



Agenda Item I.1.b
SWFSC Presentation 1
November 2026

Highly Migratory Species Research Update Southwest Fisheries Science Center

*Presented by
Annie Yau, Fisheries Resources Division Director*

Presentation to Pacific Fishery Management Council Nov 15, 2026

Updates since November 2025





HMS Research Update: Outline

- **Assessments:**
 - 2026 assessment summary:
 - North Pacific Albacore benchmark
 - North Pacific Albacore harvest strategy tool
 - Pacific Bluefin Tuna MSE harvest control rule calculation
 - 2027 assessment schedule
 - Pacific Bluefin Tuna update (health check)
- **Life History:**
 - Pacific Bluefin tuna age and growth: International workshop
 - Pacific Bluefin tuna foraging update
- **Genetics:**
 - Pacific Bluefin close-kin mark-recapture update
- **List of publications and presentations**





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2026 North Pacific Albacore benchmark stock assessment

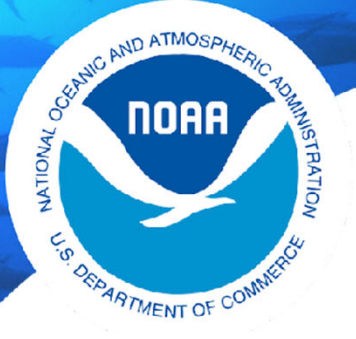


- Led by SWFSC scientists and completed through ISC ALB WG
- Accepted as best available science by ISC
- Presented to stakeholders, IATTC and WCPFC

[https://isc.fra.go.jp/pdf/ISC26/ISC26 ANNEX 08-
Stock Assessment Report for Albacore Tuna in the North Pacific Ocean v1.pdf](https://isc.fra.go.jp/pdf/ISC26/ISC26%20ANNEX%2008-S%20Stock%20Assessment%20Report%20for%20Albacore%20Tuna%20in%20the%20North%20Pacific%20Ocean%20v1.pdf)

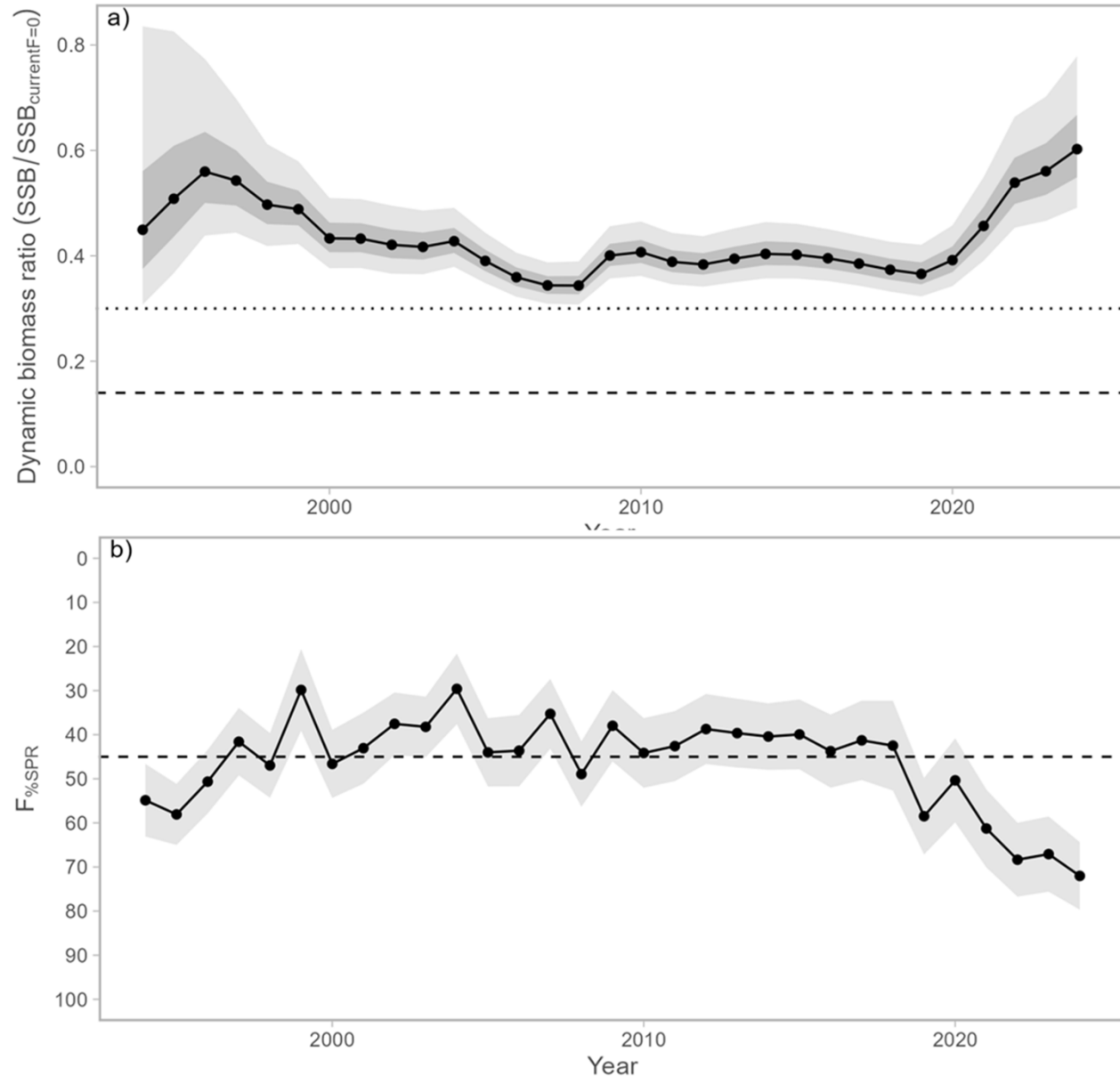
2026 North Pacific albacore stock status

