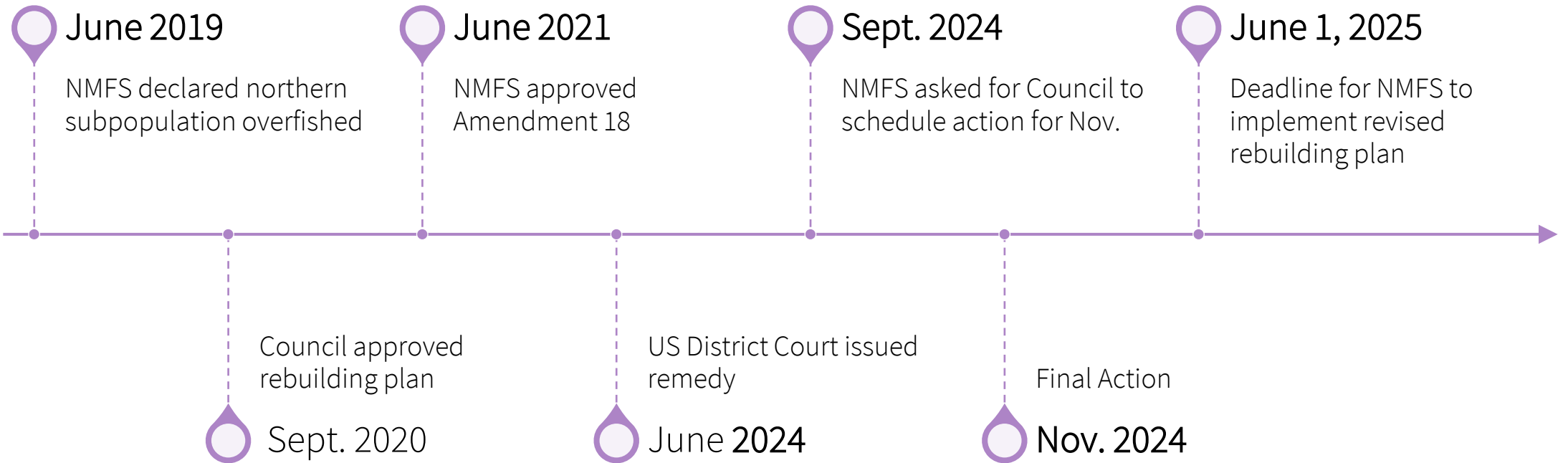




Revised Pacific Sardine Rebuilding Plan

Agenda Item J.2
November 2024

History



Court Order Specifics

- Elements vacated
 - Am.18 does not rely on catch limits to rebuild within statutory timeframe
 - Entirety of EA for Am. 18- Including discussion of impacts to humpback
 - NMFS did not demonstrate use of BSIA to set OFLs (exclusive use of CalCOFI in Emsy), and used that limit to set annual specifications
- Elements not vacated
 - Rebuilding Analysis- including Target, Tmin and Tmax
- Attachment 1 specifically looks at
 - ABC/ACLs to achieve the rebuilding target for sardine
 - Ttarget to align with new rebuilding strategy
- Changes to Emsy/HCRs not considered in document
 - Will be considered in April 2025

Council Action



Adopt a revised Pacific sardine rebuilding plan

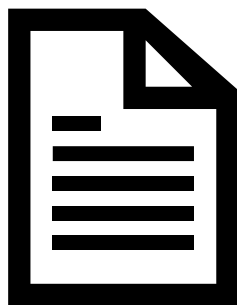


Adopt a new Ttarget



Provide guidance on FMP language

Briefing Book Materials



Attachment 1: Preliminary EA

Supp. Revised Attachment 2: Proposed FMP Language

Supp. Attachment 3: NS Guidelines Analysis

Supp. Attachment 4: Errata

Supp. CPSAS, CPSMT Reports

Public Comment

Sardine Management

Rebuilding References

Tmin	12 years
Tmax	24 years
Rebuilt biomass	150,000 mt age 1+ biomass

Ttarget

- Specified time period for rebuilding – as short as possible taking account biology of stock, needs of community and other factors
- Not to exceed Tmax
- Amendment 18 Ttarget = 14 years

