Prospects for Assessments Tentatively Adopted for 2023 in June 2022

Are there any foreseeable problems with the species proposed?

- Age reading is an important aspect of preparation for benchmark (full) assessments. In addition to the early-August meeting sponsored by the Groundfish Sub-committee to the Science and Statistical Committee (SSC), Northwest Fisheries Science Center (NWFSC) staff have consulted extensively with the state agencies reviewing otolith inventories collected from federal surveys and state fishery samplers.
    - A considerable amount of age reading will be needed to develop an adequate number of ages for recent years, across all sources, for petrale sole and canary rockfish
        - The Cooperative Ageing Project (CAP) lab, in Newport, is a joint venture between the NWFSC and Pacific States Marine Fisheries Commission. We planning to have CAP produce a minimum of 5,000-6,000 petrale sole ages for recent years (~7-8 person months), including double reads, from otoliths collected in recent years by the NWFSC West Coast Groundfish Bottom Trawl (WCGBT) survey and by Oregon Department of Fish and Wildlife (ODFW) and California Department of Fish and Wildlife (CDFW). The Washington Department of Fish and Wildlife (WDFW) will read another 1,300-1,400 otoliths collected in Washington. Two CAP staff members are currently reading petrale sole otoliths to support a 2023 assessment.
        - CAP is targeting the production of approximately 10,000 canary rockfish ages from structures collected over the past decade from the NWFSC WCGBT survey, the Pacific hake at-sea fishery, and from fisheries sampled by ODFW and CDFW. With additional double reads to quantify reader variability, that work is expected to require 15-16 person months. WDFW will be working on an additional 5,000-6,000 canary rockfish otoliths from their fishery collections. CAP has two agers currently reading canary rockfish.
    - Time permitting, in addition to reading otoliths collected from the past decade, considerable effort could also be directed towards earlier years where either few otoliths have been read or they have been read using surface microscopy, rather than the current best practice of a break-and-burn age reading for petrale sole. The CAP workload could expand to 12-15 person-months of age reading for petrale sole, with additional focus on filling gaps and converting surface ageing to break-and-burn for earlier years. The 600 canary rockfish structures collected on the 1986 Triennial trawl survey have never been aged, and would add most of another month of ageing.

    - Given the extensive ageing needs for petrale sole and canary rockfish, holding the Stock Assessment Review (STAR) Panel(s) for one or both of these species as late as possible would facilitate greater availability of age data. (see discussion, below).
    - ODFW and WDFW will both be ageing their own black rockfish otoliths leaving CAP to age any black rockfish and copper rockfish otolith samples collected from California fisheries and research projects that are useful to those assessments.
    - CAP will also need to age 2,500-3,500 Pacific hake otoliths from U.S. fishery sectors this fall for use in the 2023 assessment.
    - Although there may be circumstances in which otoliths collections outside of existing, established sampling programs can be useful in estimating growth curves, particularly for very data-poor species, in general it should be recognized that ad-hoc otolith collections outside of existing sampling programs are unlikely to be useful for full stock assessments, due to issues associated with non-random sampling and/or data weighting.

- Identifying suitable catch histories–which address uncertainties in both landed and discarded catch–can present challenges in many assessments, particularly for species that have not been identified to a species level in landing data throughout much of their exploitation history.
    - Representatives from all three state agencies joined a regular meeting of NWFSC and Southwest Fisheries Science Center (CDFW) assessment staff in late July 2022 to begin discussing process and responsibility issues relating to catch-history finalization for 2023 assessments. This early dialogue bodes well for ensuring that time series anomalies in Pacific Fisheries Information Network (PacFIN) or Recreational Fisheries Information Network (RecFIN) will be resolved early and that catch data incorporated in assessments, even in the formative stages, will be supported by the corresponding state agency.

- Literature review for genetic information
    - We have not come across any recent genetic studies that would bear on the structure of assessment modeling for the proposed species.
    - Timing and budgetary resources did not permit existing genetic samples for copper rockfish to be processed and the results analyzed to shed light on whether genetic differentiation is present among copper rockfish across the West Coast. This should be a research priority before the next copper rockfish assessment.
- The SWFSC has planned winter sampling (November 2022-March 2023) of copper rockfish along the California coast to collect samples to inform maturity and fecundity for each assessment area in California. The June 5 STAR panel date for copper rockfish may preclude the use of those data in the assessment relying on SWFSC staff alone to process samples.

