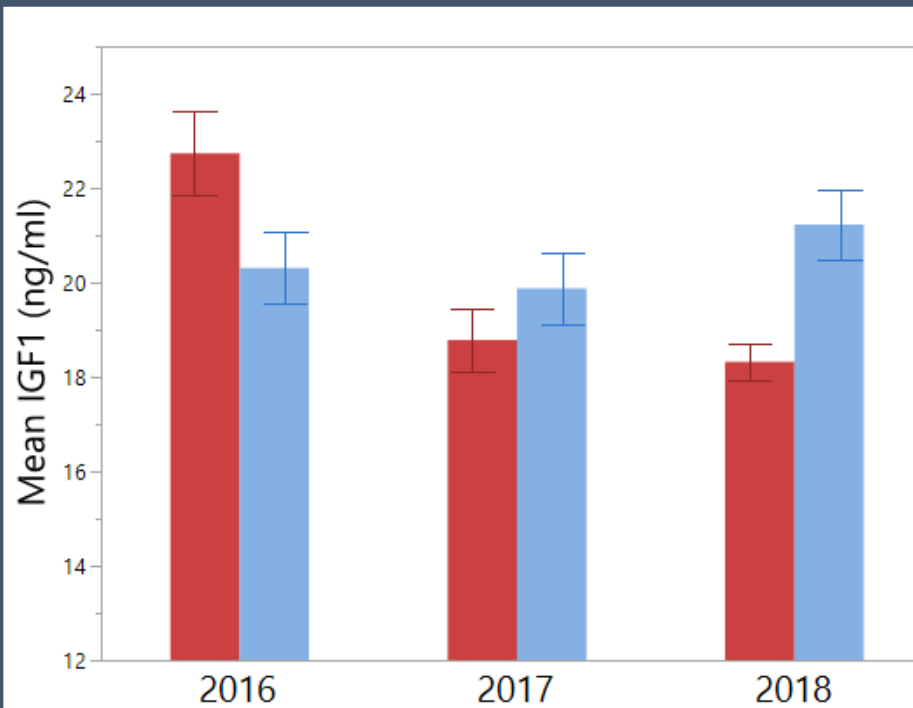
Piedras Blancas had higher levels of IGF1 for all three years sampled



