

Biol 541– Ecology of Fishes and Fisheries Biology

Lecture 8 – Reproduction and Life-history Strategies

Reproductive Strategies

Strategy that results in greater survival and reproductive success.

Reproductive behaviors and life-history patterns are coupled, because consideration of these behaviors in successful reproduction will often lead to arguments about how they fit in an evolutionary context.

Life-history theory: predicts life-history pattern that will evolve to maximize fitness in environments that have effects on age-specific mortality, growth, and fecundity.

Strategy can be defined as a “genetically determined life-history or behavior which has evolved because it maximizes fitness (lifetime reproductive success) under frequency-dependent intraspecific competition” (Gross 1987).

Proximate (environmental factors that act immediately) and ultimate (long-term evolutionary change) factors that shape reproductive strategies:

	Long Life	Short Life
Steady Reproduction	?	Possible
Variable Reproduction	Possible	Not Possible

Figure 16-2. Summary of Murphy's arguments on life history strategy for marine fishes. Redrawn from Murphy (1968).

Example of reproductive strategy (bird clutch size)

Life history patterns (trade-offs)

Life-history patterns result in

Iteroparity

Semelparity

Advantages of semelparity and iteroparity:

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Table 16-1. Factors linked to alternate reproductive life histories in fish populations.

Factor	Semelparity	Iteroparity
Young survival	Constant or predictable	Variable or unpredictable
Adult survival	Low	High
Reproductive behavior	High energetic cost	Lower energetic cost

Timing of reproduction

Age at first maturity

Percentage of repeat spawners increases with latitude for American shad

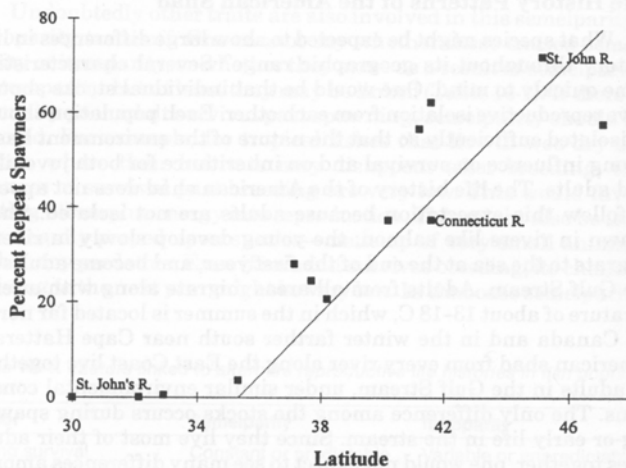


Figure 16-3. Relationship between percent repeat spawners and latitude for 13 populations of American shad. Redrawn from Leggett and Carscadden (1978).

Seasonality

Diel and other temporal patterns of spawning

Allocation of resources to reproduction

Measured by GSI – gonadosomatic index = 100 (gonad weight/body-weight)

Egg Size and Quality

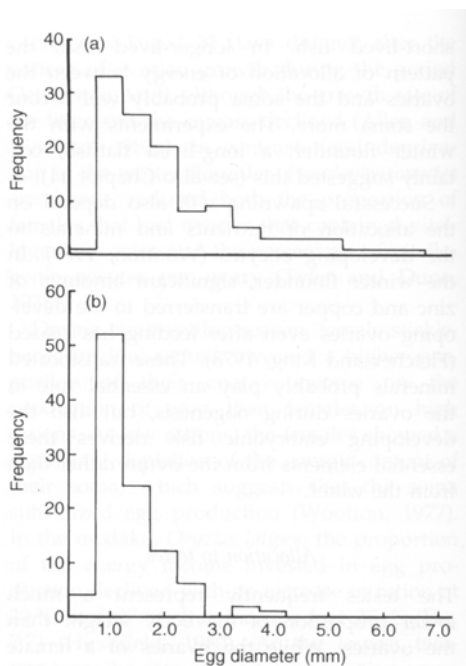


Fig. 7.8 Frequency distribution of egg diameters for species from north temperate (a) fresh waters ($N = 33$) and (b) sea waters ($N = 101$). Redrawn from Wootton (1979).

Reproductive behavior

There are several aspects to reproductive behavior, including site selection, mate selection, and parental care. These activities have a cost in energy, which then cannot be put into gamete production.

Site selection

Mate Selection

Anisogamy (gametes are of different sizes):

Body size (bigger is better, evolutionary fitness):

Coloration patterns (hormonal control – readiness to mate):

Large territory size (indication of a more successful male):

Breeding site (quality of site for egg success)

Frequency of spawning

Parental care

Mouthbrooding (keeping eggs in mouth until they develop into advanced stages)

Livebearing (develop eggs in body until advanced stages of development)