Current Sardine Management

Harvest Control Rule (HCR)

OFL = Biomass * Emsy * Distribution

ABC = Biomass * BUFFER* Emsy*Distribution

ACL \leq ABC

Management Measures

- Directed fishery prohibited when biomass \leq 150,000 mt (closed since 2015)
- Automatic reduction in incidental allowances when biomass \leq 50,000 mt (MSST)
- Council can incorporate voluntary measures
 - Ex. 1 mt per trip limit for all CPS fisheries when ACT reached

Range of Alternatives

Alternatives

- Narrow scope
- Based on existing elements of CPS FMP, AM 18, 2024 Stock Assessment, and Court order
- Alternatives 1-4 analyzed for Amendment 18, Alternatives 5-6 added to revised rebuilding plan

Alternative 1 (No Action)

- "Status Quo" in Amendment 18: Maintains existing annual harvest specifications process
- Sardine catch will likely never reach ABC/ACL due to FMP mgmt measures, due to closure of directed fishery; Does not set specific ACL
- Revised plan assumes full ABC removals

Alternative 2 - Zero U.S. Harvest

- Complete closure of remaining fisheries (ACL= 0)
- Elimination of incidental landing allowances
- Modeled to provide T_{min}
- Difficult to enforce in reality

Alternative 3 - 5% Fixed U.S. Harvest Rate

- ACL = 5% of total age 1+ biomass
- OFL/ABC based on existing HCR
- ACL would bypass DISTRIBUTION/BUFFER
- Intermediate alternative from Amendment 18 analysis between No Action and Zero Harvest

Alternative 4 - Constant Catch

- OFL/ABC set using HCR
- ACL = 2,200 mt or the ABC (if less than 2,200 mt)
- Modeled in Amendment 18 rebuilding analysis to represent 2015-2020 average catch

Alternative 5 - Modified Constant Catch

- OFL/ABC set using HCR
- ACL = 3,200 mt or the ABC (if less than 3,200 mt)
- Added buffer to 2015-2020 average catch
- **note** corrected landings values may facilitate smaller buffer

Alternative 6 - Mixed Rate

- OFL/ABC set using HCR
- ACLs set using tiered approach
 - Biomass \leq 50,000 mt : ACL = 2,200 mt or the ABC (if less than 2,200 mt)
 - Biomass $>$ 50,000 mt : ACL = 5% of total age 1+ biomass

Comparison of Alternatives

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	No Action	Zero Harvest	5% Fixed Harvest Rate	Constant Catch	Modified Constant Catch	Mixed Rate
ACL	Determined annually	0	5% of biomass	2,200 mt	3,200 mt	Bio \leq 50,000 = 2,200 mt Bio > 50,000 = 5% biomass
Chance of Rebuilding by Tmax (24 years)	< 50%	> 50%	> 50%	> 50%	> 50%	> 50%
Years to Rebuild	Not within modeled timeframe	12 years	< 16 years	< 17 years	< 17 years	< Tmax (24 years)