Potential Species and STAR Panel Review Scenarios for 2023 Assessments

The species, areas, and assessment types (e.g., benchmark) selected for assessment in 2023 will impact the total number of species that can be assessed given staffing and review capacity. At the June Pacific Fishery Management Council (the Council) meeting, questions arose around the implications for the area and assessment type selected for copper rockfish and how that decision may impact the ability to assess all species identified for considering in 2023 and the available options for the selection of stock-status areas within the stock definition process (see Agenda Item G.5, Attachment 2, September 2022 for detailed information on stock definitions). Five potential scenarios for the number of assessments, assessment type, the timing of the STAR panel review, and tentative NMFS and state staffing is provided below. All of the options presented below incorporate the expectation that a class that will be taught at the University of Washington School of Aquatic and Fishery Science (UW-SAFS) by NWFSC staff during winter and spring terms will develop a limited set of the planned assessment products

The first assessment option, Option A (Table 1), selects benchmark assessments for black rockfish, petrale sole, canary rockfish, and copper rockfish in California, length-based data-moderate (LB-DM) assessments for rex sole and longspine thornyhead, and catch-only updates for cowcod, widow rockfish, and yelloweye rockfish. We believe this option provides assessment staff with the greatest opportunity to provide the most valuable information possible to the Council for managing groundfish in 2025-26 and beyond. The anticipated workload and assessment capacity aligns in Option A, allowing for all tentatively-adopted assessments to be conducted. All subsequent assessment options require at least one or two species be dropped from consideration in 2023. An additional benefit of Option A is that it allows petrale sole and canary rockfish to be assessed in the final STAR panel, providing much needed additional time to complete ageing work needed to support these assessments. Option A is linked to eventual identification of a stock boundary for copper rockfish at 42° N. Lat. (or a potential coastwide if the SSC identifies an approach to use the 2021 LB-DM assessments in Oregon and Washington to determine stock status in 2023). That decision would allow the Council's preliminary decision to only conduct new assessments for copper rockfish in California to move forward, along with the full remaining slate of assessments included in the June motion. The UW-SAFS class would conduct the LB-DM assessments for shortspine thornyhead and rex sole. Two of the species identified for catch-only updates, cowcod and widow rockfish, were last assessed in 2019. Given the limited years that would be updated with the realized removals (i.e., 2020, 2021, and 2022) and the Groundfish Management Team (GMT) expected removals in 2023 a catch-only update may only provide limited changes in future harvest limits. It is also important to note the catch-only updates do not update the applied time-varying change in sigma to determine reductions between the Overfishing Limit and the Acceptable Biological Catch.

Table 1. Option A for species and the assessment type (full benchmark assessment, length-based data-moderate (LB-DM)), STAR panel timing, the number of potential model areas, needed staffing numbers per assessment, and tentative NMFS and state staff.

Starting	Species	Assess. Type	Modeled Areas	Lead Agency Staff Needed	Lead Agency Staff Available	Tentative NMFS assignments	State help
Option A			9	8	9		
STAR Panel 1 June 5	**Copper rockfish CA-only**	Full	2	2		Wetzel, Monk	CDFW
	Shortspine thornyhead	LB-DM	1	Grad student class @ UW-SAFS, led by NWFSC staff		Hamel, Haltuch, Gertseva	
	Rex sole	LB-DM	1				
STAR Panel 2 July 10	**Black rockfish**	Full	3	3		Cope, Dick & Rogers, Berger	Tsou, Whitman, CDFW
STAR Panel 3 July 24	**Petrale sole**	Full	1	2		Taylor, Gertseva	Tsou, Whitman, CDFW
	Canary rockfish	Full	1 (3)	1		Langseth, Oken	
Catch-only updates	**Cowcod** **Widow rockfish** **Yelloweye rockfish**					Wallace	GMT
						Johnson: TBD (prob. black rockfish or copper rockfish)	

The three assessment and review options identified as Options B-1 to B-3 (Tables 2-4) are linked to the Council identifying a preference for a copper rockfish stock boundary at 40° 10′ N. Lat. Different approaches for responding to that choice are discussed in the context of each table.

Under Option B-1 (Table 2), the full assessments for copper rockfish in California would cover areas south of 40° 10′ N. Lat., and only one additional LB-DM copper rockfish assessment would be added for Oregon and the portion of California north of 40° 10′ N. Lat., at the cost of the rex sole assessment. This approach would require that 2023 projections from the 2021 Washington LB-DM assessment be used for status assessment purposes for the northern area, if supported by the SSC. The 2021 assessments for copper rockfish estimated unfished spawning biomass from the portion of the stock off Washington and Oregon to be less than 1 percent and 5 percent, respectively, of the total spawning biomass coastwide. As in Option A, the first STAR panel would include full assessments for copper rockfish in California and two LB-DM assessments for copper rockfish between north of 40° 10′ N. Lat. and Oregon/Washington border and shortspine thornyhead. The UW-SAFS class would conduct the LB-DMs for shortspine thornyhead and northern portion of the copper rockfish stock.