Not overfished - No overfishing



>99% probability
not overfished relative to the
threshold ($30\%SSB_{current,F=0}$)
and limit ($14\%SSB_{current,F=0}$)
reference points

>99% probability
no overfishing relative to the
target reference point
($F_{45\%SPR}$)





North Pacific Albacore harvest strategy tool



An interactive analytical tool to inform allocation setting for NPALB

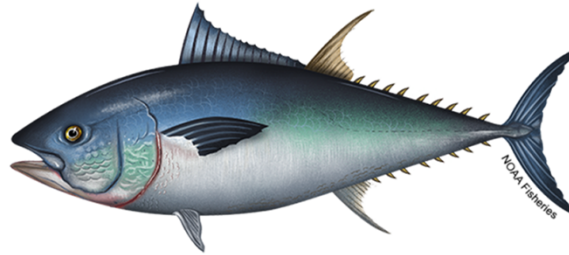
- Harvest strategy adopted by IATTC & WCPFC in 2023 but allocation rules are still uncertain
- To inform allocation rules, WCPFC NC requested analyses on historical fishing impacts by different fleets
- User can select timeframes, fleet structures, catch/effort limits to calculate impacts and biomasses
- Led by SWFSC scientists and completed through ISC ALB WG
- Presented to stakeholders, IATTC, and WCPFC

https://connect.fisheries.noaa.gov/NPALB_harvest_strategy_tool/

Pacific Bluefin Tuna MSE update



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2025 PBF MSE completed testing 16 candidate management procedures:
<https://connect.fisheries.noaa.gov/ISCPBF-adopted-MSE-tool/>

The new harvest control rule has been calculated via the MSE:
<https://connect.fisheries.noaa.gov/ISCPBF-MSE-tool/>

- Following completion of the MSE in 2025, the WCPFC-IATTC Joint Working Group on PBF proposed *a new harvest control rule in Mar 2026*, adopted by the IATTC in August 2026.
- Through ISC PBF WG, SWFSC scientists led the calculation of this new HCR using the MSE framework
- Will be presented to WCPFC-NC, WCPFC-SC, and WCPFC this fall



2027 Assessment Schedule

ISC

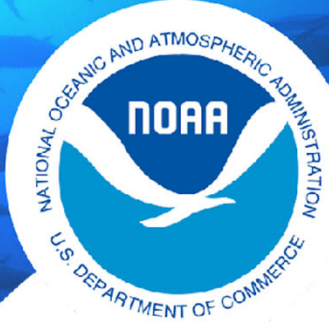
- Pacific Bluefin Tuna health check (update, last was in 2024) - SWFSC lead
- WCNPO Striped Marlin benchmark (last was in 2023) - PIFSC lead
- NPO Blue shark benchmark (last was in 2022) - PIFSC lead
- NPO Swordfish MSE (new) - PIFSC lead

WCPFC (Subject to change)

