American Fishermen's Research Foundation News

This newsletter focuses on two forums attended by AFRF consultants and reports below of each event. The first on the International Scientific Committee (ISC) meeting and updates on the direction the Management Strategy Evaluation (MSE). The following report is on the 69th Tuna Conference at lake Arrowhead where Stephanie Snyder presented her tag data results.

Albacore Working Group Workshop - International Scientific Committee for Tuna and Tuna-like Species - 30 April – 5 May 2018 - SWFSC/NOAA, La Jolla, CA, USA

Each year, the Albacore Working Group (ALBWG) of the ISC gathers at the NOAA Science Center in La Jolla, CA to update, renew or revise the modeling framework of how north Pacific albacore (NP ALB) stocks are assessed and subsequently managed. Last year the WG met and developed an entirely revised "benchmark" stock assessment for north Pacific albacore (NPALB) based on the Stock Synthesis III modeling framework that IATTC uses for all its stock assessment work. Science Advisor David Itano attended that workshop (March 2017) and reported out on the revised stock assessment last year. As a member of the ALBWG he also attended the recent meeting described here. The meeting was convened by the current Chairman, Hidetada Kiyofuji. Scientists from Canada, Japan, Taiwan, USA and persons representing the IATTC, NOAA Fisheries, the Secretariat of the Pacific Community and AFRF attended.

This year's workshop concentrated on the development of a model for the management of NPALB using the Management Strategy Evaluation (MSE) approach. A quick Google of MSE reveals a handy description from PEW that *"Management strategy evaluation (MSE) is a tool that scientists and managers can use to simulate the workings of a fisheries system and allow them to test whether potential harvest strategies—or management procedures— can achieve pre-agreed management objectives."* FAO defines MSE as; *"… (MSE) involves assessing the consequences of a range of different management strategies or options to assist determine [sic] which approach will be the most appropriate to meet the operational objectives of the fishery".*

The NOAA Fisheries definition is more difficult to grasp and far more confusing to non-modelers, stated thus; *"The Management Strategy Evaluation (MSE*) combines a number of NFT programs to examine the ability of stock assessment programs to provide the correct management advice when a variety of assumptions are broken. The PopSim model is used to create the operating model, aka simulated truth, while the VPA or ASPIC models can be used to estimate the population trajectory and time series of fishing mortality rates. These estimated values are used as input for AgePro or ASPICproj, respectively, to forecast the amount of catch that should be caught in future years according to a user defined control rule. The control rule relates the desired fishing mortality rate to the spawning stock or population biomass according to a simple rule of the full rate at high biomass with a linear decline once biomass falls below a user defined breakpoint".*

*NFT refers to the NOAA Fisheries Toolbox which is a bunch of software programs to which data can be plugged in for fishery stock assessment purposes.

The objectives of this year's NPALB Workshop were to 1) review the outcomes and recommendations from workshops on MSE and an MSE related meeting of the ALBWG held in Vancouver in October 2018; 2) review the development of the NPALB MSE model; 3) review preliminary results and 4) prepare a summary of MSE progress for presentation to ISC18 plenary in Yeosu, Korea in July 2018.

The majority of the 5.5 day workshop was taken up in review and discussion of the NPALB MSE modeling work being conducted/lead by NOAA/NMFS staff Desiree Tommasi with assistance from other NOAA modeling staff. The overall aim of

the MSE process is to examine the performance of selected alternative management strategies and reference points for NPALB. The approach taken could be defined as a mix of the three definitions listed above, heavy on the NOAA NFT approach.

The model evaluated two harvest strategies in relation to spawning stock biomass against six management objectives that had been identified at the Vancouver MSE meetings, listed here to:

1. Maintain spawning biomass above the limit reference point

2. Maintain depletion (fished biomass/unfished biomass) around historical average depletion

3. Maintain fishing impact by fishery at historical average

4. Maintain catches by fishery above average historical catch

5. Change in total allowable catch between years should be relatively gradual

6. Maintain fishing mortality (F) at the target value

The analysis considered key uncertainties to which the management strategies should be responsive to; those being Recruitment, Natural Mortality, Growth and Movement (parameters also identified at the Vancouver meetings). Note that these inputs to the model can be reported in this newsletter as they have been thoroughly discussed and adopted by previous meetings. The actual workings of the model and results cannot be made public as they may well change in the coming months and are not public until the details of the model are discussed, potentially modified and adopted by ISC.

These key uncertainties populate an Operating Model that provides data that flows into the Stock Assessment Model that was developed last year that produces output that then flows into a Management Model with hypothetical target, threshold and limit reference points that can theoretically trigger management actions. Several example harvest scenarios were presented that demonstrated how management actions would kick in if $SSB_{Threshold}$ or SSB_{Limit} were breached under conditions of low and high ocean productivity.

