Prioritizing Fish Stock Assessments

Draft* Ranks for Pacific Coast Groundfish

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* This is a work in progress and still very much
open to comment and further exploration

Overview of Process

Identifying stocks for upcoming <u>Benchmark/Full or Update</u> assessments

1. **Define stock list – excludes:**
   - International assessments
   - Ecosystem component species
   - Stocks not listed in the FMP
   - Stocks with total landings <0.8 mt in 2010-14

2. **Assemble data and develop Factor Scores**
   - All factors standardized to max of 10 points
   - For now, excluding **Unexpected Changes in Stock Indicators** and **Ecosystem Importance** categories – future inclusion

3. **Calculate Target Frequency for each stock**

4. **Determine weights and Calculate total species scores**
   - Sum of factor scores times weights

5. **Evaluate priority ranking, in light of other factors**
   - Available index and composition data, workload

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Factor Scoring Overview

Category	Factor	Source/Basis	Range
FISHERY	Commercial Fishery Importance	Landed value (transformed)	0-10
	Recreational Fishery Importance	Landings * relative weights (transformed)	0-10
	Importance to Subsistence	Tribal comm revenue + habitat subsistence scores	0-10
	Non-Catch Value	Scuba/snorkel viewing	0-10
	Constituent Demand/Choke Stock	Constraining species; higher importance to sub-fleet or area	0-10
	Rebuilding Status	Status, rebuilding projections	0-10
STOCK	Relative Stock Abundance	Latest assessment or PSA	1-10
	Relative Fishing Mortality	Mortality reports	1-10
ECOSYSTEM	~~Key Role in Ecosystem~~	LATER: Link to Climate Vulnerability Asmt scores	~~1-10~~
ASMT	~~Unexpected Changes in Stock Indicators~~	LATER: Use GLMMs or survey swept-area estimates	~~0-10~~
	Relevant New Type of Information Available	Updated steepness, new survey, new fishery comps, issues from last assessment	0-10
	Years Assessment Overdue	Relative to Target Frequency	0-10+

Supporting data and scoring for each Factor is presented in an individual tab in the Brf. -Book Workbook

Fishery Importance – Commercial

Description:

    - Score based on Log-transformed ex-vessel value of landed catch

    - Preserves rank order, but reduces range & differences

    - Scaled against most valuable *regional* groundfish stock

    - Does not include tribal landings

Point Range: 0-10

Data Source:

    - Ex-vessel revenue,

    - Summed over years 2010-14

    - Obtained from PacFIN

Top-15 Species	Factor Score	Revenue $1000s
Sablefish	10.00	136,051
Dover sole	8.80	34,182
Petrale sole	8.30	19,251
Shortspine thornyhead	8.10	15,285
Longspine thornyhead	7.11	4,877
Lingcod	7.04	4,528
Yellowtail rockfish	6.98	4,219
Longnose skate	6.77	3,302
Black rockfish	6.76	3,248
Cabezon	6.59	2,690
Arrowtooth flounder	6.53	2,515
Chilipepper rockfish	6.40	2,151
Gopher rockfish	6.34	2,005
Brown rockfish	6.29	1,899
Rex Sole	6.10	1,532

Fishery Importance – Recreational

Description:

- No comparable metric to commercial revenues

- Landed weight alone ignores differential species value to anglers

- Proposing to apply relative weights ('pseudo-prices') to landed mts;

    - current range from 0.5 to 2.0

- Resulting 'pseudo-values' are scored in the same manner as comm. Revenues

Point Range: 0-10

Data Sources:

- Landings from state rec. data coordinators;

- Summed over 2010-2014

- Weights developed with State staffs & Angler representatives

Top-15 Species	Factor Score	Pseudo-Value	Catch (Mts)
Black rockfish	10.00	7,075	3,719
Lingcod	9.75	5,292	2,670
Vermilion Rockfish	8.77	1,726	923
Cal. Scorpionfish	8.25	949	474
Blue Rockfish	8.22	908	495
Bocaccio	8.17	865	467
Copper Rockfish	7.92	643	398
Brown Rockfish	7.86	605	418
Yellowtail Rockfish	7.78	547	450
Cabezon	7.38	346	292
Gopher Rockfish	7.34	331	304
Pacific Sanddab	7.09	248	304
Olive Rockfish	6.52	128	111
Kelp Greenling	6.49	124	119
Starry Rockfish	6.34	105	96