Both Options A and B-1 maintain one currently-unassigned NMFS assessment person. We believe that is important, given that four area-models envisioned for full assessments currently have only one NMFS person assigned to them. It is often difficult to know in advance where the greatest challenges will arise, among a slate of scheduled assessments, and therefore having someone in reserve who can help where needed provides a greater measure of insurance that unanticipated challenges can be addressed successfully.

Option B-2 (Table 3) includes full assessments for copper rockfish in California south of 40° 10′ N. Lat. and adds two new LB-DM assessments: one for Oregon with California north of 40° 10′ N. Lat., and an update of the 2021 LB-DM assessment for Washington. Both of these would be needed if using projections from the 2021 Washington assessment were deemed unacceptable for determining stock status for the area north of 40° 10′ N. Lat., unless a single assessment north of 40° 10′ N. Lat. would suffice. Adding both of these additional assessment areas for copper rockfish would create additional workload challenges. We currently envision the best approach for addressing these would be to focus the entire first panel on copper rockfish, with the University of Washington class handling both northern LB-DMs. Given our preferred assessment assignments, a shortspine thornyhead LB-DM would need to be reviewed separately by the SSC's Groundfish Sub-committee (SSC-GFSC) in August. This option would continue to preserve review timing for petrale sole and canary rockfish in July, allowing more time for age reading.

Table 2. Option B-1 for species and the assessment type (full benchmark assessment, length-based data-moderate (LB-DM)), STAR panel timing, the number of potential model areas, needed staffing numbers per assessment, and tentative NMFS and state staff.

Starting	Species	Assess. Type	Modeled Areas	Lead Agency Staff Needed	Lead Agency Staff Available	Tentative NMFS assignments	State help
Option B-1			9	9	9		
STAR Panel 1 June 5	**Copper Rockfish** CA: S. of 40° 10' N. Lat.	Full	2	2		Wetzel, Monk	CDFW
	Copper Rockfish N. of 40° 10' N. Lat. (N.CA + OR)	LB-DM	1	Grad student class @ UW-SAFS, led by NWFSC staff		Hamel, Haltuch, Gertseva	Whitman, Tsou, CDFW
	Shortspine thornyhead	LB-DM	1	Grad student class @ UW-SAFS, led by		Hamel, Haltuch, Gertseva	Tsou
STAR Panel 2 July 10	**Black rockfish**	Full	3	3		Cope, Dick & Rogers, Berger	Tsou, Whitman, CDFW
STAR Panel 3 July 24	**Petrale sole**	Full	1	2		Taylor, Gertseva	Tsou, Whitman, CDFW
	Canary rockfish	Full	1 (3)	1		Langseth, Oken	
Catch-only updates	**Cowcod** **Widow rockfish** **Yelloweye rockfish**					Wallace	GMT

Table 3. Option B-2 for species and the assessment type (full benchmark assessment, length-based data-moderate (LB-DM)), STAR panel timing, the number of potential model areas, needed staffing numbers per assessment, and tentative NMFS and state staff.

Starting	Species	Assess. Type	Modeled Areas	Lead Agency Staff Needed	Lead Agency Staff Available	Tentative NMFS assignments	State help
Option B-2			9	9	9		
STAR Panel 1 June 5	**Copper Rockfish** CA: S. of 40° 10' N. Lat.	Full	2	2		Wetzel, Monk	CDFW
	Copper Rockfish N. of 40° 10' N. Lat. (N.CA + OR)	LB-DM	1	Grad student class @ UW-SAFS, led by NWFSC staff		Hamel, Haltuch, Gertseva	Whitman, Tsou, CDFW
	Copper Rockfish WA	Update LB-DM	1	Grad student class @ UW-SAFS, led by NWFSC staff		Hamel, Haltuch, Gertseva	Tsou
STAR Panel 2 July 10	**Black rockfish**	Full	3	3		Cope, Dick & Rogers, Berger	Tsou, Whitman, CDFW
STAR Panel 3 July 24	**Petrale sole**	Full	1	2		Taylor, Gertseva	Tsou, Whitman, CDFW
	Canary rockfish	Full	1 (3)	1		Langseth, Oken	
SSC-GFSC August	**Shortspine thornyhead**	LB-DM	1	1		Johnson	
Catch-only updates	**Cowcod** **Widow rockfish** **Yelloweye rockfish**					Wallace	GMT