The Workshop quickly identified a significant problem with the process. The number of management scenarios to test and complexity of the three-tiered model incorporating the integrated SS III stock assessment model takes a long time to run, even on NOAA's best computer banks. In order to produce output in a reasonable amount of time the WS recommended to reduce the number of proposed harvest strategies to investigate, to simplify the modeling process and discussed adding computing capacity. Even with these modifications, results suitable for review will not be ready in time for the July ISC18 meeting in Korea.

The WG then worked to complete a Workshop Meeting Report and an MSE Progress Report to be presented to ISC18 with the completed model and preliminary results to be presented to the 4th ISC MSE stakeholder workshop in Japan in early 2019. It was noted that the details of the model development and preliminary results presented at the May 2018 Workshop were still in development and subject to change. The WG strongly recommended that the output discussed were theoretical scenarios and not to be used for management. However, it was agreed that a sample run of model results should be included in the progress report for illustrative purposes and used to gain feedback on specific outputs and recommendations on how this information can be effectively and more clearly communicated to stakeholders.

The WG finalized a draft MSE Progress Report that was later presented to the 9th Scientific Advisory of the IATTC in mid-May 2018. The progress report will then be presented to the ISC 18 meeting (July 2018/Yeosu, Korea) after which it becomes publicly available. The report will be made available to the WCPFC Scientific Committee 14 (Busan, Korea) and the WCPFC Northern Committee 14 (Japan/September 2018). A table of meetings is provided here (Table 1).
Note that a NPALB Stakeholders meeting is tentatively scheduled for March 2019 in Yokohama, Japan. This will be the first time the MSE model and initial results will be presented and discussed. It was noted that participation from AFRF, AAFA and EPO surface fishery stakeholders would be very important. The last stakeholder meeting was held in Vancouver and switches

between eastern and western Pacific annually. Questions regarding the May 2018 MSE workshop can be directed to AFRF Science Advisor David Itano <daveitano@gmail.com>

Table 1. Future meetings relevant to NPALB and MSE model development

Date	Location	Task/Event
May 2018	La Jolla, CA, USA	9th SAC of IATTC: provide MSE progress report
July 2018	Yeosu, Korea	ISC18 Plenary: provide MSE progress report
August 2018	Busan, Korea	SC14: provide MSE progress report
September 2018	TBD, Japan	NC14: provide MSE progress report
March 2019	Yokohama, Japan	4th ISC MSE workshop (tentative)
		ALBWG: to discuss MSE framework
November, 2019	Shimizu, Japan	ALBWG: data preparatory (tentative)
April, 2020	La Jolla, CA, USA	ALBWG: stock assessment (tentative)

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The 69th Tuna Conference on Tunas and Billfish - Lake Arrowhead, CA - May 21st – 24th, 2018 - Compiled by D. Itano, contact: <daveitano@gmail.com>

The 69th Tuna Conference saw an international crowd of tuna scientists discussing a wide range of topics of importance to the furthering of tuna science and management related research. Attendance was good this year with 89 scientists representing more than a dozen countries, territories or international organizations. The meeting was significantly enhanced by presentations by graduate students from around the world that were able to attend thanks to scholarships offered to students that covered their registration, room & board and travel expenses. Scholarships were provided by the Automatic Differentiation Model Builder Foundation (ADMB), American Fishermen's Research Foundation, American Tuna Boat Association, CLS America, International Seafood Sustainability Foundation (ISSF), Lotek Wireless Inc., Monterey Bay Aquarium, Oceanographic In-situ Interoperability Project (OIIP), Patrick Tomlinson, Prime Time Seafood Inc., and Wildlife Computers Inc.

The AFRF scholarship supported Christina Hernandez of the MIT-Woods Hole Oceanographic Institute Joint Program in Oceanography who spoke on "Larval habitat suitability for Atlantic bluefin tuna spawned in the Slope Sea." Although this study was not albacore specific, I do believe the AFRF contribution is money well spent. There are several scholarships and no requirement that they are tied to a specific field. These scholarships have provided young people with their first experience in the international world of tuna science and many current researchers received their career start through a Tuna Conference scholarship. A short summary of albacore related presentations is provided below:

What have we learned? An overview of 15 years of albacore archival tagging – STEPHANIE SNYDER, Suzanne Kohin and John Childers, Presenter: Stephanie Snyder

The presentation described results from the Albacore Archival Tagging Program (AATP) as a collaborative effort of the Southwest Fisheries Science Center and the American Fishermen's Research Foundation to gain information on juvenile albacore using data archiving tags. The AATP has recovered 37 archival tag recaptures that describe 42 annual migrations of albacore from tagging locations in the EPO for up to 3-year periods that contain fine-scale environmental, physiological and behavioral information on north Pacific albacore that span the north Pacific Ocean. The tagging data clearly records how albacore use thermal fronts during feeding and migration movements and respond to changes in the thermal structure and ENSO condition prevalent mainly connected to the north Pacific convergence zone. Interesting ontogenetic patterns of vertical behavior are evident in the longer duration records as the fish grow and utilize deeper waters as they mature. One long-term track showed interesting equatorial movement as the fish grew to shift from surface vulnerable behavior as it recruited to international deep-set longline fisheries.