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Fishery Importance – Subsistence (Tribal)

Description:

 - Interpreted as Tribal fishery importance

     - Includes both tribal commercial landings and subsistence importance

 - Commercial portion is scored as
     non-Tribal commercial

Point Range: 0-10

Data Sources:

 - Tribal revenues from PacFIN

     - Averaged over 2010-15

 - Subsistence scores based on feedback
     received during NW Regional Habitat
     Assessment Prioritization process
     (Makah and Quinault tribal responses)

 - Additional Tribal review is underway

Species	Factor Score	Subsist. Score	Tribal "Commercial" Comm. Score	Tribal "Commercial" Revenue Dollars
Sablefish	10.0	3	7.0	18,397,119
Yellowtail Rockfish	8.8	3	5.8	2,700,516
Pacific cod	8.5	3	5.5	1,667,044
Lingcod	7.8	3	4.8	461,893
Petrale sole	7.5	2	5.5	1,627,204
Canary rockfish	6.3	3	3.3	42,727
Widow Rockfish	6.3	2	4.3	208,253
Dover sole	6.1	1.5	4.6	382,154
English sole	6.1	1.5	4.6	339,042
Rex Sole	6.0	2	4.0	140,555
Rougheye Rockfish	6.0	2	4.0	124,912
Big Skate	5.8	2.5	3.3	42,136
Redstripe Rockfish	4.7	2	2.7	15,389
Longnose Skate	4.5	2	2.5	10,701
Shortraker Rockfish	4.3	2	2.3	8,406

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Fishery Importance – Choke Species and Constituent Demand

Description:

- Stocks that constrain the catch of other healthy stocks
    - Particularly rebuilding stocks
- Species that are more important to a specific fleet or area than reflected in overall comm/rec ranks

Point Range: 0-10

Data Source:

- Impact of mgmt. measures for ACLs
- Level and attainment of ACL
- Commercial ranks: Overall & by fleet, state
- Recreational ranks: Overall & by state

Top-15 Species	Factor Score	Component Scores	
		Choke stock	Const. Demand
Cowcod	10	10	
Yelloweye Rockfish	10	10	
Darkblotched rockfish	9	8	1
Bocaccio	8	7	
Canary rockfish	6	4	2
Pacific ocean perch	6	5	1
Blackgill Rockfish	4	1	3
Rougheye Rockfish	4	1	3
China Rockfish	3	1	2
Quillback Rockfish	3	1	2
Shortraker Rockfish	3	1	2
Bank Rockfish	2		2
Black and Yellow Rockfish	2		2
Cabezon	2		2
California scorpionfish	2	1	1

Fishery Importance – Rebuilding Status

Description: Includes rebuilding, ESA-listed stocks

- Catch is reduced and may occur mainly as discarded bycatch

- Using expanded point range with additional scoring categories

Point Range: 0-10

Scoring:

 0 points = Stock does not have a rebuilding plan

 3 points = Recently rebuilt stock, but catch history impacted by restrictions

 6 points = Stock projected to rebuild > 20 years

 8 points = Stock projected to rebuild within 20 yrs

 9 points = Stock projected to be rebuilt by next assessment

10 points = Stock has a rebuilding plan,

　　　　　　　　but biomass is declining

Data Source:

- Stock status

- Recent assessments and rebuilding plans

Species	Factor Score
Bocaccio	9
Darkblotched rockfish	9
Cowcod	6
Pacific ocean perch	6
Yelloweye Rockfish	6
Canary rockfish	3
Widow Rockfish	3
All other species	0

Fishery Importance – Non-Catch Value

Description:

- Value not associated with any harvest
- Most traditional sources of non-use value are assumed to be adequately protected by the goals and effectiveness of the groundfish harvest policy
- Chose to base this value on *in situ* **viewing** of groundfish stocks (e.g. nearshore habitats, southerly distribution and abundance, and colorful/unique appearance)
- This Factor is currently given very low weight in summarization

Point Range: 0-10

Data Source: NMFS staff

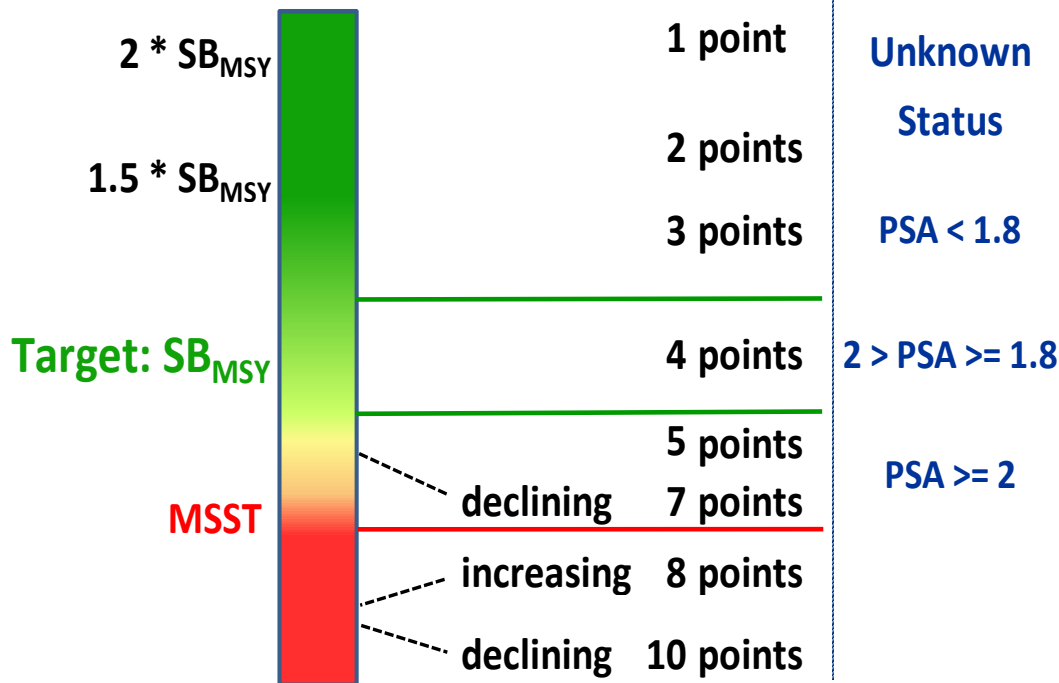| Top-15 Species	Factor Score
Black & Yellow Rockfish	10
Cabezon	10
Canary rockfish	10
China Rockfish	10
California scorpionfish	9
Kelp Greenling	9
Quillback Rockfish	9
Gopher Rockfish	8
Leopard Shark	8
Tiger Rockfish	8
Vermilion Rockfish	8
Yellowtail Rockfish	8
Copper Rockfish	7
Kelp Rockfish	7
Lingcod	7

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Stock Status – Biomass

Description:
- When available, based on relative spawning biomass (depletion), and targets/limits (or proxies)
- PSA scores used when biomass status is unknown (Additional categories add more resolution to scoring)

Point Range: 1-10

Data Sources: Most recent assessments & PSA scores

$2 * SB_{MSY}$	1 point	**Unknown**
		Status
$1.5 * SB_{MSY}$	2 points	
	3 points	**PSA < 1.8**
Target: SB_{MSY}	4 points	**2 > PSA >= 1.8**
	5 points	**PSA >= 2**
MSST	declining 7 points	
	increasing 8 points	
	declining 10 points	