- SPO Albacore Tuna benchmark (jointly with IATTC)
- SWPO Blue Shark benchmark

IATTC

- EPO Bigeye Tuna update
- EPO Yellowfin Tuna MSE (initiation)
- Dorado update (subject to data availability)



Record Pacific Bluefin Tuna Landed in California by Rod and Reel



- 4 fish over 400 pounds landed in September 2026 by recreational and commercial fishermen
- 1 fish was estimated to be ~500 lbs after it weighed 446 lbs gilled and gutted
- Previous California state record was 395 lb fish caught recreationally in 2021
- HMS scientists worked with industry partners to sample otoliths, tissues, and DNA
- Working with academic partners we hope to determine if these fish crossed the Pacific recently or multiple times



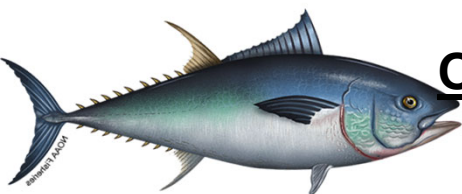
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International Workshop on Pacific Bluefin Tuna Age and Growth

An International Aging Workshop for PBF was co-hosted by SWFSC, Fisheries Research Agency (FRA; Japan), and National Taiwan University (NTU; Taiwan)

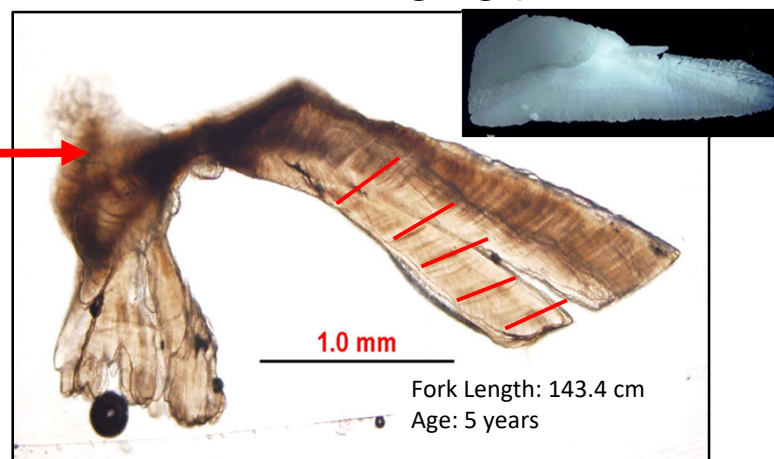
Goal:

Compare reading consistency across international labs
(longer term) Develop EPO length-at-age estimates for stock assessments



Outcomes:

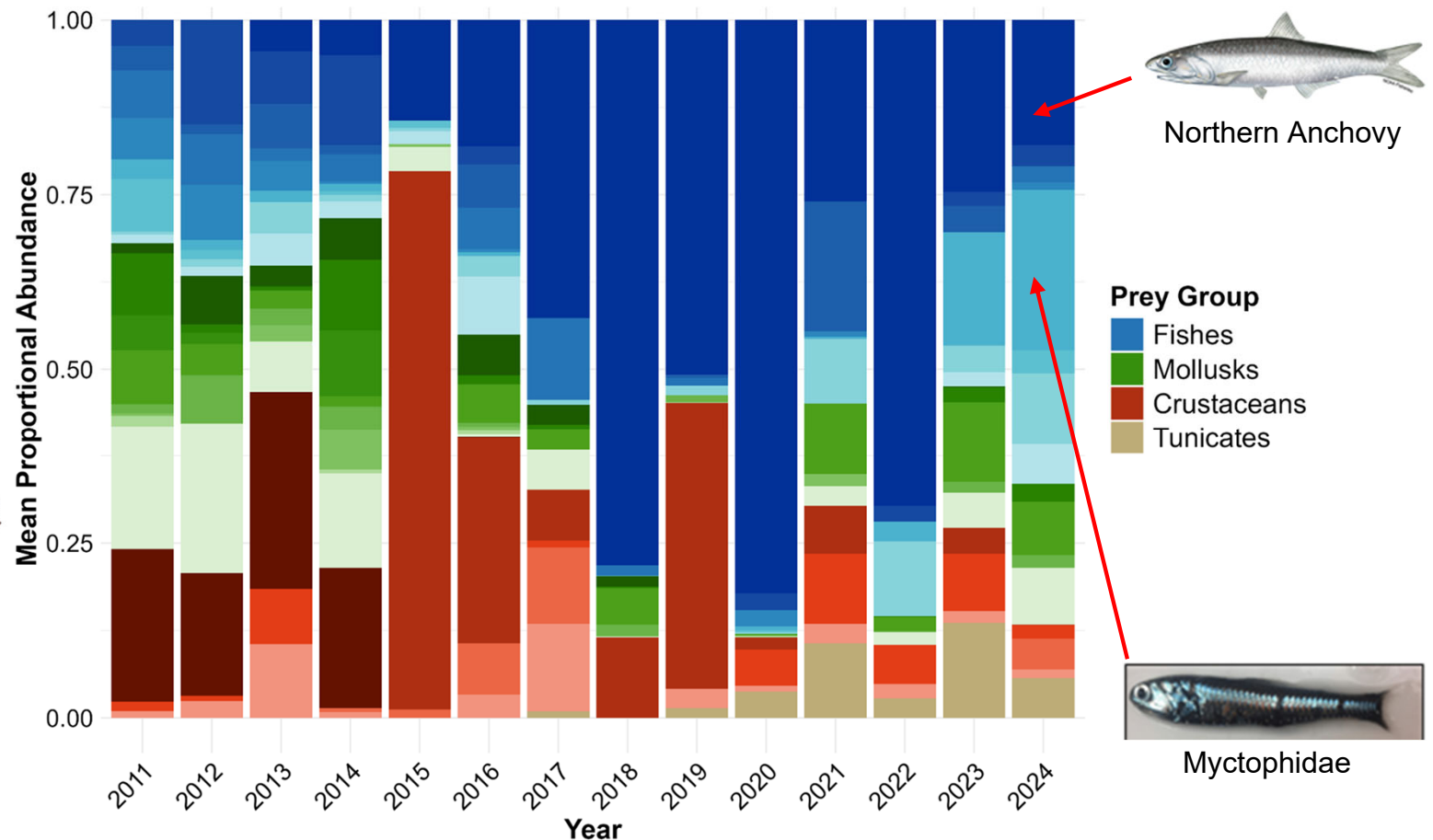
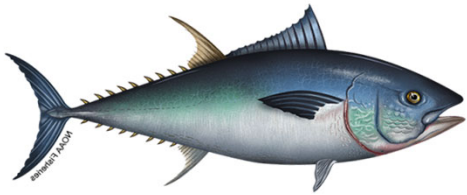
- Aging discrepancy at younger ages identified and being resolved
- 632 EPO otoliths sectioned in preparation for comparison reading
- 210 otoliths aged by FRA & NTU; NOAA aging planned for Fall 2026



Pacific Bluefin Tuna: Foraging Update



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- An additional year of data for 2024 has been processed: Myctophids were the dominant prey and anchovy consumption dropped relative to 2023
- PBF stomachs from 2025 and 2026 are currently being processed
- HMS scientists are currently working with local fishermen to collect PBF stomachs ahead of and during ENSO to document potential diet shifts



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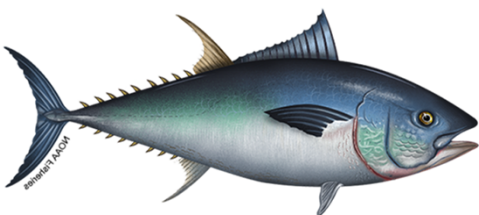
Pacific Bluefin Tuna

Close-Kin Mark-Recapture (CKMR)

Plans to restart CKMR collections in 2027 through a partnership with the CPFV fleet

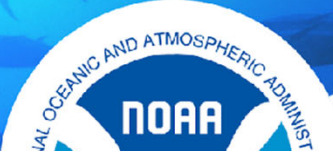
Goals:

- Develop and refine sample collection protocol to ensure no cross-contamination
- Add to SWFSC's existing CKMR sample collection
- Spark collaborative work with Japan to improve CKMR data collection and analyses



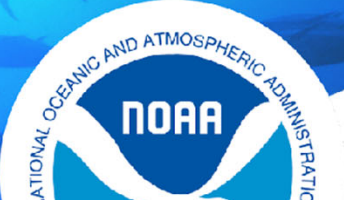
<u>Year</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>
#	195	396	220	133	262	1040	672	1817	1119	392	357	269

SWFSC PBF tissue samples by year of collection. Bolded values indicate years of dedicated sampling for CKMR. Note that 2020 sampling was interrupted by COVID.



