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Evaluating available information to determine stock management delineation for copper rockfish off the U.S. West Coast

SSC Groundfish Sub-Committee Mop-Up
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Recruitment and Dispersal

Copper Specific
General Information

Evidence for Managing at Assessment Scale	Evidence for Alternative Management Scale	General Caveats or Caveats of Information Source
Markel (2011) – Variable recruitment among sites sampled in Barkley Sound		
Buonaccorsi et al. 2004 – Estimated dispersal distance of 13 km or less based on stepping stone model		Values highly sensitive to ratio of total population size to effective population size
Lack of coherence in model estimated recruitments across assessed areas.		Length data may not be fully informative on annual recruitment strength
	Field et al. 2021 – Strong recruitments observed between 2014-2016 were largely coastwide	

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Adult Movement

Evidence for Managing at Assessment Scale	Evidence for Alternative Management Scale	General Caveats or Caveats of Information Source
Lea et al. 1999 – High site fidelity observed in tagged fish		
Reynolds et al. 2010 – Long periods of residency with limited movement of tagged fish in Prince William Sound		
Tolimieri et al. 2009 – Observed home ranges of copper rockfish in Puget Sound		
	Lowe et al. 2009 – Observed low site fidelity and high variation in detectability at a particular site	
		McGilliard et al. 2015 – Simulations looking at open and closed areas found that stock assessment accuracy depends upon movement rates

Variation in Genetic Composition

Copper Specific
General Information

Evidence for Managing at Assessment Scale	Evidence for Alternative Management Scale	General Caveats or Caveats of Information Source
Sivasundar and Palumbi 2010 – Moderate differentiation in mtDNA	OR and Monterey Bay population genetically differentiated from SB but OR and Monterey Bay populations area similar.	No nuclear structure in copper rockfish
Buonaccorsi et al. 2002 – Measures sig. divergence in allele frequency indicating isolation by distance		
Johansson et al. 2008 – Confirm isolation by distance		Divergence in allele frequency may be related to habitat patchiness and not distance alone.
		Waples and Gaggiotti 2006 – To detect significant differences in populations they would be reproductively isolated for many generations

Variation in Phenotypic Traits

Copper Specific
General Information

Evidence for Managing at Assessment Scale	Evidence for Alternative Management Scale	General Caveats or Caveats of Information Source
Minor differences in maturity-at-length observed between south of Pt. Conception and Oregon		
Punt 2015 – Simulation that identified biased estimates when areas were ignored for a spatially heterogeneous population (mort., growth, recr.)		
	Limited growth differences measured between fish in OR/WA and south of Point Conception	
		Spatial gradient of growth are commonly observed in rockfish and other species along the U.S. West Coast (multiple studies)

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Abundance Trends

Copper Specific
General Information

Evidence for Managing at Assessment Scale	Evidence for Alternative Management Scale	General Caveats or Caveats of Information Source
Ying et al. 2011 – Simulation, managing each sub-population led to overfishing but managing as a meta-populations led to local depletion		
Distinct stock trajectories estimated for each of the assessed areas		
		Cope and Punt 2013 – Simulation, single area stock assessments failed to estimate local patterns but adequately estimated the overall stock status
	The areas of the true population variation may not align with the defined assessment boundaries	

Size and Age Compositions

Evidence for Managing at Assessment Scale	Evidence for Alternative Management Scale	General Caveats or Caveats of Information Source
Distinct selectivity curves estimated in the recreational and commercial fisheries north and south of Point Conception		
Bosley et al. 2019 – Simulation, specifying correct spatial pop. structure may not be as important as spatial heterogeneity in fishery selectivity and life-history variation		
Berger et al. 2021 – Simulation, bias and risk were greater for assessments that spanned multiple pop. segments compared to one that covered a subset of the population		
		Punt 2019 – An integrated spatial model could be applied to model area and coastwide dynamics but comes at the cost of a larger number of parameters.