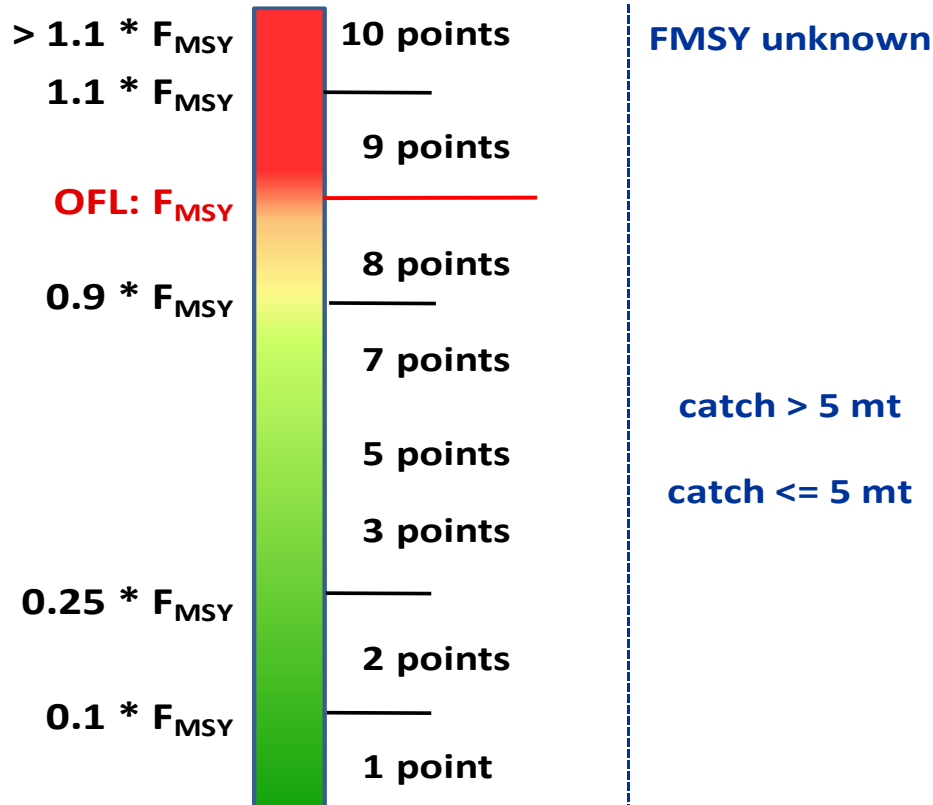| Top-20 Species	Factor Score	Depl. %	PSA Score
Pacific ocean perch	8	19%	1.69
Yelloweye Rockfish	8	21%	2
Bank Rockfish	6		2.02
Blue Rockfish	6	30%	2.01
Greenblotched Rockfish	6		2.12
Leopard Shark	6		2
Quillback Rockfish	6		2.22
Redbanded Rockfish	6		2.02
Redstripe Rockfish	6		2.16
Rosethorn Rockfish	6		2.09
Shortraker Rockfish	6		2.25
Silvergray Rockfish	6		2.02
Speckled Rockfish	6		2.1
Tiger Rockfish	6		2.06
Vermilion Rockfish	6		2.05
Blackgill Rockfish	5	30%	2.08
Bocaccio	5	31%	1.93
Cowcod	5	34%	2.13
Greenspotted Rockfish	5	35%	1.98
Sablefish	5	35%	1.64

Stock Status – Fishing Mortality

Description: Based on current fishing mortality & limits (or proxies)

(Additional categories add more resolution to scoring)

Point Range: 1-10

Data Source: Avg (2012-14) % of OFL attainment

Scoring:

	Points		
> 1.1 * F_{MSY}	10 points	**FMSY unknown**	
1.1 * F_{MSY}			
	9 points		
OFL: F_{MSY}			
	8 points		
0.9 * F_{MSY}			
	7 points		
	5 points	**catch > 5 mt**	
	3 points	**catch <= 5 mt**	
0.25 * F_{MSY}			
	2 points		
0.1 * F_{MSY}			
	1 point		