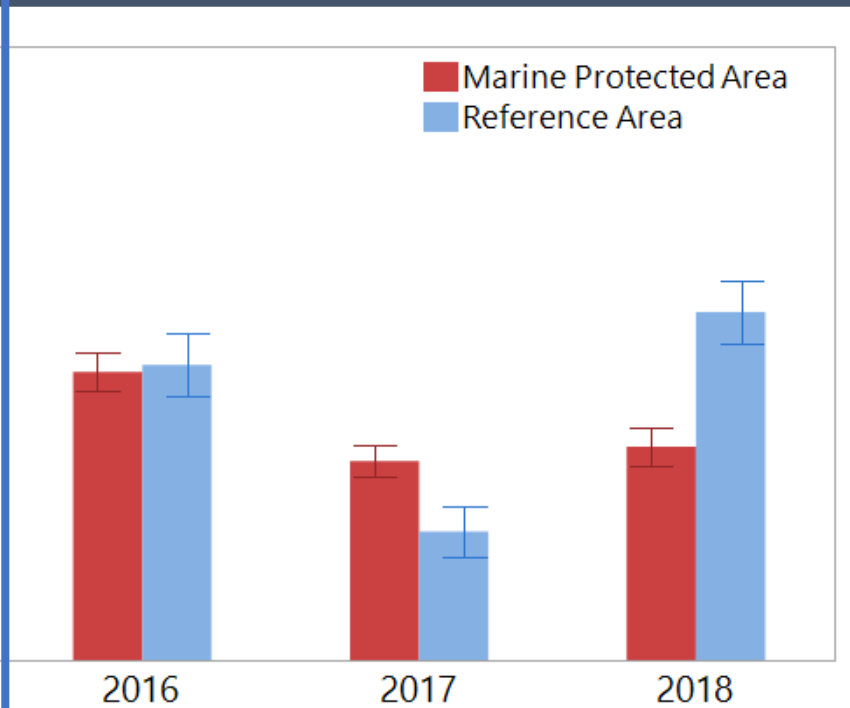
Results: Marine Protected Areas



Piedras Blancas

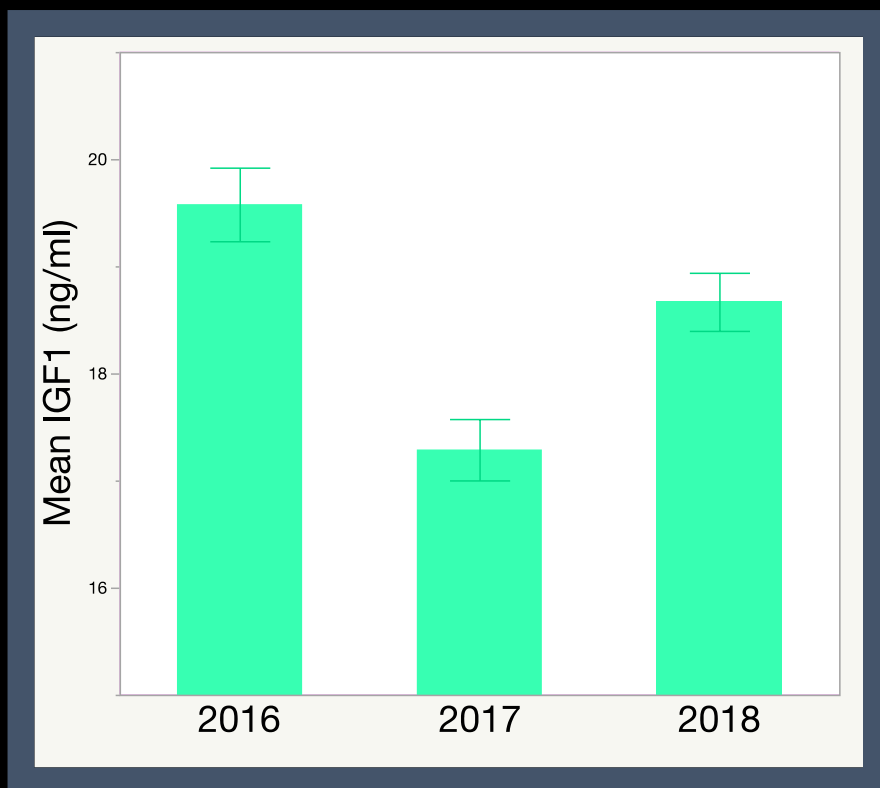


Point Buchon





Results: Interannual Variation



2016 and 2018 had higher levels of IGF1 than 2017



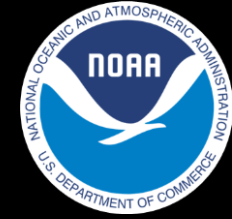
Photo: Gary O'Neill

Future Directions

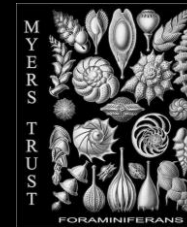
- Explore reasons for difference in IGF1 levels between Piedras Blancas and Point Buchon through cell to cell variation
- Explore the relationship between IGF1 and oceanographic conditions such as temperature and plankton abundance



Acknowledgements



- CCFRP Volunteer Anglers!
- Lema Lab vampires, Including Theresa Bersin and Nicole Hack
- Brian Beckman and Meredith Journey
- Virg's Landing, Patriot Sportfishing, and Morro Bay landing, and especially to the captains and crews of *F/V Patriot*, *F/V Avenger*, *F/V Fiesta*, *F/V Rita G*, *F/V Phenix*, *F/V Flying Fish*, and *F/V Endeavor*.
- All DEW Lab Members, Current and Former: Dean Wendt, Grant Waltz, Juan Aviles, Dante Delaney, Alicia Ellingson, Meghan Fox, Kavi Frey, Emma Hilty, Erin Johnston, Deanna Kelsey, Zach Kucinski, Matthew McKechnie, Wyatt Palser, Julie Ridgeway, Chandler Skinner-Horn, Nick Soares, Peter VanderBloomer, Lauren Zaragoza, Callie Perdue, Noel Clark, and Megan Wilson.
- Funding: California Sea Grant, AFS Cal-Neva Small Grants Program, NOAA Northwest Fisheries Science Center Internal Grants Program, William and Linda Frost Fund in the Cal Poly College of Science and Mathematics, Dr. Earl H. Myers & Ethel M. Myers Oceanographic & Marine Biology Trust