Recent HMS Publications

1. Lin, Y. W., Chang, Y. J., Hsu, J., Snodgrass, O. E., Richards, T., and Shiao, J. C. 2025. Spawning stock recovery of Pacific bluefin tuna (*Thunnus orientalis*): evidence from length, age and catch data of Taiwanese longline fishery in 2010–2023. Fisheries Research, 292, 107602. <https://doi.org/10.1016/j.fishres.2025.107602>
2. Nickels, C. F., Muhling, B. A., Portner, E. J., Snodgrass, O. E., & Dewar, H. 2025. Ocean conditions drive interannual variability in juvenile albacore tuna (*Thunnus alalunga*) muscle energy content in the California Current System. Plos one, 20(9), e0331436. <https://doi.org/10.1371/journal.pone.0331436>
3. Ku, C. C., Richards, T., Snodgrass, O. E., Jin, C. B., Wang, P. L., and Shiao, J. C. 2026. Natal Origin and Trans-Pacific Migration of Pacific Bluefin Tuna (*Thunnus orientalis*) Inferred From Otolith Oxygen and Carbon Isotope Analysis. Fisheries Oceanography, 35(3), 462-476. <https://doi.org/10.1111/fog.70032>
4. Wells, R. D., Richards, T. M., Sluis, M. Z., Rooker, J. R., Mohan, J. A., Liu, H., ... and Tanaka, Y. 2026. Nursery-specific contribution estimates of Pacific Bluefin Tuna to the eastern North Pacific Ocean. Marine and Coastal Fisheries, 18(4), vtag010. <https://doi.org/10.1093/mcfafs/vtag010>
5. Richards, T. M., Snodgrass, O. E., Preti, A., Dewar, H., and Muhling, B. A. 2026. Pacific Bluefin Tuna maintain trophic stability despite shifting diet composition over 12 years in the California Current Ecosystem. Scientific Reports. <https://doi.org/10.1038/s41598-026-66804-7>
6. Vissio, N. V., Deniro, D., Warkentin, S., et al. 2026. The origin and evolution of tuna sex chromosomes. <https://doi.org/10.1186/s12864-026-13229-1>
7. Milton Love, Tor Mowatt-Larssen, Jules Jacobs, Owyn E. Snodgrass, Jason Watters, Marianne Nyegaard. 2026. The Giant Sunfish, *Mola alexandrini* (Ranzani 1834) (Molidae), Joins the List of Marine Fishes in California Waters, Bulletin, Southern California Academy of Sciences, 124(3), 101-105
8. Grewe P.M., Hammond J.M., Reis A.L.M. et al. 2026. The origin and evolution of tuna sex chromosomes. <https://doi.org/10.1186/s12864-026-13229-1>
9. Rodríguez-Medrano, M. C., Z. Ramírez-Mendoza, O. Sosa-Nishizaki, N. C. Wegner, J. R. Hyde, O. Snodgrass, H. Dewar, S. A. Aalbers, and C. A. Sepulveda. 2026. Determining the preferred structure for aging smalleye Pacific opah in the Eastern North Pacific. California Fish and Wildlife Journal 112:e8.



Recent HMS Presentations

National Stock Assessment Workshop

- Re-conceptualizing Spawning Potential Ratios as Poisson-binomial Distributions
- Applying Diagnostic Tools to Determine the Uncertainty Grid for Management Strategy Evaluation: a Pacific Bluefin Tuna Example
- Simulation Testing of Alternative Management Procedures for Pacific Bluefin Tuna to Improve Performance Under a Recruitment Drop Scenario

PICES 2026 Small Pelagic Fish Symposium

- Interannual variability in Pacific Bluefin Tuna Diets in the Southern California Bight

SWFSC Seminar

- Pacific bluefin Tuna in the California Current: Updates on Age, Growth and Trophic Ecology

ISC Plenary 2026

- Pacific Bluefin Tuna in the California Current: Updates on Age and Growth Objectives

The American Albacore Fishing Association (AAFA)

- 2026 North Pacific Albacore Stock Assessment

Fisheries Innovation Workgroup webinar

- Bayesian estimation of Catch and Bycatch performance in novel fishing methods

National Cooperative Research Program Meeting

- Cooperative Research to Support Highly Migratory Species Management: Overview and FY26 Progress Report