Top-15 Species	Catch % of OFL	Factor Score
Rougheye Rockfish	218%	10
Tiger Rockfish	218%	10
Squarespot Rockfish	156%	10
Shortraker Rockfish	156%	10
Quillback Rockfish	108%	9
Treefish Rockfish	99%	8
China Rockfish	96%	8
California scorpionfish	95%	8
Petrale sole	86%	7
Vermilion Rockfish	84%	7
Aurora Rockfish	78%	7
Honeycomb Rockfish	77%	7
Kelp Rockfish	72%	5
Black and Yellow Rockfish	67%	5
Blackgill Rockfish	66%	5

Assessment – New Information

Description:

 - Significant new data sources or methods expected to resolve uncertainties
    from previous assessments or upgrade level

 - Most stocks score zero in this category

Point Range: 0-10

Calculation:

Sum of points in four sub-categories (currently):

  - Updated steepness prior

  - Significant new source of index data

  - New source of composition data

  - Previous assessment issues can now be 'solved'

Data Source: NMFS staff

Species	Factor Score
Blue Rockfish	10
Yellowtail Rockfish	8
Gopher Rockfish	7
Vermilion Rockfish	7
Yelloweye Rockfish	7
Shortbelly Rockfish	6
Greenstriped Rockfish	5
Lingcod	5
Splitnose Rockfish	5
Arrowtooth flounder	4
All others (currently)	0

Target Frequency Details

Assessment Target Frequency for previously-assessed stocks is calculated using:

- Transformed Mean age in Catch (degree of inertia in OFLs)

- Additive adjustments for stocks with high or low:
  - Degree of Recruitment fluctuation
  - Fishery Importance (sum of weighted Fishery Factor scores)
  - Ecosystem Importance (when scores available; not included currently)

- Not calculated for stocks with data-limited assessments

- Target frequencies restricted to be no more than 10 years
  - rounded to the nearest even number to correspond to the PFMC's biennial cycle

Number of Stocks by Target Frequency

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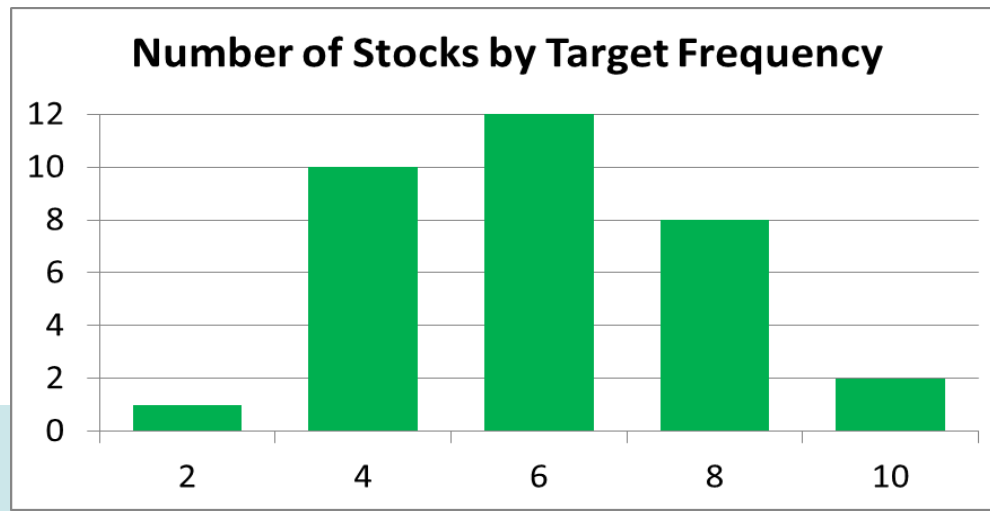
Assessment – Years 'Overdue'

Description:

- Years (if any) a stock has gone beyond its target frequency without an assessment
- Previously unassessed stocks assigned a value of '4', which also increases annually until an assessment is conducted
- Not currently considering D-M assessments in calculations for important species with data available to conduct a more complete assessment (e.g. yellowtail rockfish)

Point Range: 0-10+

Data Sources:

- Target assessment frequency
- Year of last assessment

Species	Score	Years since last asmt	Target Freq
Yellowtail RF	10	16	6
Starry flounder	8	12	4
CA Scorpionfish	8	12	4
Gopher RF	8	12	4
Lingcod	4	8	4
Cabezon	4	8	4
Blue RF	4	10	6
Arrowtooth	4	10	6
Longnose skate	4	10	6
ALL SPECIES	4	LACKING A TARGET FREQUENCY	
All other sp.	0		

Development of Overall Scores/Ranks

- All Factor Scores are assembled in the 'Factor Summary' spreadsheet/tab in the Excel file in Briefing Book

- The Factor Scores for each species are multiplied by a specific weight assigned to each Factor

- The summation of those weighted scores forms the basis for ranking species

- The results of 3 alternative sets of weights are presented along with the base weights in the 'Alt Weighting' tab
  - The Base Weights are recommended for further use through June, subject to new scoring of recent trend information)

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Next Steps: Before June

- Add scores for Changes in Stock Indicators
  - Estimate swept-area abundance trends for stocks that are sampled well by the trawl survey

- Cycle the model through future assessment periods
  - Limited updating of scores for the Factors:
    - Years an Assessment is Overdue
    - Rebuilding (for bocaccio and darkblotched)
    - New Type of Information Available (zeroing scores when assessed)
  - Value in identifying needs for future assessments skate example

- Refine evaluation of workload and data-availability considerations for assessing individual species, or suites of species

Next Steps: After June

- Develop metrics and scoring for the Ecosystem Importance Factor

- Evaluate alternative scoring transformations for commercial and recreational values

- Evaluate additional considerations that could contribute to determining target assessment frequency

- Explore/address issues raised by the Council and advisory bodies through this year's discussions

Preliminary Species Recommendations for Further 2017 Assessment Consideration

Species	Base Case Score	Base Case Rank	Last Assessed	Data Adequacy Lengths	Data Adequacy Ages	Data Adequacy Index	2017 Preliminary Assessment Recommendations
Yellowtail RF	5.44	1	2013 DM				**Full** asmt - **previous full asmt (2001) outdated**
Gopher RF	4.44	2	2005				Possible Full or DM asmt - **nearshore**, 1 state
Lingcod	4.35	3	2009				**Full** asmt - modeled as 2 areas in 2009
Bocaccio	4.32	4	2015				**Update** asmt - completion of rebuilding expected
Vermilion RF	4.30	5	2005				Wait until sunset issue is better resolved; Past assessment efforts have failed
Sablefish	4.27	6	2015				Assessed 2015 cycle
CA scorpionfish	4.13	7	2005				Possible Full or DM asmt - **nearshore**, 1 state
Cabezon	4.05	8	2009				Possible Full asmt (**nearshore**, 3 state) if workload allows
Darkblotched RF	4.03	9	2015				**Update** asmt - completion of rebuilding expected
Blue RF	3.93	10	2007				**Full** asmt - test of joint asmt of similar cryptic species (**nearshore**, 2-3 area)
Brown RF	3.92	11	2013 DM				Nearshore, 1 state; index available; CA comp data?
Quillback RF	3.85	12					Nearshore, 3 state; data availability is worse than for some nearshore species
Yelloweye RF	3.74	13	2011				**Full** asmt - highly constraining; update prior
Petrale sole	3.70	14	2015				Assessed 2015 cycle
Longnose Skate	3.66	15	2007				Unlikely to be able to age available samples this cycle; prepare for **2019**
Shortraker RF	3.65	16					Minimal survey catch; no index; Few ages
Black & Yellow RF	3.61	17					Nearshore, 1 state; no index; No (or few) ages
Pacific cod	3.60	18					Southern end of range; no ages read
Grass RF	3.54	19					Nearshore, 1 state; no index; No (or few) ages
Pacific ocean perch	3.48	20	2011				Data available, but it has a longer target frequency
Bank RF	2.98	36					Possible Full asmt
Blackgill RF	2.99	35	2011				Possible Full asmt
Arrowtooth flounder	3.22	28	2007				Possible **Update** to address age of assessment and potential for constraint
Big Skate	3.16	30					Unlikely to be able to age available samples this cycle; prepare for **2019**