Option B-3 (Table 4) reflects a major shift in assessment organization, moving canary rockfish and petrale sole to the first panel, with the UW-SAFS class conducting the petrale sole assessment. This would reduce available ageing time for those species by about six weeks and could reduce the total reading effort for these species by as much as 24 reader weeks. Given that desired ageing for these two species could run as high as 20,000 age reads and over 30 reader-months of work, we do not see this as a desirable alternative. LB-DMs for shortspine thornyhead and copper rockfish in Washington would be reviewed by the SSC-GFSC in early May, with the remaining copper rockfish models reviewed in a single STAR Panel in early July. This option would allow NMFS to retain one uncommitted assessment person to be assigned to specific need areas, as they arise.

Table 4. Option B-3 for species and the assessment type (full benchmark assessment, length-based data-moderate (LB-DM)), STAR panel timing, the number of potential model areas, needed staffing numbers per assessment, and tentative NMFS and state staff.

Starting	Species	Assess. Type	Modeled Areas	Lead Agency Staff Needed	Lead Agency Staff Available	Tentative NMFS assignments	State help
Option B-3			10	9	9		
STAR Panel 1 June 5	**Canary rockfish**	Full	1 (3)	1		Taylor, Oken	Tsou, Whitman, CDFW
	Petrale sole	Full	1	**Grad student class** @ UW-SAFS, led by NWFSC staff		Hamel, Haltuch, Gertseva	
STAR Panel 2 July 10	**Copper rockfish** CA: S. of 40° 10' N. Lat.	Full	2	2		Wetzel, Monk	CDFW
	N. of 40° 10' N. Lat.- OR/WA	LB-DM	1	1		Johnson	Whitman, Tsou, CDFW
STAR Panel 3 July 24	**Black rockfish**	Full	3	3		Cope, Dick & Rogers, Berger	Tsou, Whitman, CDFW
SSC-GFSC May 10-11	**Copper rockfish (WA)**	Update LB-DM	1	1		Johnson (+ Wallace)	
	Shortspine thornyhead	LB-DM	1	1		Langseth	
Catch-only updates	**Cowcod** **Widow rockfish** **Yelloweye rockfish**					Wallace	GMT
						Gertseva: TBD (prob. black rockfish or copper rockfish)	

The final option, Option C (Table 5) presents the species that could be assessed in 2023 if coastwide full assessments are chosen for copper rockfish. This option would most likely be associated with Council preference for a coastwide stock-status area for copper rockfish and a perceived need for all component areas to receive full assessments. Given that combined Oregon and Washington contributions to unfished spawning biomass levels are a relatively small portion of the coastwide totals, we would not anticipate new estimates from this portion of the stock in 2023 to have a substantial impact on the coastwide stock status. Additionally, conducting full assessments across the coast for copper rockfish, would come at the cost of needing to drop LB-DM assessments for rex sole and shortspine thornyhead in 2023. This option also results in both canary rockfish and petrale sole being reviewed in the first STAR panel, limiting the much needed time for ageing otoliths for these species. As noted above, this would greatly constrain age reading for these two species, and should be avoided if possible.

Table 5. Option C for species and the assessment type (full benchmark assessment, length-based data-moderate (LB-DM)), STAR panel timing, the number of potential model areas, needed staffing numbers per assessment, and tentative NMFS and state staff.

Starting	Species		Modeled Areas	Lead Agency Staff Needed	Lead Agency Staff Available	Tentative NMFS assignments	State help
Option C			9	8	9		
STAR Panel 1 June 5	**Canary rockfish**	Full	1 (3)	1		Langseth, Oken	Tsou, Whitman, CDFW
	Petrale sole	Full	1	Grad student class @ UW-SAFS, led by NWFSC staff		Hamel, Haltuch, Gertseva	
STAR Panel 2 July 10	**Copper rockfish** CA	Full	2	2		Wetzel, Monk	CDFW
	OR + WA	Full	2	2		Taylor, Johnson	Tsou, Whitman
STAR Panel 3 July 24	**Black rockfish**	Full	3	3		Cope, Dick & Rogers, Berger	Tsou, Whitman, CDFW
Catch-only updates	**Cowcod** **Widow rockfish** **Yelloweye rockfish**					Wallace	GMT
Gertseva: TBD (prob. black rockfish or copper rockfish)							