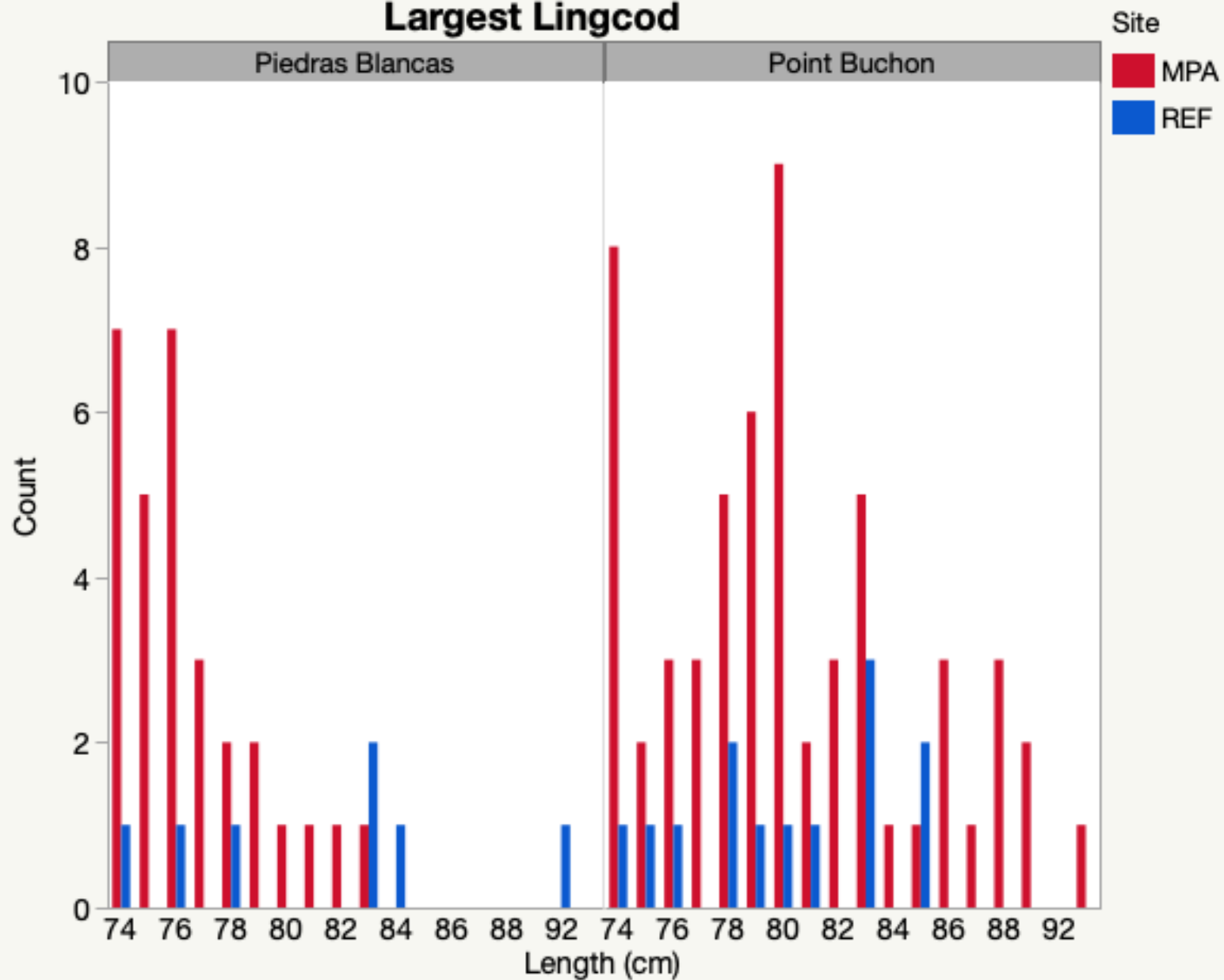
Max Lingcod Length

Angler	Year	Site	Area	Max Lingcod Length(cm)
Tim Davis ★	2015	MPA	PB	97
Virg's (Aaron) ★	2019	REF	BL	92
Ralph Boone ★	2016	MPA	PB	89
Buck Murray ★	2017	MPA	PB	89
Bob Shumey	2014	MPA	PB	88
Lyndon Mueller	2017	MPA	PB	88
Bob Ward	2012	MPA	PB	88
David Girard	2011	MPA	PB	87
Phil Ellis	2014	MPA	PB	86
Bob Shumey	2016	MPA	PB	86
Paul Heuser	2015	MPA	PB	86

