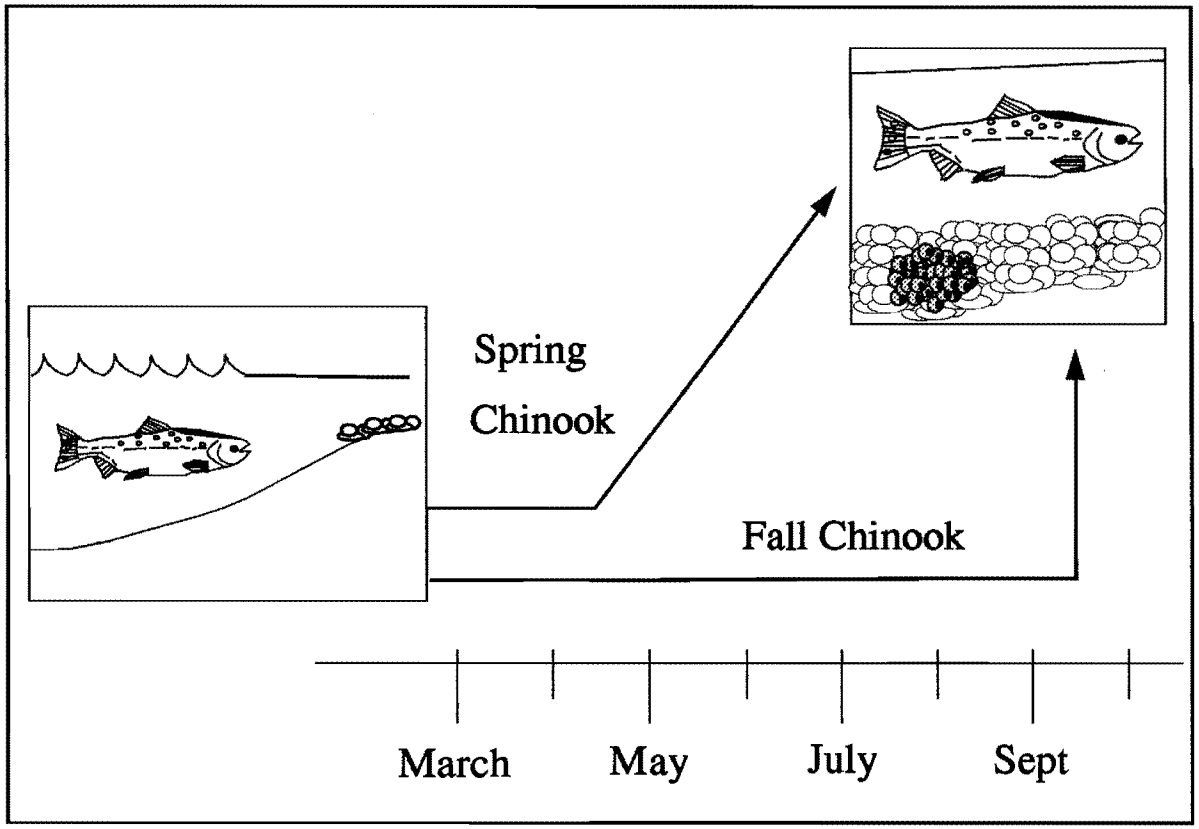
OUTLINE

- Problem Addressed: Spring vs. Fall Chinook
- Problem Approach: Optimality Model
- Results
- Conclusions

PROBLEM ADDRESSED

Spring vs. Fall Chinook



ADAPTATIONIST'S VIEWPOINT

- Run timing is shaped by selective pressures described by a trade-off between ocean growth and passage opportunity.

