Contribution to the round of informal consultations on General Assembly Resolution 78/68 on the topic "Sustainable Fisheries Management in the face of climate change" by the North Pacific Marine Science Organization (PICES).

Prepared by PICES Secretariat (Sonia Batten, Executive Secretary and Sanae Chiba, Deputy Executive Secretary) based on contributions from PICES Expert Groups.

Below is a summary of the recent findings by PICES expert groups

adversely impacted by anomalously warm conditions, whereas catches of Pacific bluefin tuna in the California Current region were at record levels during the 2015–2016 marine heatwave.

A key requirement for building statistical species distribution models is the availability of both biological and environmental datasets. Biological data for commercially exploited species can be sourced from fishery-dependent observations, or electronic monitoring systems, such as vessel monitoring systems. In some cases, observations from fishery-independent surveys are available which may also include life stages not present in commercial or recreational fishing data. However, at-sea surveys are expensive and time-consuming to run, particularly for species which are found across very large spatial areas. As a result, the majority of data available for modeling HMS distributions comes from the fishing industry. These data are usually considered to be confidential when in raw, un-aggregated format, and are typically not able to be shared among scientists from different countries. As a result, habitat modeling activities mostly focused on the geographic ranges covered by national fishing fleets, rather than attempting to combine data from different countries. In contrast, environmental predictors for use in species distribution models are mostly from remotely-sensed sources, or from ocean models, rather than at-sea observations. This is particularly true in recent decades, as these types of remote observations and ocean models have become more sophisticated and more widely available. However, in situ observations are still highly valuable for verification and ground-truthing, and for assimilation into ocean models.

Joint PICES/ISC Working Group on Ocean Conditions and the Distribution and Productivity of Highly Migratory Fish, WG34	
Key outputs	**Relevant references**
• Developed environmentally-informed species distribution models for Pacific bluefin tuna and albacore in the North Pacific Ocean • Developed future projections of albacore distribution in the eastern North Pacific using climate model outputs • Explored predictability of recruitment from ocean conditions and climate variables for Pacific bluefin tuna and albacore. • Contributed to development of international Management Strategy Evaluation (MSE) for North Pacific albacore. • Convened workshops and topic sessions at PICES annual meetings to promote international collaboration and information sharing	Working Group report Rpt61.pdf (pices.int) Muhling B., A., Brodie, S., Jacox, M., Snodgrass, O., Dewarq292184 Tdwd6-3.mmasi P b l e b l e l 3 - 1 . 7 (t) - 5 . 7

2. The **Joint PICES/ICES (International Council for Exploration of the Seas) working group on Impacts of Warming on Growth Rates and Fisheries Yields,** WG45, is a still-active expert group expected to complete its term later in 2024. A session was convened by the working group at the 2022 ICES Annual Science Conference and concluded that despite the theoretical predictions of the Temperature Size Rule on how temperature affects body size (the TSR proposes that fish living at warmer temperatures will have rapid early growth but lower adult size according to Forster et al. 2012), many presentations showed observations indicating that responses in natural populations can be more complex, and that other factors such as fishing and food availability must be appropriately considered. The session highlighted that there are still large disagreements in the underlying mechanisms of temperature impacts on fish size in natural ecosystems. It did, however, reinforce that: temperature does have strong impacts on fish populations (directly or indirectly); careful experimentation and analysis of fisheries data offers exciting opportunities to test new theoretical models; and, concerted effort is urgently needed to appropriately consider temperature effects in fisheries models.

Other findings to date

- Species alternation in the Western Pacific

- Surveys of ocean managers and decision-makers were conducted in China, Canada, and the U.S. to evaluate the extent to which marine ecosystem service values were or could be useful for fisheries management and analyses involving climate change effects.
- A majority of respondents found ecosystem service value information helpful or useful for fisheries management analyses and decision-making, but differences were seen in how this information is viewed in China compared to