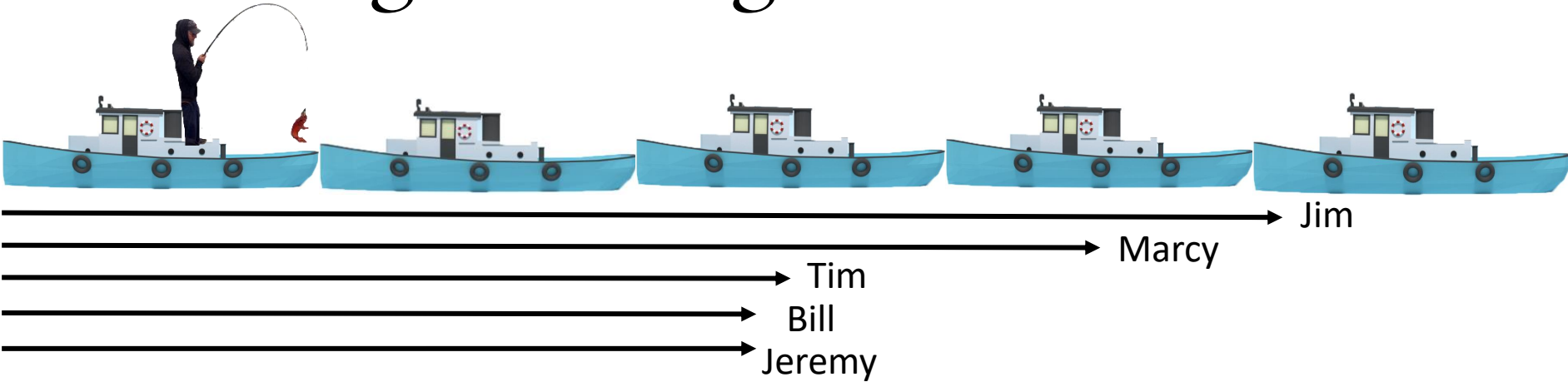
Max Lingcod Length



Largest Lingcod



Total Lingcod Length

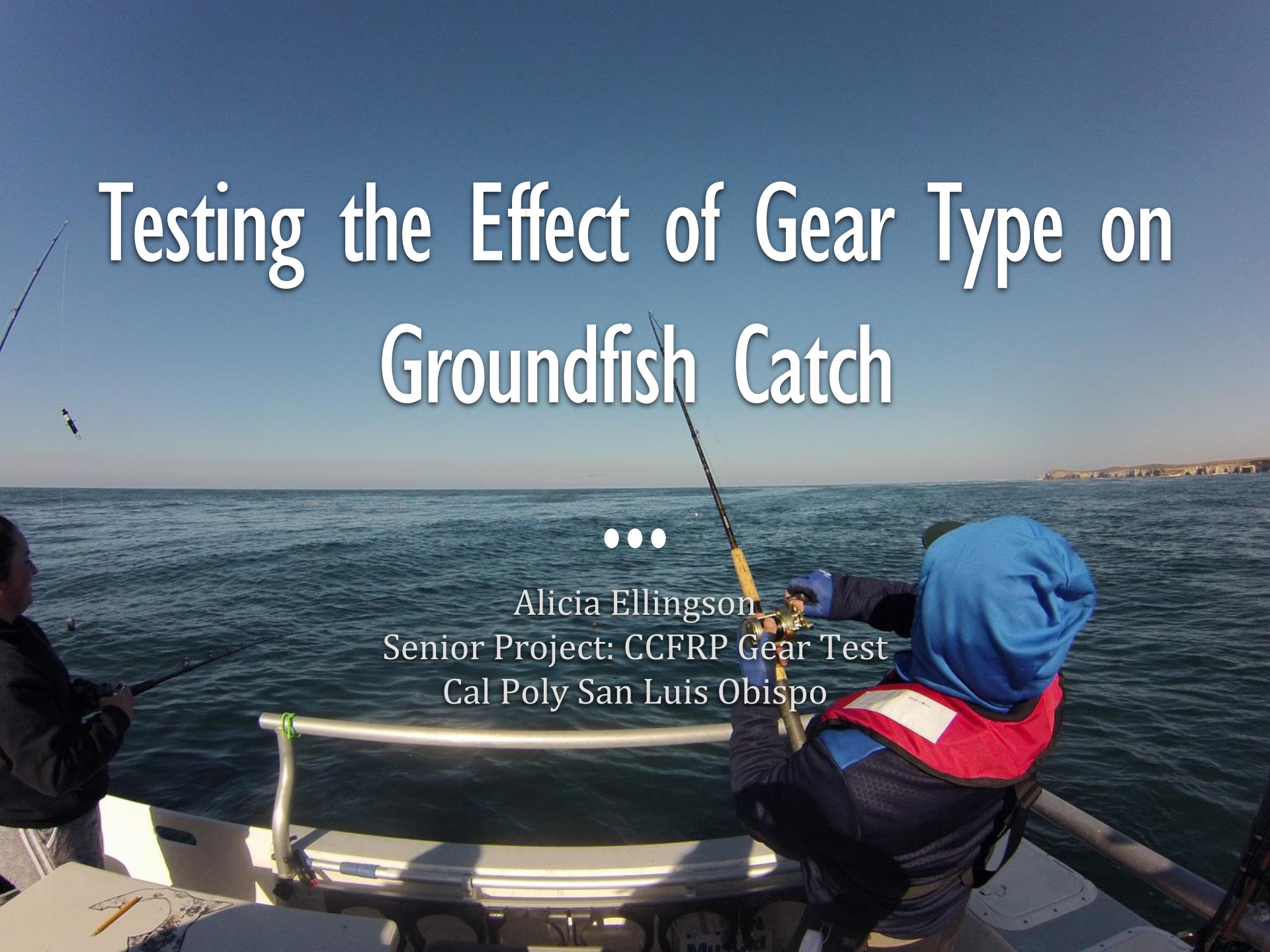


Angler	Sum of Lingcod Length (ft)
Jim Webb	225.69
Marcy Dorflinger	191.03
Tim Davis	133.26
Bill McKinney	128.83
Jeremy Harkins	128.77

Testing the Effect of Gear Type on Groundfish Catch

...

Alicia Ellingson
Senior Project: CCFRP Gear Test
Cal Poly San Luis Obispo





Project Overview

- This study tests the effectiveness of swimbaits against preexisting gear types.
- Results may be valuable to CCFRP as a means to:
 - quantify differences in catch, by gear type
 - justify whether or not Cal Poly should consider incorporating swimbaits in the sampling protocol

Primary Research Question:

How do swimbaits perform relative to jigs and shrimp flies along the central coast?

