Management Allocation of Vermilion & Sunset Rockfish in California

SSC Groundfish Subcommittee Mop-Up Panel 9/30/2021

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Current Practice

- Allocate OFL proportional to catch
  - Works well if catch proportional to biomass (constant F, rarely tested)
  - Risks 'rewarding' excessive harvest
- Allocate OFL proportional to survey biomass
  - Requires survey of assessed area
  - Not available for many stocks
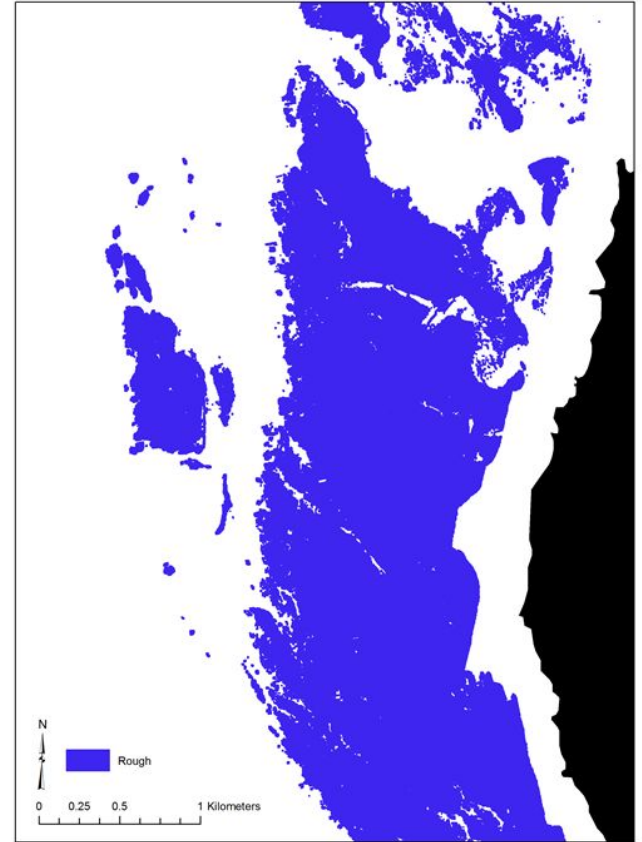 - Not available for vermilion/sunset rockfish

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Ways Forward

E.J. presented "Allocating Yield to Management Areas Using Recreational Catch Rates" at AFS

- Habitat-based allocation
  - Assign OFL proportional to habitat area (or proxy)
  - Assumes constant density, static habitat
  - Inconsistent data formats across states
- Allocate OFL proportional to biomass
  - Spatial index of relative abundance
  - Two components: density & habitat (or proxies)
  - Increases equilibrium yield for stocks with Isolation-by-Distance structure (Spies et al. 2015, CJFAS)
  - E.J. applied this method in the 2017 blue/deacon assessment (Appendix E)

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Habitat Proxy

- California Seafloor Mapping Program
- 2-meter bathymetry of CA state waters (3 nm from shore, assume proportional habitat in the white zone)
- North of Point Conception only
- SWFSC developed "reefs" based on the area of 5-meter buffer polygon around 2-m pixels
- Details in the China rockfish assessment appendices

Application to 2021 northern California Vermilion/Sunset Rockfish Assessment

Table I1: California recreational total mortality (1000s of fish) for vermilion rockfish by CRFS district, 2016-2019. The Redwood district occurs mainly north of Cape Mendocino. Source:RecFIN

Year	CENTRAL	BAY	WINE	REDWOOD	Percent mortality in Redwood District
2016	63.382	15.480	3.888	2.099	2.47%
2017	79.042	20.795	4.891	2.858	2.66%
2018	89.937	17.996	4.192	3.214	2.79%
2019	96.274	29.016	8.616	3.363	2.45%

Table I2: Commercial landings (mt) of vermilion rockfish in California port complexes located north (CRS+ERK) and south (MRO-BRG) of Cape Mendocino, 2016-2019. Source: CALCOM.

Year	MRO-BRG	CRS+ERK	Percent landings in CRS+ERK
2016	12.477	0.888	1.33%
2017	12.738	1.550	2.32%
2018	17.650	2.010	3.00%
2019	16.579	3.052	4.56%

Number of trips sampled in the PR1 mode by year and CRFS District.

YEAR	Central	Bay	Wine	Redwood
2016	2175	795	279	1108
2017	1782	800	392	1148
2018	1783	677	345	1149
2019	1724	681	204	1151

Application to 2021 northern California Vermilion/Sunset Rockfish Assessment

From Appendix I. Management Boundary Analysis
- Used an average from 2016-2019 of the CDFW CRFS private/rental mode index of relative abundance as the estimated CPUE
  - Large number of samples from northern CA
  - Excluded 2020 due to COVID-19 sampling issues
- Redwood district represents the area in CA north of the management boundary
- Area calculated using the 2m resolution seafloor mapping data of CA state waters
  - Analysis constrained to CA state waters north of Point Conception

Table I4: Estimated CPUE, percent habitat area, and relative abundance by CRFS District.

CRFS District	CPUE	Area	Percent of Area	CPUExAREA	Relative Abundance
Central	0.833	315.912	35.56%	0.296	59.32%
Bay	0.448	271.279	30.54%	0.137	27.45%
Wine	0.286	136.937	15.42%	0.044	8.82%
Redwood	0.122	164.193	18.48%	0.022	4.41%

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Reference Points vs. Recent Catch

- Combined reference points, US-Mexico border to Cape Mendocino
- 4.4% of northern model allocated north of Cape Mendocino

	South	North	Pt. Conc. to Cape Mendocino	South of 40-10
Unfished spawning output	1053.3	1114.7	1065.6	2119.0
Unfished Age 4+ Biomass (mt)	6345.3	6144.6	5874.2	12219.6
Unfished Recruitment (1000s of fish)	785.5	433.5	414.5	1200.0
Spawning Output (2021, millions of eggs)	521.8	436.1	416.9	938.7
Fraction Unfished (2021)	0.495	0.391	0.391	0.443
Reference Points Based on SPR50%				
Proxy Spawning Output	469.9	497.3	475.4	945.4
Proxy MSY	140.6	140.9	134.7	275.3
OFL 2023	160.0	168.7	161.3	321.2

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