Benefit

Late Run ⟶ Ocean Growth

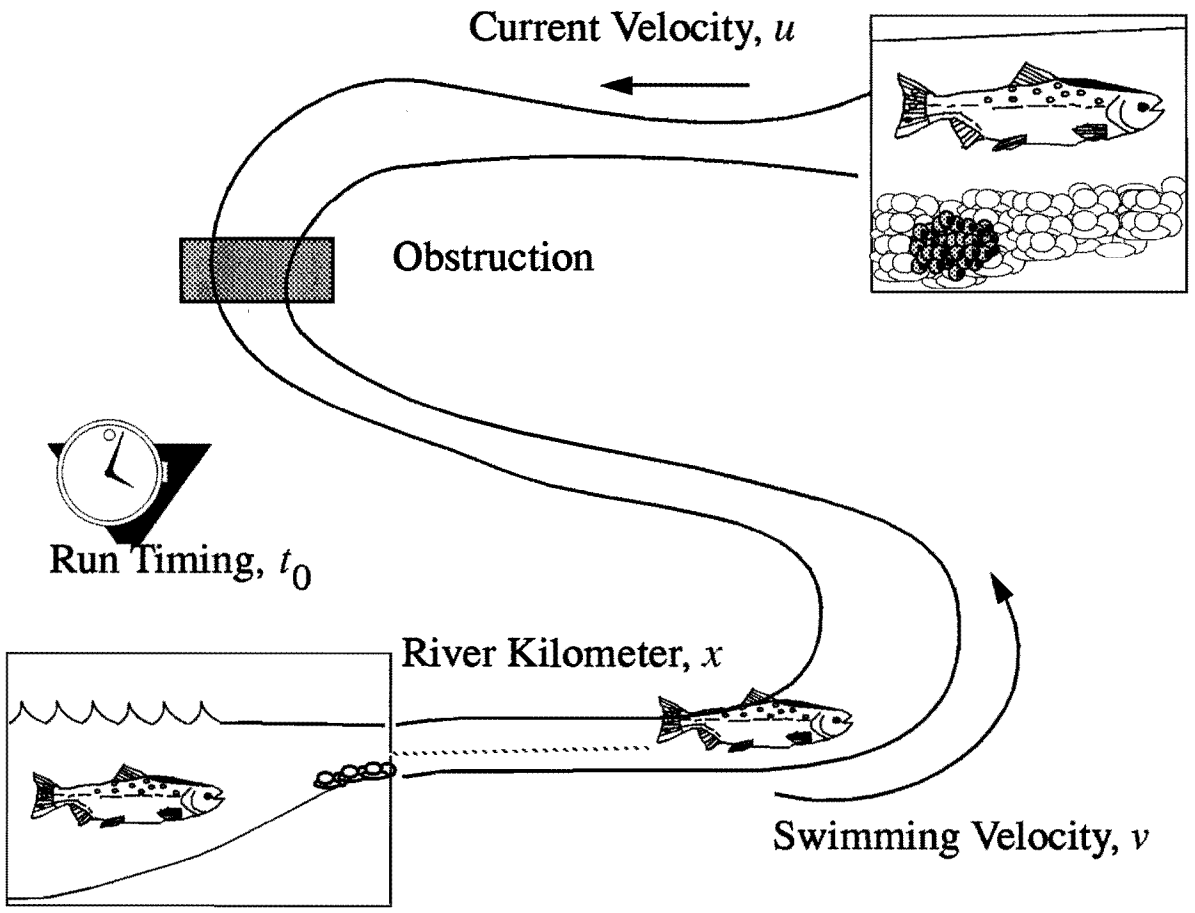
Early Run ⟶ Passage Opportunity

MODELLING APPROACH

Optimization Model

- State Variables - Weight and River Kilometer
- Control Parameter - Run Timing
- Stochastic Input - Passage Events (Random)
- Surrogate Fitness Measure - Expected Fecundity