Analysis of Alternatives

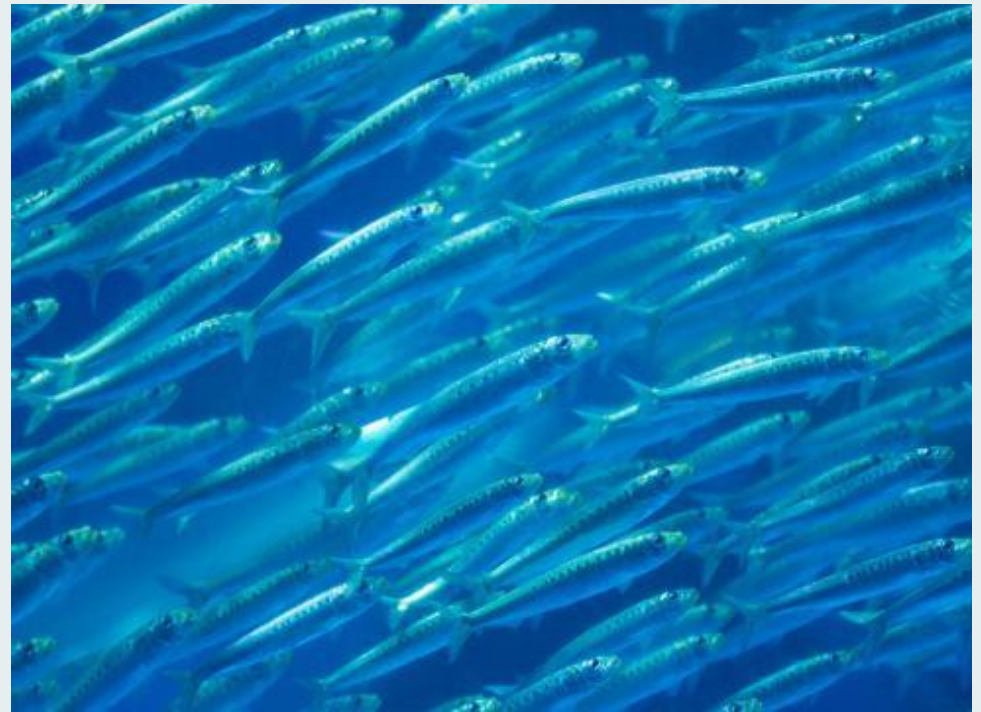
Modelling and Analysis of Alternatives

- "Rebuilder" tool run in 2020 by a team from the SWFSC
- Model assumes full ABC/ACL removal, counts all removals towards NSP
 - Interpretation of results under each Alt accounts for proportion of NSP
- Model and inputs reviewed by SSC
- Rebuilder model provides results for Alternatives 1-4; results extrapolated for Alternatives 5-6

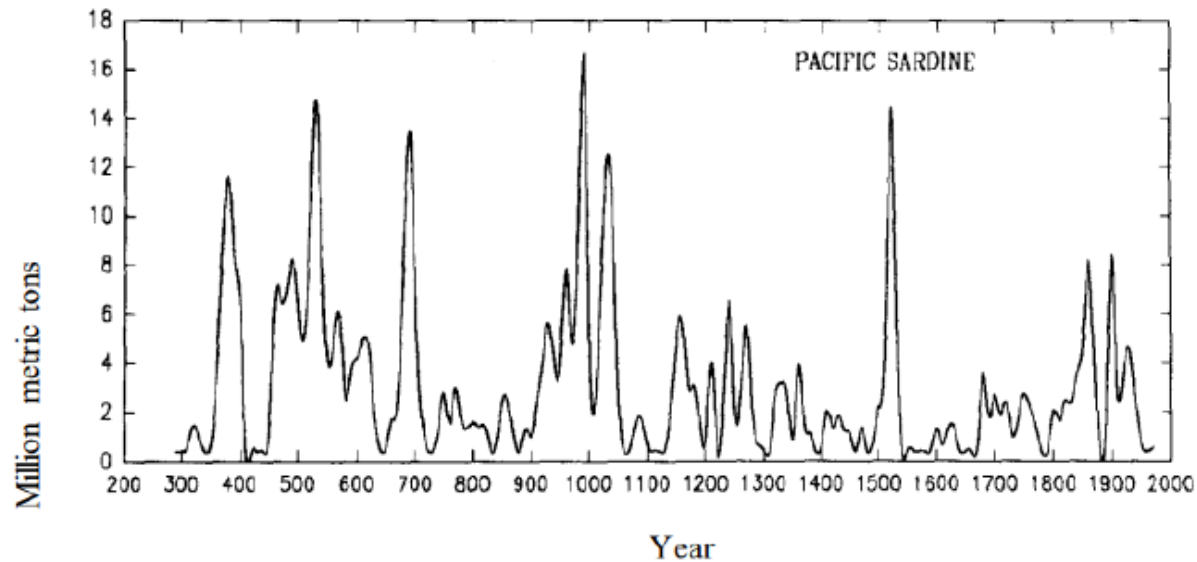
Key Parameters

- 18% Emsy
- 9.9% Mexico Catch
- 2015-2018 Recruitment Baseline
- 2020 Benchmark Stock Assessment