Specifically, this study tests:

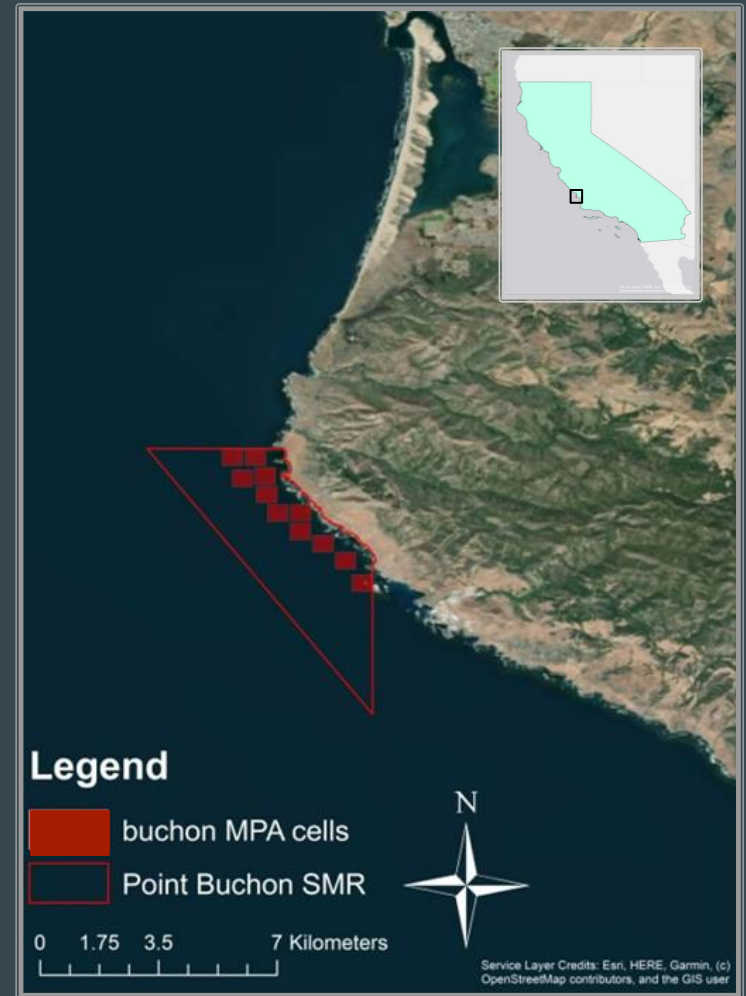
- 1) CPUE among the gear types
- 2) Length among the gear types
- 3) Species Diversity among the gear types

Methods



Sampling Design

- Comparable sampling design to regular CCFRP sampling trip
- Deviations from regular CCFRP trip:
 - All trips within the Point Buchon SMR
 - 4 volunteer anglers per trip
 - All trips on Cal Poly research vessel
 - Inclusion of swimbait gear type
- Surveying dates:
 - 10/21
 - 10/29
 - 12/3
 - 12/11



Gear types

Shrimp fly (bare) + 1 lb lead weight



Lingcod Bar



Shrimp fly + 1 lb lead weight + Squid bait



Swimbait (5-6in) + 2, 3, 4oz lead head





Personnel on board

- Four volunteer anglers with roughly equivalent fishing experience and familiarity with CCFRP sampling trips
- Qualified Cal Poly Vessel operator and science crew member
- Licensed commercial fishing captain
- Me :)

