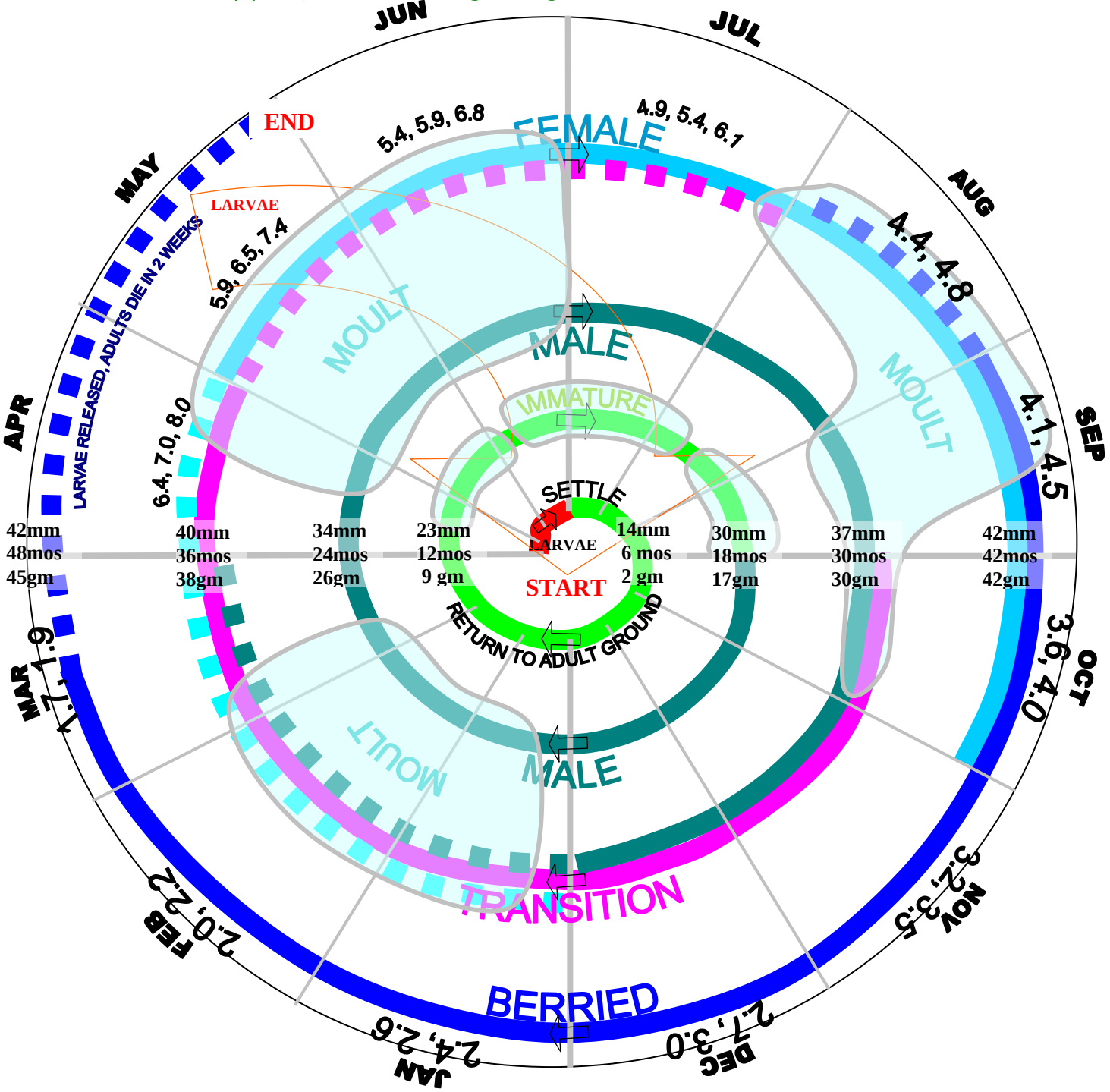
PRAWN LIFE CYCLE



LIFE CYCLE NOTES

The diagram is based on the 12 months of the year, and the 4 year life cycle of the prawns. It provides information about what life stages may be present, their size, and for the last year of the life cycle, the spawner index to which the fisheries are managed.

The diagram was first created in March 2003. It is still under review and correction with respect to size at age, and timing of moult occurrences. In particular, the size increases from 30 mos ot 42 mos appear insufficient, and the shape of the timing of the moult period occuring in the late summer needs some clarification.

Solid spiral lines indicate that most prawns are in that stage at that time and portion of their life cycle. Hatched lines indicate that some prawns may be in the leading or trailing portions of a life cycle stage. All prawns begin life as males, spawn at about 2.5 yrs. of age, then undergo a change at 2.5 to 3 yrs. of age to become females, spawn again as adult females, extrude and carry eggs at 3.5 to 4 yrs., hatch out the larvae and then die.

The light green spiral line near the centre of the diagram indicates immature prawns from larval settlement to 18 mos. This continues out to a dark green spiral line indicating male prawns from 18 mos to 30 – 36 mos. The next mauve portion of the spiral line indicates transition prawns which are in the process of changing from male to female life forms, from 30 to 37 mos. The light blue portion of the line indicates adult female prawns from 37 to 43 mos, before they extrude and carry eggs under their tails. The dark blue portion of the line indicates female prawns carrying eggs under their tails, from 41 to 48 mos. This is the end of the life line.