Leveraging datasets: a mechanistic approach to estimating catchability – STEPHANIE SNYDER, Suzanne Kohin and John Childers, Presenter: Stephanie Snyder

This study examines whether a catchability parameter generated by tagging data – courtesy of the Albacore Archival Tagging Program – can capture trends in the probability of catch given oceanographic conditions found in logbook data of the U.S.

North Pacific juvenile albacore surface fishery. The study examined albacore archival tag data from 37 recaptures that have provided over 11,000 days of detailed information on depth, position and temperature of each fish during the time of the fish. These data were used to generate probabilities of the tagged albacore being within range of surface fishing gear (troll, pole and line) given certain oceanographic conditions. These tagging data provided a useful measure of catchability with tag-derived catchability compared to probability distributions of catch in logbook data given the same oceanographic conditions. Preliminary results indicated consistent patterns in surfacing behavior of albacore under these conditions and interesting comparisons between oceanographic patterns present in fishing effort and the tagging data.

Evaluating alternative management strategies for North Pacific albacore tuna – DESIREE TOMMASI, Steve Teo, Barbara Muhling and Gerard DiNardo, Presenter: Desiree Tommasi

Efforts to develop an alternative management strategy using the MSE process for north Pacific albacore were described, noting that the WCPFC interest in developing a management framework for albacore through the development of formal harvest control rules supported by appropriate harvest and limit reference points. The presentation was essentially what has been described earlier in a report to AFRF on the Albacore Working Group Workshop that looked at developing an MSE management framework, 30 April – 5 May 2018.

Interannual variability of north Pacific albacore distribution in the California current ecosystem – BARBARA MUHLING, Desiree Tommasi and John Childers, Presenter: Barbara Muhling

This presentation is similar to the presentation provided to AFRF via Dropbox that describes the use of migration corridors across the North Pacific. These east-west pathways are defined by the north Pacific transition zone with temperature preferences of ~ 13 – 21°C that shift north and south depending on large-scale variation in north Pacific SST such as that which occurs during strong El Nino events. The study presented also related albacore distribution to the abundance of primary prey species in the California Current Ecosystem (CCE) and examined how shifts in availability of forage species has driven "prey switching behavior over time with consequences to availability of albacore to the southern fishery (southern California). Movements of albacore may be at least partially driven by availability of Inshore species such as anchovy and hake vs saury and sardine that are more available offshore. Variability in time and space of different forage assemblages may be contributing to albacore distribution and catchability. The study concluded that the spring migration of albacore into the CCE is impacted by transition zone temperatures with warm water conditions associated with a more northern/inshore distribution and higher landings in Oregon and Washington with lower catches in California. Future work will look further at the impact of forage assemblages on albacore distribution; the utility of seasonal temperature forecasts for the fishy and projections related to climate change.

In addition to the albacore related talks, there were several outstanding presentations on a wide variety of subjects relevant to the management of pelagic species.

The Proceedings of the 69th Annual Tuna Conference can be found at:
https://docs.wixstatic.com/ugd/ba25d2_a772b320a34848b1bcc4dc46d54db3b6.pdf

AFRF Board Action: On May 1, 2018 the AFRF Board of directors had a discussion on future funding for AFRF. By a unanimous roll-call vote the board voted to raise the present $20/st fee to $30/st beginning in 2018 and reaffirmed this in a subsequent conference call on May 21, 2018 after soliciting thoughts from AFRF contracted buyers. This would be the first such raise in the fee since 1978. This does not affect the dock price of WFOA member boats as this fee is paid over and above the established dock prices and not out of the vessels proceeds

AFRF Contracted Buyers: Bornstein Seafoods Inc., Bumble Bee Seafoods, C2C Premium Seafood, Chicken of the Sea International, Da Yang Seafood, Driscoll's Wharf, Garibaldi Landing Fishermen, Hag Fish LLC, High Seas Tuna Inc., Interocean Fisheries, Island Trollers Inc., Albers / Jessie's Ilwaco Fish Company, JK Fisheries, J. DeLuca Fish Co., Ilwaco Landing Fishermen, Manabe & Co LLC, Oregon Seafoods, Pacific Seafood Group, Papa George Gourmet Albacore, Pelican Packers Inc., Seafood Producers Co-op, Star Kist Foods, Trident Seafoods, Tri-Marine International, Westport Seafood Inc, Wild Planet Foods