Results

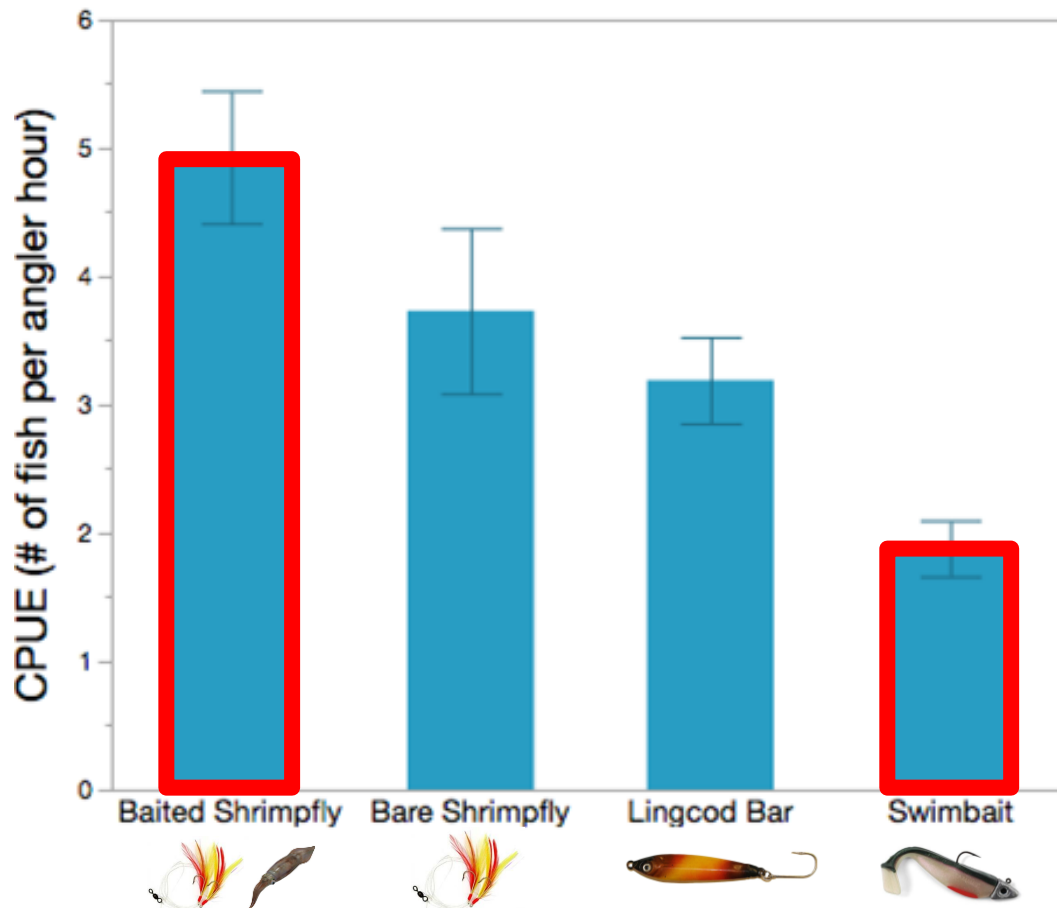


Central Coast- Cal Poly Gear Test

Area	Number of Sampling Trips	Number of Fishes Caught	Number of Species Caught
Point Buchon MPA	4	661	17

Catch per unit effort (CPUE)

Total CPUE by Gear Type



- **Baited Shrimpfly** have the highest CPUE
- **Swimbait** have a lower CPUE

Gear Type Comparison across top 5 Species



Baited Shrimpfly



Bare Shrimpfly



Lingcod Bar



Swimbait



Gear Type Comparison across top 5 Species



Baited Shrimpfly



Bare Shrimpfly



Lingcod Bar



Swimbait



Fish Length (cm)

Length by Gear Type

- For all species tested, all geartypes catch fish of similar length
- Further studies may show otherwise

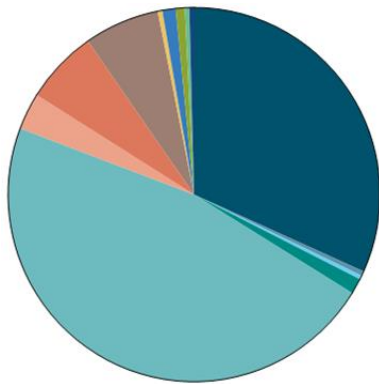


Species Diversity (D)

Species Diversity: Simpson's Index

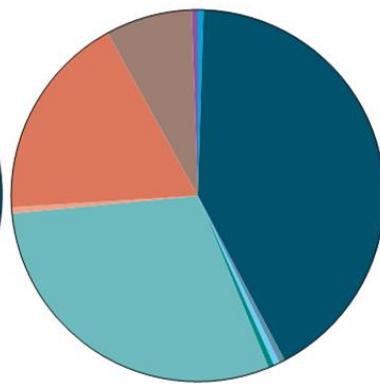
Species

- Black
- Blue
- China
- Canary
- Copper
- Gopher
- Kelp
- Lingcod
- Olive
- Vermilion
- Brown
- Cabezon
- Rosy
- Starry
- Treefish
- Ocean Whitefish
- Yellowtail



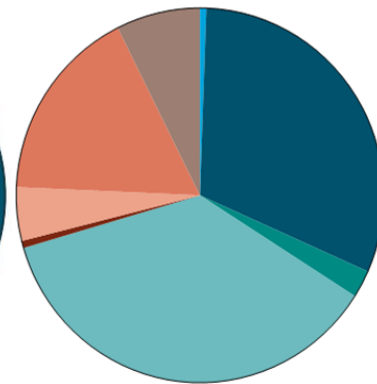
Baited Shrimpfly

D=0.67



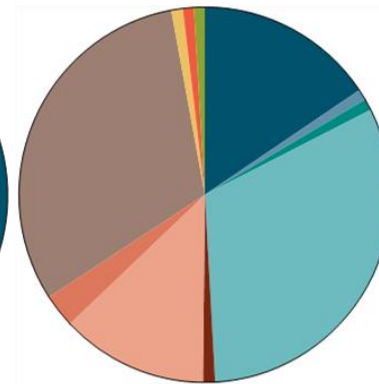
Bare Shrimpfly

D=0.68



Lingcod Bar

D=0.71



Swimbait

D=0.72



Conclusions



- Swimbait does not consistently catch more or larger fishes
- Swimbait does not catch a greater diversity of species

Swimbait Inclusion Considerations

- Swimbait Durability
- Angler Variability
 - Fishing swimbaits may require increased angling skill
- Gear Variability
 - Increased array of tackle to account for diverse oceanic conditions and angler preferences