Target Species- Pacific Sardine



Pacific Sardine



- Small schooling fish that have boom and bust cycles
- California Current Ecosystem
- Influenced by environmental conditions, climate cycles (PDO)

Overfished Status

- Poor recruitment

Figure: 1700-year hindcast series of Pacific sardine biomasses off California and Baja California (reproduced and modified from Baumgartner, Soutar, & Ferreira-Bartrina, 1992)

Pacific Sardine – Subpopulations

Three subpopulations: (1) Northern Subpopulation (in FMP); (2) Southern Subpopulation; (3) Gulf of CA

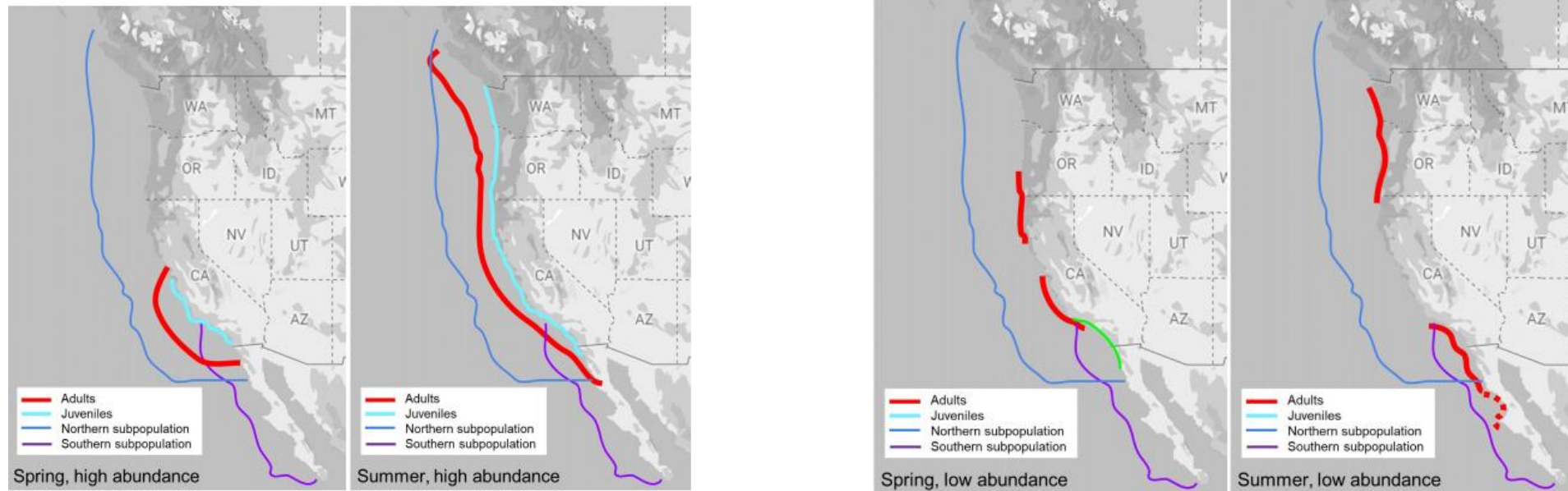


Figure: Illustrative archetype of the northern subpopulation of Pacific sardine. Adult distribution in red, juvenile distribution in green. Northern subpopulation in blue, southern subpopulation in purple. (Output from 2023 Pacific sardine stock structure workshop)

Pacific Sardine – Subpopulations

Management Year	NSP Landings	Total Landings, per 2024 Stock Assessment
2015-2016	75	1,919
2016-2017	602	1,885
2017-2018	351	1,775
2018-2019	525	2,278
2019-2020	627	2,062
2020-2021	657	2,276
2021-2022	298	1,772
2022-2023	517	1,619
2023-2024	154	1,206

Northern and Southern Subpopulation Landings

- All landings accounted towards NSP
- Since 2015, average of 22.67% of landings were NSP

Data from 2024 Benchmark Stock Assessment (Kuriyama et al. 2024)

