Common Jellyfish *(Aurelia aurita)*

Common Names: Moon jelly, figure eight jelly

Description, Distribution and Biology

Jellyfish are members of the phylum Cnidaria, which also includes sea anemones, sea whips, corals, hydroids, and Portuguese man-of-war. There are over 200 species of jellyfish found throughout the world's oceans. The most widely recognized of these species is the common jellyfish (*A. aurita*). The common jellyfish has a transparent saucer-shaped bell, with four pink or orange horseshoe-shaped goads in the centre of the bell. Short tentacles surround the bell margin with curtain-like oral arms on the underside of the bell (Fig.1). Stinging cells, located primarily on the tentacles, are used for defence against predators and in response to stress, however the stinging cells of the common jellyfish is mild in comparison to other jellyfish species. Like all other species of jellyfish, the common jellyfish has no head, no backbone, and no special organs for respiration or excretion. *A. aurita* typically reaches 15.2 to 20.3 cm in diameter, but some have been know to exceed 50.8 cm.

Figure 1: Moon Jelly. Source: Artwork courtesy of South Carolina Department of Natural Resources.

A. aurita is distributed worldwide in temperate waters between 70 ^{0} N and 40 ^{0} S. The common jellyfish populations are predominately found in coastal embayments, fjords, and estuaries, with appropriate substrates for larval attachment. The degree of containment, water depth, salinity, temperature, tidal flow, and feeding conditions can vary considerably within these environments. Jellyfish swim by contracting and relaxing special muscles (coronal) located on the margin of the bell. These muscles allow the jellyfish to move up and down within the water column, however horizontal movement is predominately the result of wind, waves and currents. *A. aurita* congregates near surface waters during the evening and migrates downward through the water column during the day.

The common jellyfish has a complex life cycle consisting of four development stages; asexual benthic (bottom-dwelling) polyp, or scyphistoma, to a sexual pelagic medusae (Fig.2). In October or November, adult female jellyfish will produce eggs and hold them close to their mouths. Males will then release sperm into the water column and the female will use her oral arms and tentacles to

capture the sperm and fertilize her eggs. The female will retain the fertilized eggs in her oral arms until the eggs grow into flat, round larvae, which is then released into the water. The larvae are typically 1 to 2 cm long and are carried through the water by currents, wind or waves to eventually settle on a hard substrate such as rock or shell. After settlement the larvae will develop into polyps. These polyps usually develop in a few months but have been known to take a number of years. At the end of this developmental stage the polyps will form horizontal groves that will deepen until the polyp divides into a number of individuals. The juvenile jellyfish (ephyra) will gradually develop tentacles and oral arms. The young jellyfish will enter the final stage of development, the medusa stage, and live approximately 2 to 6 months.

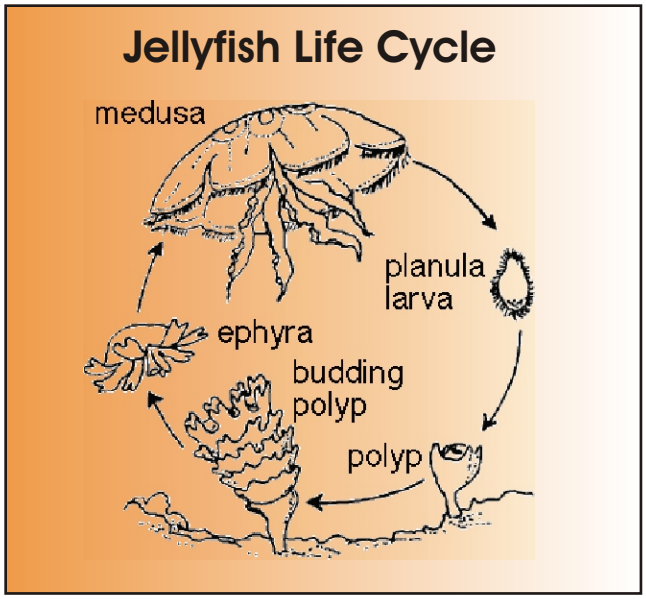

Figure 2: Jellyfish Life Cycle. Source: Sea Science, South Carolina Department of Natural Resources.

The common jellyfish, like all other jellyfish species, is carnivorous, feeding on a variety of zooplankton, comb jellies and other jellyfish. Larger adult jellyfish are capable of capturing and consuming large crustaceans and other marine organisms. The main predators of jellyfish are spadefish, sunfish, and loggerhead turtle.