Acknowledgments



- Dean Wendt
- Grant Waltz
- John Gavin
- Volunteer anglers:
 - Jim Webb
 - Bill McKinney
 - Ed Gomez
 - Duane Goudy
 - John Schumann
 - Meghan Fox
- Tom Moylan & Cal Poly Center for Coastal Marine Sciences
- Ellie Brauer & fish lab folks
- Frost Undergraduate Research Fund
- CSU Council on Ocean Affairs, Science & Technology (COAST)



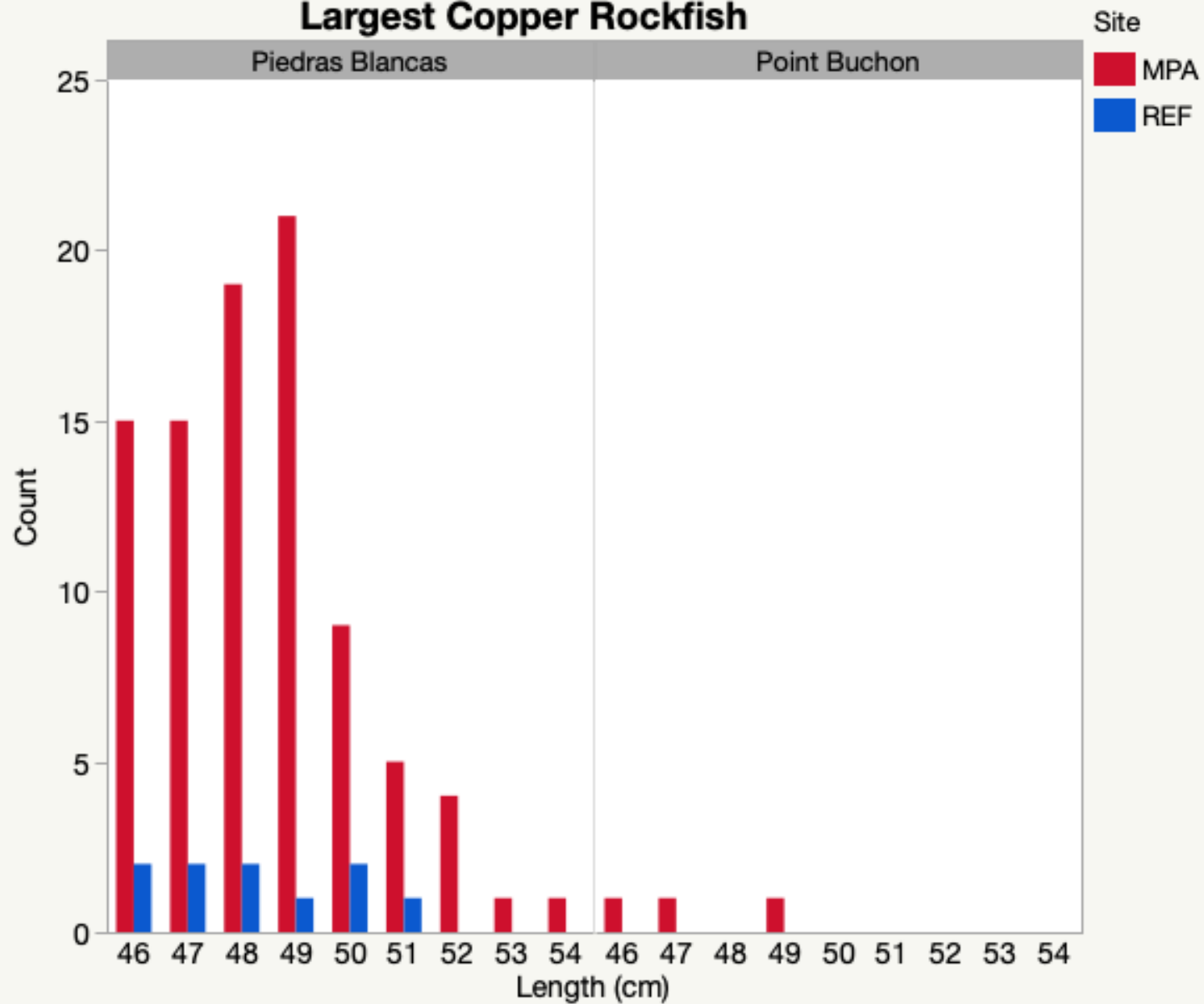
Max Copper Rockfish Length

Angler	Year	Site	Area	Max Copper RF Length(cm)
Phil Ellis ★	2014	MPA	BL	54
Cary Burns ★	2011	MPA	BL	53
Marcy Dorflinger ★	2014	MPA	BL	52
Bill McKinney ★	2018	MPA	BL	52
Jeremy Harkins ★	2009	MPA	BL	52
Bob Spalding ★	2018	MPA	BL	52
Marcy Dorflinger	2012	MPA	BL	51
Ralph Boone	2013	MPA	BL	51
Jason Anderson	2019	MPA	BL	51
Duane Goudy	2017	MPA	BL	51
Gary Aubuchon	2010	MPA	BL	51
Cal Poly	2011	REF	BL	51