Pacific Sardine – Data Sources

Management Year	Total Landings – Stock Assessment	Total Landings – PacFIN
2015-2016	1,919	
2016-2017	1,885	
2017-2018	1,775	
2018-2019	2,278	
2019-2020		2,085
2020-2021		2,498
2021-2022		1,772
2022-2023		1,619
2023-2024		1,774

Understanding landings data used in analysis

- Slight discrepancies in landings data between 2024 stock assessment and PacFIN
- PacFIN does not include live bait landings before 2019
- See errata for corrections
- Proportion of NSP derived from stock assessment

Data from 2024 Benchmark Stock Assessment (Kuriyama et al. 2024) for 2015-2016 through 2018-2019 fishing years and from PacFIN data portal for 2019-2020 through 2023-2024 fishing years

Impacts to Sardine

Alternative	Time to Rebuild	Year Expected to Rebuild
1	Not within modeled timeframe	-
2	12 years	2033
3	< 16 years	2037
4	< 17 years	2038
5	< 17 years	2038
6	< T _{max}	2045

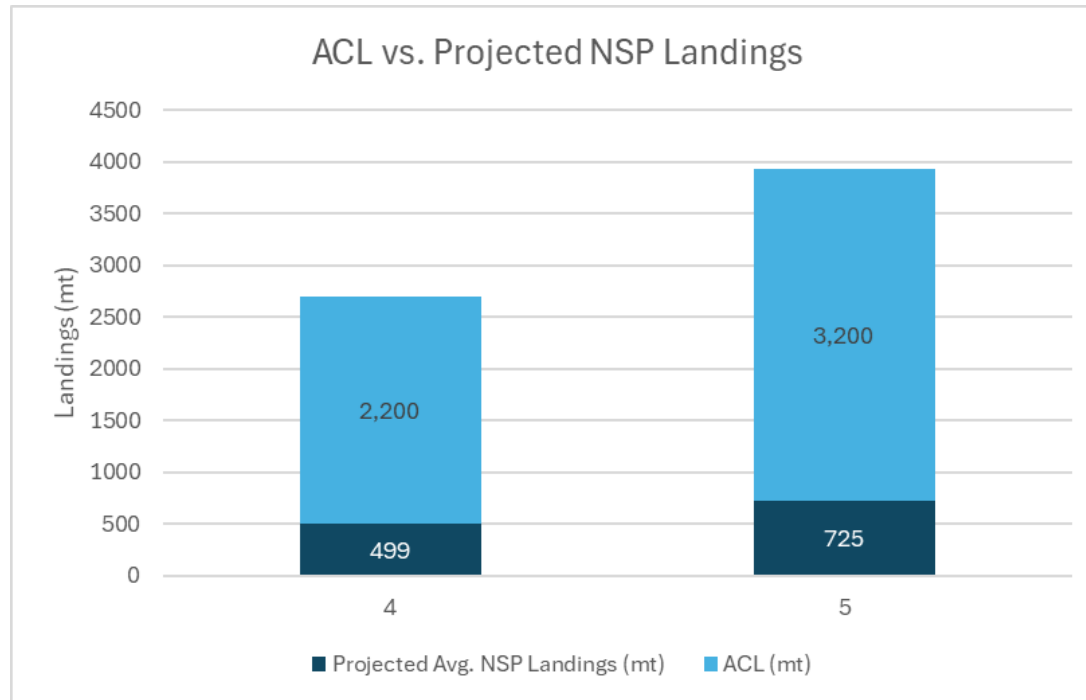
Note: Time to rebuild was directly modeled for alternatives 1-4; extrapolated for alternatives 5-6

- Time to rebuild = 50% probability to reach target of 150,000 mt age 1+ biomass
 - Begins in 2021
 - Modeling does not account for
 - Average SSP landings
 - Not attaining ACL due to socio-economic reasons
- T_{target} may be selected to account for SSP
 - Full Rebuilder timeline > T_{target}
- Environmental conditions will play a key role in time to rebuild from low biomass – all rebuilding timelines have uncertainty