Harvesting and Management

Jellyfish have been exploited and processed by China as a food source for more than a thousand years. At present, the global jellyfish fishery occurs primarily in the Indian, northwest Pacific, and western central Pacific Oceans and is almost exclusively exported to Asian countries. Traditionally, there have been approximately five commercially exploited jellyfish species, the most abundant and important species being *Rhopilema esculentum*. These species belong to the family Rhizostomatidae, which are large, firm bodied, warm water species, however in recent years Japanese processors have been interested in sourcing other species of jellyfish, particularly *A. aurita*, a much smaller and less firm bodied organism in comparison to rhizostome jellyfish. In 1984, British Columbia initiated a test fishery for the harvesting, processing and marketing of the common jellyfish. Results from this fishery indicated that a large quantity of jellyfish are available for harvest during the summer months and that little effort was required for harvesting. Processing the jellyfish into a marketable product was largely unsuccessful and marketing of the product to local Asian consumer groups failed. Today, only a small-scale fishery remains in British Columbia. Recent studies have been conducted on the east coast of Canada to evaluate jellyfish resources, analyze traditional processing techniques, and assess potential markets.

There are a number of methods for harvesting jellyfish species throughout the world including cast nets, beach or haul seine, dip nets, pair trawls, and wing nets.

A jellyfish fishery does not exist in Atlantic Canada, however Florida and parts of Australia do conduct a fishery and have developed exploitation management plans. These management plans incorporate many of the same rules and regulations applied in Canadian fisheries management including gear restrictions, by-catch reduction measures, vessel restrictions, catch limits, area and time closures, and entry requirements.

Processing and Markets

After capture, jellyfish is often placed in clean sea water containing 1-2 percent alum (potassium aluminium sulphate) to preserve quality for short periods prior to processing. Jellyfish spoil at ambient temperatures and therefore must be processed quickly after capture and preferably while the organism is still alive. The bell or "umbrella" and the oral arms are the only items used in processing. Traditional methods of processing jellyfish involve the reduction of the water content using salt and alum. The process requires a five step salting procedure. The entire process requires 20 to 40 days to produce a salted final product with 60-70% moisture and 16-25% salt. Processed jellyfish has a yield of approximately 7-10% of the raw material weight. The salted product has a shelf life of 1 year at room temperature and 2 years if kept cool but not refrigerated. The majority of jellyfish products are exported to Japan and to a lesser extent Singapore, Hong Kong and Taiwan. The market price varies according to size and condition. Processed jellyfish flesh should be crunchy and elastic in texture. The larger the jellyfish the better the price received for the product. Jellyfish bells greater than 45.7 cm in diameter, which have minor fringing around the bell margins and are white to cream colour with a crispy texture, are classified as Grade A quality, receiving $10 to 12 per pound in Asia.

Constraints and Future Development

A major constraint to the development of a jellyfish fishery on the east coast of Canada and other countries is the level of effort required to efficiently harvest and process the organism. Further investigation is needed to develop a cost-effective harvesting design to preserve product quality and an automated processing technique to reduce labour costs and improve production. Another constraint to future development is the sourcing and capturing of markets. The Asian market prefers a larger firmer species of jellyfish than *A. aurita*. New markets, particularly in North America, are limited, however jellyfish are a low calorie seafood product used in salads, at sushi bars, and has the potential of being used for medicinal purposes.

ADDITIONAL READINGS:

Hsieh, Y-H. P. (2001). Jellyfish as food. *Hydrobiologia*, Vol. 451: 11-17.

Lucas, C. H. (2001). Reproduction and life history strategies of the common jellyfish, *Aurelia aurita*, in relation to its ambient environment. *Hydrobiologia*, Vol. 451: 229-246.

Sea Science. *Jellyfish*. Retrieved from the World Wide Web {June 7/02}: http://www.dnr.state.sc.us/marine/pub/seascience/jellyfi.html

Sloan, N. A. and C. R. Gunn. (1985). *Fishing, Processing, and Marketing of Jellyfish (Aurelia aurita) (L.), from Southern British Columbia.* DFO, Fisheries Research Branch. Canadian Industry Report of Fisheries and Aquatic Sciences No. 157.

Subasinghe, S. (1992). *Shark Fin, Sea Cucumber and Jellyfish: A Processors Guide.* Infofish. Technical Handbook # 6.

Thorpe, J. P., A. M. Sole-Cava and P. C. Watts. (2000). Exploited marine invertebrates: genetics and fisheries. *Hydrobiologia*, Vol. 420: 165-184.

For Further Information Contact:
Centre for Sustainable Aquatic Resources, Marine Institute of Memorial University of Newfoundland, P.O. Box 4920, St. John's, NL A1C 5R3
Toll Free: 1-709-778-0521 Website: http://www.mi.mun.ca/csar/ OR
Department of Fisheries and Aquaculture, Government of Newfoundland and Labrador, P.O. Box 8700, St. John's, NL, A1B 4J6
Telephone: 1-709-729-3766

Partners/Contributors:
Centre for Sustainable Aquatic Resources (CSAR)
Fisheries and Marine Institute of Memorial University of Newfoundland

The $10 million Fisheries Diversification Program is part of the $81.5 million Canada-Newfoundland Agreement respecting the Economic Development Component of the Canadian Fisheries Adjustment and Restructuring Initiative, announced in August, 1999. The main thrust of the Fisheries Diversification Program is industry-wide research and development initiatives that reflect the economic development priorities of the Newfoundland and Labrador fishing industry.