

**Report of the
Stock Assessment Review (STAR) Panel
for Market Squid**

May 14-17, 2001

**Southwest Fisheries Science Center
La Jolla, California**

Market Squid Stock Assessment Review (STAR) BACKGROUND

- C Department of Commerce rejected portions of Amendment 8 to the CPS FMP (1999)
- C Draft Amendment 8 did not include an estimate of maximum sustainable yield (MSY) for market squid
- C SSC reviewed newly derived estimates of MSY for market squid (Sept 2000)
- C The SSC did not recommend an MSY value due to:
 - (1) great uncertainties surrounding the MSY estimates
 - (2) general, ongoing concerns regarding the appropriateness of defining MSY-based reference points for this species
- C Significant new biological findings & fishery data are now available (CDF&G and SWFSC research efforts)
- C SSC recommended (and the Council concurred) that:
 - (1) SSC, NMFS, AND CDF&G should organize a stock assessment review (STAR) panel
 - (2) Squid STAR Panel should meet during 2001

Market Squid Stock Assessment Review (STAR) Terms of Reference (Appendix A)

- [1] Review recent findings on the biology and life history of market squid, including the assessment-related aspects of age and growth, maturity, fecundity, spawning behavior, longevity, habitat, and environment.
- [2] Review newly developed fisheries-related data, including catch history, effort data, and port sampling protocols as they relate to estimation of key biological, population parameters.
- [3] Review all aspects of MSY estimation, as required by the Magnuson-Stevens Fishery Conservation and Management Act for all FMPs, and address the concept of MSY as it relates to a species that is short-lived and whose abundance/availability is largely environmentally determined.
- [4] Consider management measures for market squid, including operationally-practical control rules, long-term monitoring programs, and in-season adjustment mechanisms.
- [5] Prepare a report for the SSC detailing the findings of the review, practical management recommendations, and the key research & data needs.

Market Squid Stock Assessment Review (STAR)

Panel Members

Tom Barnes	CDFG & Council's GMT
Ray Conser (co-chair)	NMFS & Council's SSC
Larry Jacobson	NMFS-Woods Hole, outside reviewer
Tom Jagielo (co-chair)	WDFW & Council's SSC
Heather Munro	Munro Consulting & Council's CPSAS
Paul Smith	NMFS & Council's CPSMT

Market Squid Stock Assessment Review Working Papers (Appendix C)

- WP1** Macewicz, B. J., J. R. Hunter, N. C. H. Lo, and E. L. LaCasella. 2001. Lifetime fecundity of the market squid, *Loligo opalescens*.
- WP2** Macewicz, B. J., J. R. Hunter, and N. C. H. Lo. 2001. Validation and monitoring of the escapement fecundity of market squid.
- WP3** Butler, J., J. Wagner, and A. Henry. 2001. Age and growth of *Loligo opalescens*.
- WP4** California Department of Fish and Game (CDFG). 2001. Status of the market squid fishery with recommendations for a conservation and management plan. M. Yaremko (editor).
- WP5** Coastal Pelagic Species Management Team (CPSMT). 2001. Coastal pelagic species fishery management team working review: market squid optimum yield and maximum sustainable yield working plan.

Market Squid Stock Assessment Review (STAR) Working Papers - continued (Appendix C)

WP7 Maxwell, M. R. 2001. Stock assessment models for the market squid, *Loligo opalescens*.

WP8 Maxwell, M. R., and P. R. Crone. 2001. Management recommendations for the market squid fishery.

WP9* Maxwell, M. R. 2001. Reproductive (egg) escapement model and management recommendations for the market squid fishery.

* WP9 is a revision of WP8 requested by the STAR Panel to document the analyses carried out during the STAR Panel meeting. The analyses and results contained therein reflect the STAR Panel consensus at the end of its meeting with respect to the most appropriate modelling and management control rules

Market Squid Stock Assessment Review (STAR)

Participants (Appendix D)

Last Name	First Name	Affiliation
Amoroso	Orlando	San Pedro Purse Seine Owners
Barnes	Tom	CDFG, La Jolla
Butler	John	SWFSC, NMFS
Conser	Ray	SWFSC, NMFS
Crone	Paul	SWFSC, NMFS
Garrison	Karen	NRDC, San Francisco
Henry	Annette	CDFG, La Jolla
Herrick	Sam	SWFSC, NMFS
Hill	Kevin	CDFG, La Jolla
Hunter	John	SWFSC, NMFS
Jacobson	Larry	NEFSC, NMFS – Woods Hole, MA
Jagiolo	Tom	WDFW, Olympia, WA
Klingbeil	Rick	CDFG, Los Alamitos
Lo	Nancy	SWFSC, NMFS
Lutz	Steven	USC
Maxwell	Mike	UCSD, SIO
Munro	Heather	Munro Consulting
Oliver	Chuck	SWFSC, NMFS
Smith	Paul	SWFSC, NMFS
Vetter	Russ	SWFSC, NMFS
Wagner	John	UCSD, SIO
Wertz	Steve	CDFG, Los Alamitos
Yaremko	Marci	CDFG, La Jolla

Market Squid Stock Assessment Review (STAR) Maximum Sustainable Yield

- C Focused on MSY as a basis for practical management reference points
- C Reviewed earlier work on MSY estimation for market squid (WP 5)
- C Reviewed new work on MSY estimation (WP 7 & WP 8)
- C Explored other possible means for estimating MSY with available data
- C **STAR Panel Conclusions on MSY:**
 - (1) Currently available MSY-based reference points do not provide a practical basis for year-to-year management of market squid
 - (2) It will be more fruitful to explore MSY proxies as a basis for market squid management than to continue efforts on MSY-based reference points
 - (3) Egg escapement reference points may provide viable MSY proxies for market squid

Market Squid Stock Assessment Review (STAR) Practical Control Rules for Management

- C Market squid life history strategy and the current operational practices of the fishery upon them present unique management challenges and opportunities
- C Traditional management approaches, such as those used for the Council's groundfish and salmon FMP's, may not be appropriate for market squid management
- C An egg escapement approach to market squid management, which captures these unique aspects, was presented to the STAR Panel and refined during the meeting.
- C **STAR Panel Conclusions on Egg Escapement Approach:**
 - (1) Although further refinement and sensitivity analysis are desirable, the egg escapement approach is technically sound
 - (2) Current port sampling protocols and laboratory procedures appear to provide the key data elements needed to implement the approach
 - (3) The STAR Panel recommends that this approach be explored as the basis of control rules for market squid management

Market Squid Stock Assessment Review (STAR) Status of the Market Squid Stock

- C The fishing mortality rate (F) on market squid in recent years is likely less than the F associated with commonly used reference points, e.g. F40%
- C This conclusion follows from the current fishery & life history characteristics. In particular that:
 - (1) fishing occurs almost entirely on terminal spawning aggregations
 - (2) market squid are short-lived with determinate fecundity and extremely high natural mortality after reaching maturity
- C The resilience of the market squid stock may change significantly if a substantial fishery develops for immature squid
- C Additional research and data collection are needed to confirm these preliminary conclusions (see Sections 6 & 7 of the STAR Panel Report)

Market Squid Stock Assessment Review (STAR)

Acknowledgments

- C CDF&G (and the California legislature) for financial support of much of the new biological research on market squid
- C The authors of the working papers presented to the STAR Panel - both for their work and preparations prior to the Panel meeting, and for the additional efforts extended during the meeting to support the STAR Panel requests
- C The superb support provided by the CDF&G and NMFS staff in La Jolla.
- C The excellent meeting and computing facilities provided by the NMFS Southwest Fisheries Science Center