Impacts to Sardine

Comparisons of ACLs modelled and projected NSP landings

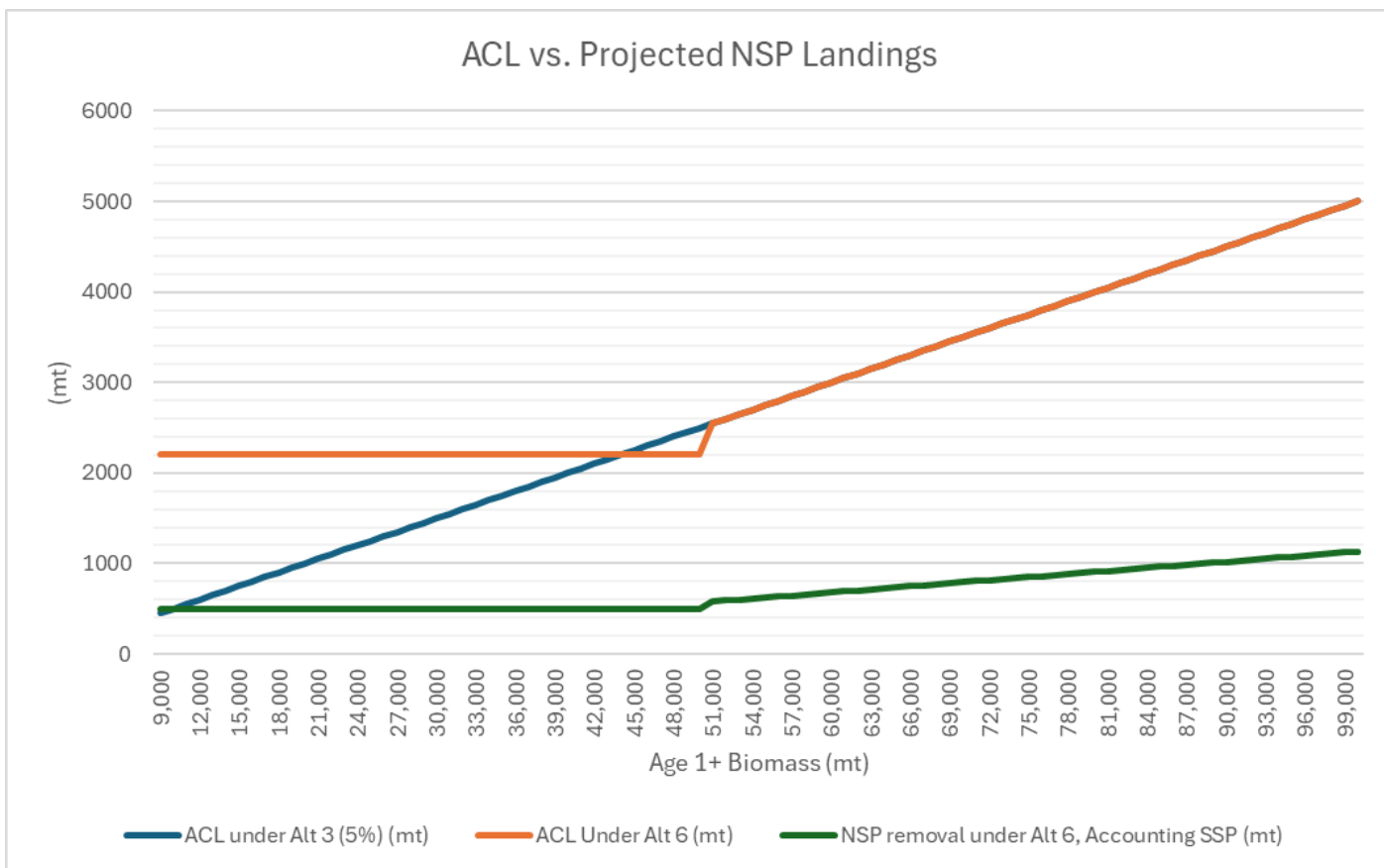
Alternatives 4 and 5



- Alternative 4
 - 2,200 mt/year modelled to rebuild within 17 years
 - Rebuilding timeline may be shorter
 - Avg. 22.67% NSP --> Ttarget shortened
- Alternative 5
 - 3,200 mt/year ACL
 - Avg. NSP = 22.67% = 725 mt < 2,200 mt
 - Expected to rebuild within 17 years