FLOW DIAGRAM



GOAL 1

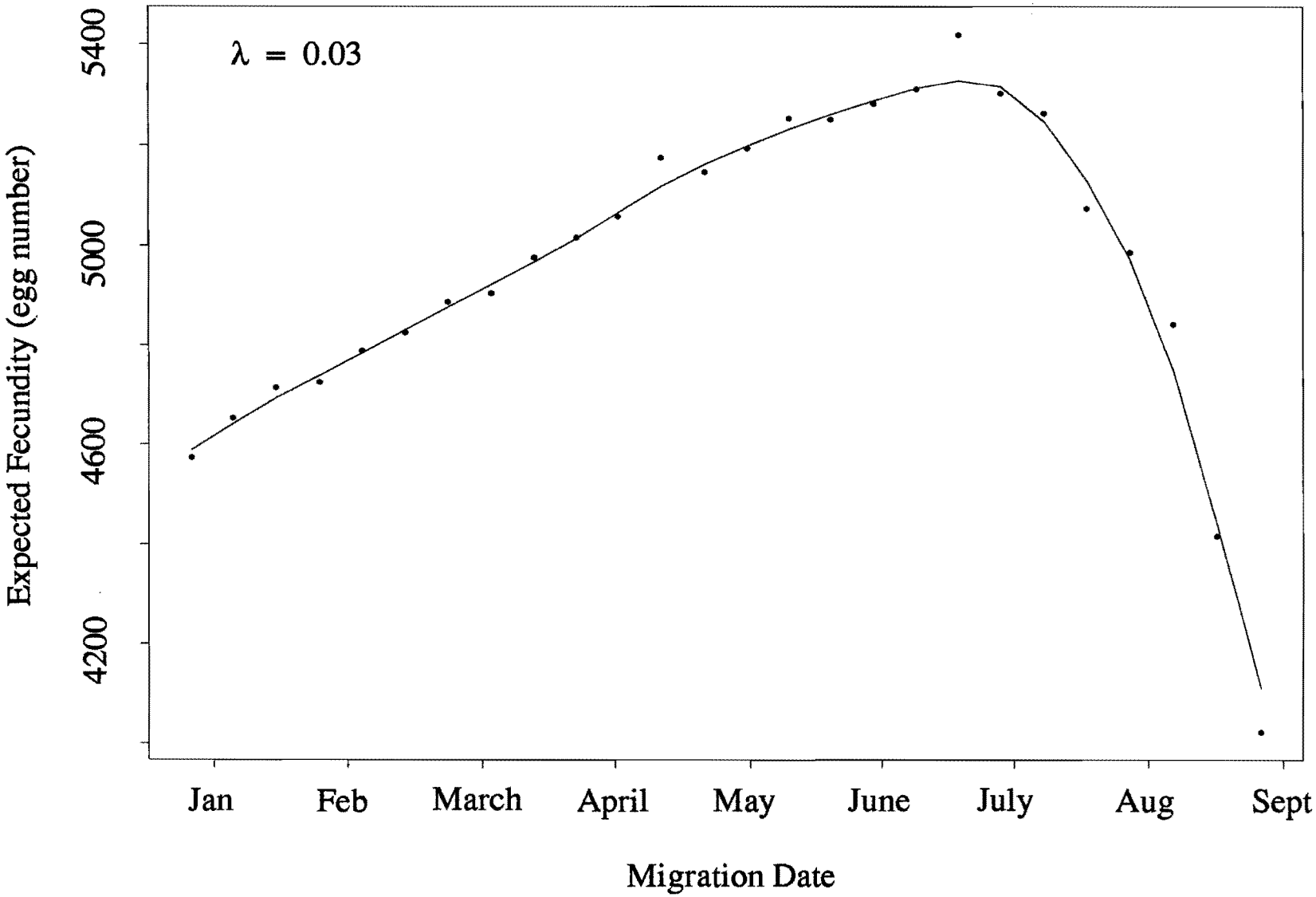
Construct a curve that gives the expected fecundity as a function of run timing.

- What is the optimal run timing?

ALGORITHM

1. Select a run time t_0.
2. Draw 500 random passage opportunity histories.
3. For each history, determine the associated fecundity.
4. Calculate the expected fecundity.
5. Increment t_0 and go to (1).