The numbers on the horizontal line through the middle of the diagram indicate an average length and weight by months of age. For example, a 30 mo. prawn is approximately 30 gm. weight and 37 mm. carapace length. Carapace length is the distance measured from the back of the eye socket to the middle of the back of the shell that covers the head and thorax, in front of the tail. Following on this example, a prawn at 30 mo. age is likely to be either a late stage male or an early stage transition, and at a time of life when they are likely to moult.

The figure also includes a series of numbers which follow the spiral for the last year of the prawn's life cycle. These are spawner index values. The spawner index is the average number of females or transitional prawns which will become females and complete their life cycle in the final year, caught by a standardized trap fished for 24 hours. From Apr. to Jul. there are 3 index numbers listed. From Aug. to Mar. there are only 2. In all cases, the first number of the series is the original "base line" spawner index which was established more than 20 years ago. In all cases, the second number is a value 10% greater than the original base line number. This is the index number that is presently used to manage prawn fisheries throughout the coast. It is higher than the baseline to provide an additional margin of safety, for example, by providing a buffer for possible delays in invoking closures in fisheries on prawns, whether they closures of the commercial fishery in-season or recreational fishery when needed. The third number is an index value 25% higher than the base line. This index number only appears for the period of the commercial fishery from April through July. It is the management target for closures in areas where there are a large number of recreational fishers following the commercial fishing season.

EXAMPLE OF USE OF THE DIAGRAM

Consider November when there are fall index suveys in important recreational fishing areas. From the outside working in, the diagram indicates you may expect to find berried female prawns of 42 mm average carapace length and 42 gm average weight. There are also small transition prawns which have recently come out of a moult and large male prawns which have not yet moulted into the transitional stage. Both of these are of like size, 37 mm CL and 30 gm. weight. Note that these 2.5+ yr. old prawns are in excess of the commercial legal size limit. There will also be smaller 1.5+ yr old male prawns of average size 30 mm and 17 gm weight. Finally, although not often seen in traps due to their size, there will be 14 mm 2 gm immature 0.5+ yr. old prawns. As well, these prawns may be in shallower water, stoll moving down slope to the preferred adult habitat at greater depths.

At this same time, note the spawner index management levels which are the two numbers on the outer edge of the spiral. Fishery managers prefer to see values in the fall index surveys in excess of an average of 3.5 females per trap. Note that at this time of year, almost all adult female prawns will be carrying eggs, so are easy to identify and count. Also note that although large transition prawns are present, they do not count towards the index as they will not complete their life cycle in this spawning season. These transitional prawns will count in the spawner index measurement, beginning in April as by that time they will complete their life cycle by the following winter. With respect to the index number, if the sampling returns an index between 3.2 and 3.5, managers will be concerned and will consider if closures may be necessary, based on fishing intensity and the indexes seen in adjacent areas in a common geographic water body. If the index number is less than 3.2, managers will take action, usually a closure. In this case, adjacent areas in a common water body may also be closed if it is considered to be potentially beneficial to ensure increased larval production from those areas to offset reduced larval production from the area with the low index.

INFORMATION SOURCES

The length and weight numbers in this diagram are from a table presented by C.S. Wright and P. Panek, which is referenced back to Butler, Boutillier and Bond, Mikkelsen, and Ricker. Of these, Butler's publication was visited for additional information. Note that Butler's length/weight descriptions are generally lower than provided in the Wright and Panek table, and lower than represented on the diagram, suggesting that a range of values should be presented on the diagram. The length/weight values need to be checked against recent measurements made in field programs. For example, in southern Gulf of Georgia in March 2003, male lengths were 30 – 32 mm and transitions were 35 – 37 mm.

Further, there will be variations based on geography. For more northern areas, the whole diagram may have to be rotated or lengths of development periods altered to represent growing conditions in those waters. As well, size and weight characteristics may change. One enduring question, is how those northern prawns can be so much larger than their southern cousins. Genetics, food supply or a 5 year life cycle?

Finally, the diagram began in response to a question from a prawn fishery observer, asking what could be expected when sampling was undertaken in March, 2003. The diagram used information from that sampling in Georgia St., as well as earlier work in Feb. 2003 and Dec. 2002 from Saanich Inlet, to identify a winter moult period and to confirm portions of the size ranges.

Butler, T., 1980.

Maximum male carapace length = 48.1 mm
Maximum female carapace length = 61.1 mm
one year after hatching = 12 mos = 21.1 mm, 6.5 gm
second autumn = 18 mos = 27.0 mm, 13 gm, prawns mature as males
most function as males for another year (=30 mos)
the remainder begin sex change at 24 mos
30 mos; mixed group of males and slightly larger females
30 mos males = 32.9 mm, 23 gm
36 mos; all prawns are female or undergoing sex change, transitions
spawning over at end of October
ovigerous period lasts 5 – 5.5 mos
48 mos; 38 mm, >35 gm
large females 43 – 50 mm C/L are either fast growing or in 5^{th} year