Impacts to Sardine

Alternatives 3 and 6; (see Attachment 1, Appendix A for full Table)



- Alternative 3
 - modelled to rebuild within 16 years
 - Rebuilding timeline may be shorter
 - Biomass > 58,000 mt likely will not achieve ACL

- Alternative 6
 - Modified Alt 3, with ACL = 2,200 mt at low biomass
 - Avg. NSP caught at low biomass = 22.67% = 499 mt < Alt 3 until biomass = 11,000 mt
 - Expected to rebuild within Tmax

Impacts to Sardine

Alternative	Time to Rebuild	Year Expected to Rebuild
1	Not within modeled timeframe	-
2	12 years	2033
3	< 16 years	2037
4	< 17 years	2038
5	< 17 years	2038
6	< T _{max}	2045

Note: Time to rebuild was directly modeled for alternatives 1-4; extrapolated for alternatives 5-6

- Time to rebuild = 50% probability to reach target of 150,000 mt age 1+ biomass
 - Begins in 2021
 - Modeling does not account for
 - Average SSP landings
 - Not attaining ACL due to socio-economic reasons
- T_{target} may be selected to account for SSP
 - Full Rebuilder timeline > T_{target}
- Environmental conditions will play a key role in time to rebuild from low biomass – all rebuilding timelines have uncertainty

Sardine in the Ecosystem



Impacts to Sardine in the Ecosystem

- Sardine are prey for commercially important marine fishes, several seabirds, dozen marine mammals, including humpback whale
- Prey switching common among CPS predators (i.e., humpback whales) based on abundance
- When biomass of Pacific sardine is low, central population of northern anchovy is high
- Environment will likely be primary determinant of prey availability

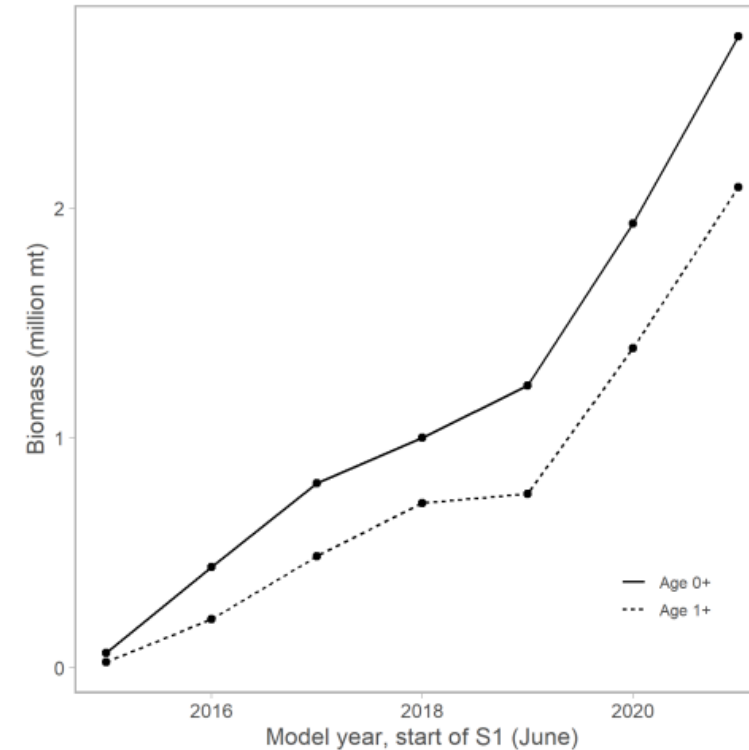


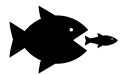
Figure: Estimated CSNA total biomass (age 0+ fish; mt) and stock biomass (age 1+ fish; mt) from 2021 Benchmark Stock Assessment

Impacts to Sardine in the Ecosystem



Timeline to Rebuild

- Alternative 1 – does not rebuild within modeled timeframe
- Alternatives 2-6 – Projected to rebuild within modeled timeframe



Differences in rebuilding timelines not expected to significantly affect forage availability or the ability for endangered seabird and marine mammal populations to recover