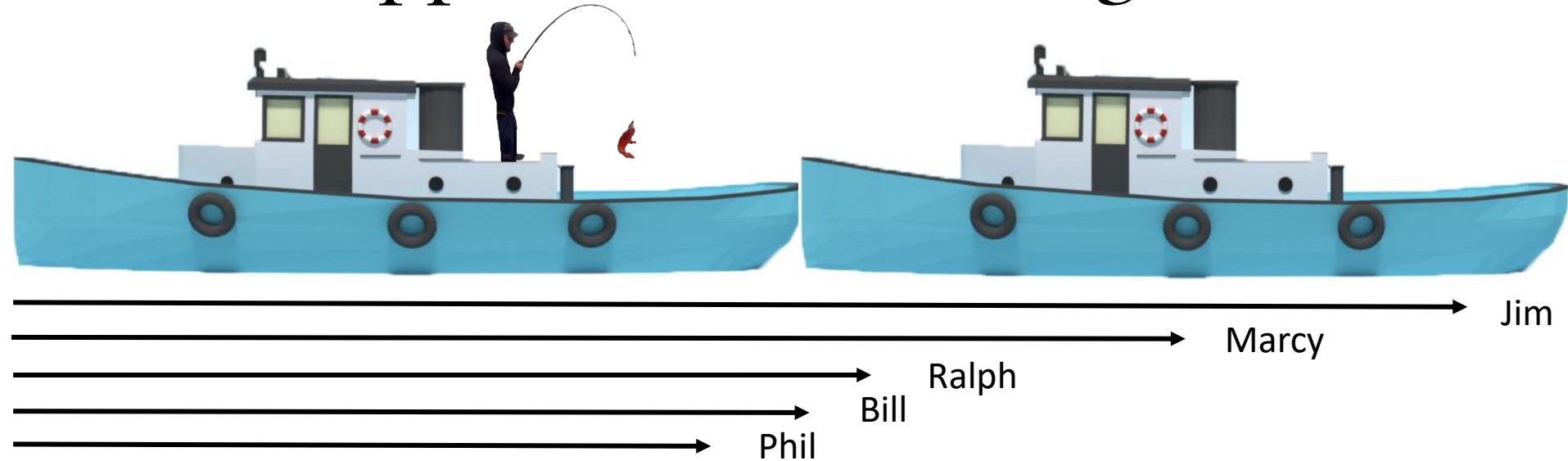
Max Copper Rockfish Length



Largest Copper Rockfish



Total Copper Rockfish Length



Angler Name	Sum of CPR Length (ft)
Jim Webb	103.32
Marcy Dorflinger	86.62
Ralph Boone	64.94
Bill McKinney	55.2
Phil Ellis	44.57

Smallest Fishes Caught

Angler	Year	Site	Area	Species	Length (cm)
Eddie Gomez ★	2016	REF	PB	Smooth Head Sculpin	5
Gary Aubuchon ★	2013	MPA	BL	Blue	7
John Stoebig ★	2016	MPA	PB	Blue	7
Doug Wyand ★	2016	REF	PB	Olive/Yellowtail	8
Mary Kay Ghilia ★	2007	REF	PB	Unknown	8
Bill McKinney	2013	REF	PB	Blue	9
Bob Shumey	2015	REF	PB	Calico RF	9
Clovis West HS	2013	MPA	PB	Bocaccio	9
Duane Goudy	2012	REF	PB	Bocaccio	9

Smallest Fishes Caught



Max Fish Caught Per Day

Angler Name	Days Fished	Fishes Caught	CPUE (# fishes/ day)
Phenix Crew ★	1	309	309
Carley Burton ★	1	98	98
Eli Campos ★	1	95	95
Kavi Frey	1	95	95
Elizabeth Hiell	1	88	88
Ed Eversole	1	87	87
Dan Fleming	1	79	79
Andrew Mercier	1	78	78
Holly Lashley	1	77	77
Allie Bakaly	1	71	71
John Stoebig	7	492	70.2
Hannah Kistner	2	140	70



More Data

Angler Name	Days Fished	Fishes Caught	CPUE (# fishes/ day)
Virg's	18	1111	61.7
Matt Mckechnie	3	173	57.6
Serena Desai	1	55	55.0
Jason Anderson	33	1584	48.0
Roger Yount	8	384	48.0
April Bancroft	7	305	43.5
Don Maruska	4	152	38.0
Lyndon Mueller	27	1022	37.8
Eddie Gomez	46	1737	37.7
Mike Blackstone	48	1809	37.6
Duane Goudy	39	1393	35.7
Cal Poly	66	2199	33.3
Patriot Crew	8	244	30.5
Dean Wendt	2	30	15.0
Grant Waltz	1	9	9.0



Thank You, Anglers, Patriot Sportfishing, and Virg's Landing!