EXPECTED FECUNDITY

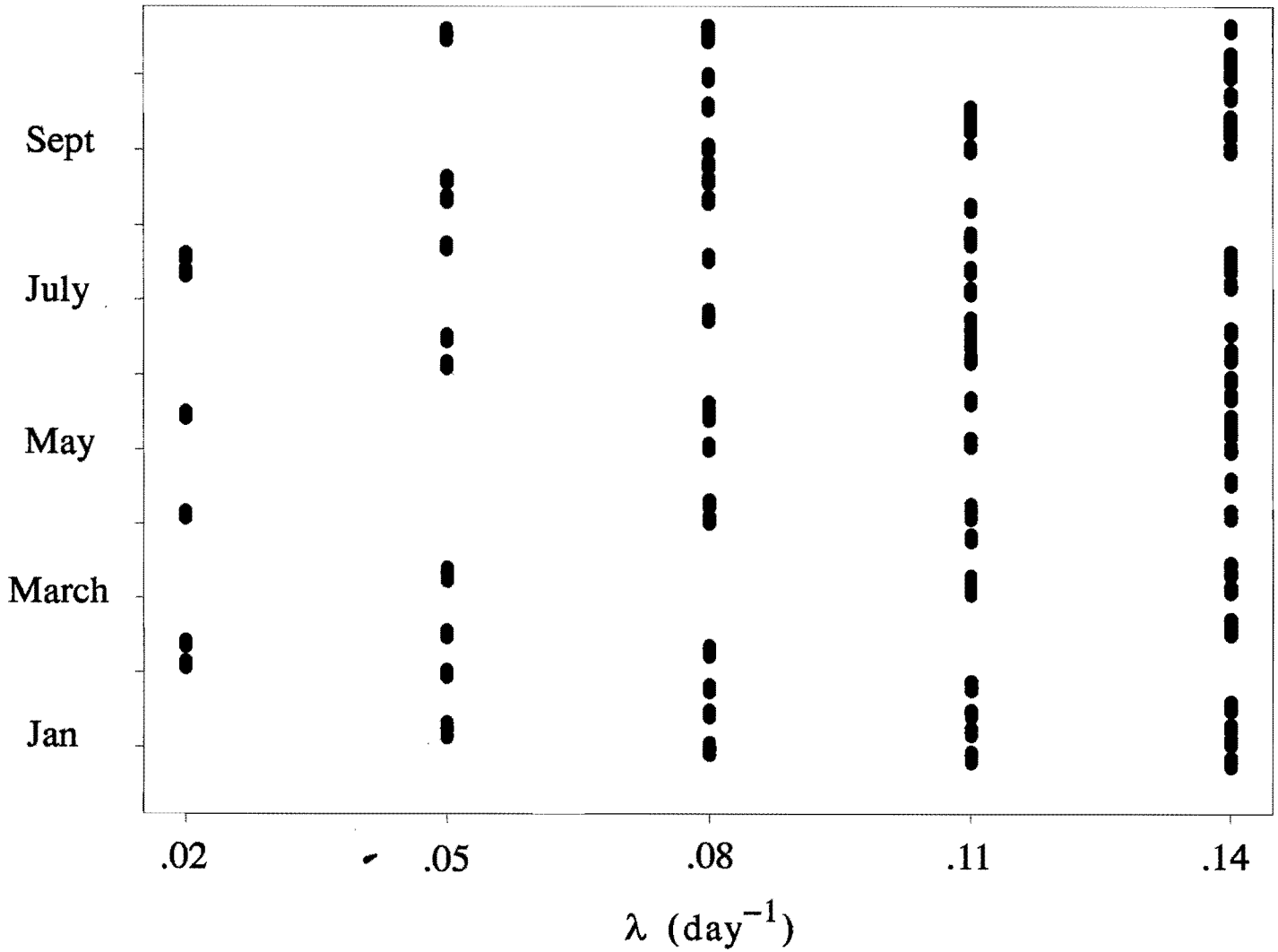


GOAL 2

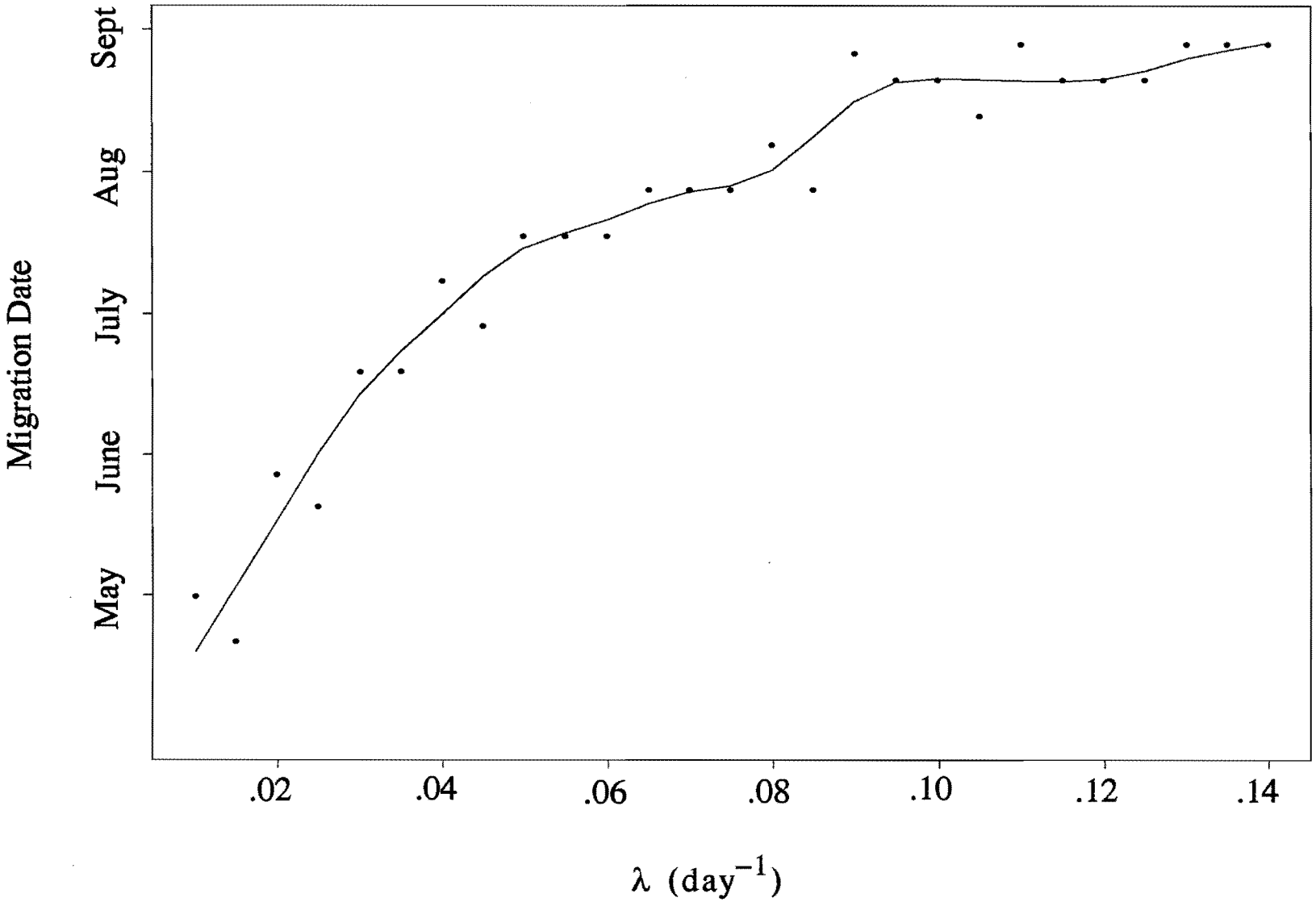
Construct a curve that gives the optimal run timing as a function of the passage opportunity rate, λ.

- Does the optimal run time increase with λ?

PASSAGE OPPORTUNITIES



OPTIMAL MIGRATION DATE



CONCLUSIONS

- The relationship between run timing and passage opportunity can be examined using optimality modelling.
- All else being equal, spawning populations subject to rare passage opportunities optimally run earlier than populations with abundant passage opportunities.