Protections to Krill – remain in place under CPS FMP

Fishing Industry



Fishing Industry Impacts

- Since 2015, only harvest by small scale and incidental sectors
- Avg catch 2015-2024 = 1,956 mt*, mostly live bait
- Catch outside the historical range is unlikely unless increase in demand from rec industry
- Incidental landings- mostly able to land within limits, but industry have expressed frustration with needing to be selective in mixed CPS loads

Minimum	Maximum	Average
1,619 mt*	2,498 mt*	1,956 mt*

Minor Directed Landings 2022-2023	Est. Live Bait Landings 2022-2023
77 mt	1,151 mt

* Some landings numbers were updated from Attachment 1, see errata

Fishing Industry Impacts

Summary of Impacts	Fishing Year	Alt 3 – 5% fixed harvest rate	Alt 4 – Constant Catch	Alt 5 – Modified Constant Catch	Alt 6 – Mixed Rate	Actual Landings
<ul style="list-style-type: none"> Alternative 2 = eliminate all fishing 	2015-2016	4,834	2,200	3,200	4,834	1,919
	2016-2017	5,307	2,200	3,200	5,307	1,885
<ul style="list-style-type: none"> Alts 3 and 4 = small scale fisheries may persist, but reduce interannual flexibility 	2017-2018	4,328	2,200	3,200	4,329	1,775
	2018-2019	2,603	2,200	3,200	2,603	2,278
<ul style="list-style-type: none"> Alt 5 and 6 = increase interannual flexibility 	2019-2020	1,377	2,200	3,200	2,200	2,085
	2020-2021	1,414	2,200	3,200	2,200	2,498
<ul style="list-style-type: none"> Alt 4, 5, and 6 = long term economic stability through maintaining set level of opportunity 	2021-2022	1,413	2,200	3,200	2,200	1,772
	2022-2023	1,368	2,200	3,200	2,200	1,619
	2023-2024	1,368	2,200	3,200	2,931	1,774

Fishing Industry Impacts

Summary of Impacts

- Alternative 2 = eliminate all fishing
- Alts 3 and 4 = small scale fisheries may persist, but reduce interannual flexibility
- Alt 5 and 6 = increase interannual flexibility
- Alt 4, 5, and 6 = long term economic stability through maintaining set level of opportunity

Considerations

- Council may consider how Alts 3-6 meet the economic intentions of status quo, while relying on acceptable HCRs in their implementation
- Council may consider change in scale of impacts to the target resource and fishing industry under Alts 4 and 5, given corrected landings data (see errata)

National Standard Guidelines

(Supplemental Attachment 3)

NS 1

Prevent overfishing
while achieving OY

- Alt 1- Determined by Court to fail to set ACLs to prevent overfishing
- Alts 1, 5, 6 higher net benefit to Nation than Alts 2, 3, 4

NS 8

Importance of fishing
resources to
communities

- Communities already experiencing adverse socioeconomic impacts
- Alts 1, 5, 6 allow for sustained participation for smaller sectors
- Alts 2, 3, 4 likely to impose additional or unnecessary socioeconomic impacts

FMP Amendment

(Supplemental REVISED Attachment 2)

Proposed FMP Edits

4.5.1 Rebuilding Plan for Pacific Sardine

In July 2019, the National Marine Fisheries Service notified the Council that it had declared the Pacific sardine stock overfished. The declaration came as a result of the 2019 Pacific sardine stock assessment indicating that the stock had declined below its MSST of 50,000 mt. The original ~~A~~-rebuilding plan was adopted by the Council in September 2020, which was modified by the Council in November 2024. The rebuilding reference points for Pacific sardine are:

T_{min} = 12 years

T_{max} = 24 years

T_{target} = ~~XX~~14 years

Rebuilding target = 150,000 mt of age 1+ biomass

Total catch limits (i.e., OFL/ABC/ACL) will be set annually based on annual stock assessments and the control rules in the FMP and recommendations from the SSC regarding uncertainty in the assessment and OFL. The ACL will be set at [INSERT ALTERNATIVE DESCRIPTION].

Council Action

Adopt a Final Preferred Alternative for a Pacific Sardine Rebuilding Plan, including an FMP Amendment

Questions?