

## Hsin-Kang Mahi Mahi stock assessment

For the implementation of the FIP, the research group conduct a long-term research program for developing the stock assessment of mahi-mahi in the Taiwan waters.

Firstly, the research group analyzed the trends of exploitation of mahi-mahi caught around Taiwan waters based on historical fishery indicators. The results indicated that a sharp decline of mahi-mahi catch occurred in 2008 and the catch trend tended to be stable thereafter. Although catch decreased, the total values gradually increased in recent years and this represents the importance of mahi-mahi resource for Taiwanese fishery industry. Based on the analysis on the length-frequency distribution, mean lengths of mahi-mahi did not obviously vary over years for both females and males but more fishes with small body sizes occurred in recent years. Length-frequency distributions revealed obvious monthly patterns for both females and males and there were two modes occurred in June and July. This may indicated there were two recruits for mahi-mahi in eastern Taiwan waters during June-July and November-December. In addition, body lengths of fishes caught in the first fishing season during April to June were obviously larger those in other months and fishes caught in the second fishing season during October to December were relatively smaller. Therefore, the mahi-mahies caught in autumn were obviously smaller than those caught in spring and summer. According to trends of fishery indicators, recruitment, abundance and CPUE declined during 2007 and 2011, while no obvious pattern observed for fishing mortality. Therefore, decrease in catch might be resulted from decline of population size during this period of time. In recent two years, increases in fishing mortality might lead to the increase in catches.

To estimate the fishing efforts, the research group developed the relationship between fishing hours and month, vessel scales and number of trips based on the records of Voyage Data Recorder (VDR) of sampling vessels operated in eastern waters of Taiwan. The estimated historical fishing hours of vessels were also used to calculate the CPUE of mahi-mahi in the eastern Taiwan waters. In addition, the results indicated that the increasing patterns in fishing efforts were conspicuous for two fishing seasons when using fishing hours as fishing effort.

The fishing methods of vessels identified based on the cluster analysis were further incorporated into the CPUE standardization models as a factor related to targeting species of fishing operations. The trends of standardized CPUE indicated that the

highest CPUE values occurred in the second quarter and there were often high CPUE values in the fourth quarter. However, the CPUE revealed a decreasing trend in recent years.

In this study, the growth of the dolphinfish in the waters around eastern Taiwan is conducted based on the length-frequency analysis approach. Based on the results, the length distributions can be divided into 4 mode groups and the models fit to observed length-frequency data well. Based on the analyses of estimation of growth parameters, growth curves are significantly different before and after 2008 or 2009. In addition, the growth curve of females and males are also significantly different that is mainly resulted from the parameters of asymptotic lengths.

The reproductive biology of mahi-mahi will be analyzed based on the gonad samples and the results will be the important basis for further analysis of population dynamics. In addition, the CPUE standardization will be conducted and stock assessment and stock status of mahi-mahi in the Taiwan waters will be analyzed based on the information aggregated from fishery statistics, biological parameters and relative abundance index.