

Trout mechanisms: common garden research

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Background

The goal of mechanism section is to identify genetic, environmental, and phenotypic mechanisms that translate to adaptive capacity of redband trout (*Oncorhynchus mykiss gairdneri*) populations.

YEAR-1 & -2 Objectives include:

1. Collect fish from field for common garden acclimation
2. Quantify physiological responses to temperature
3. Conduct genome scan for candidate genes

1. Field sampling

Desert



Cool montane



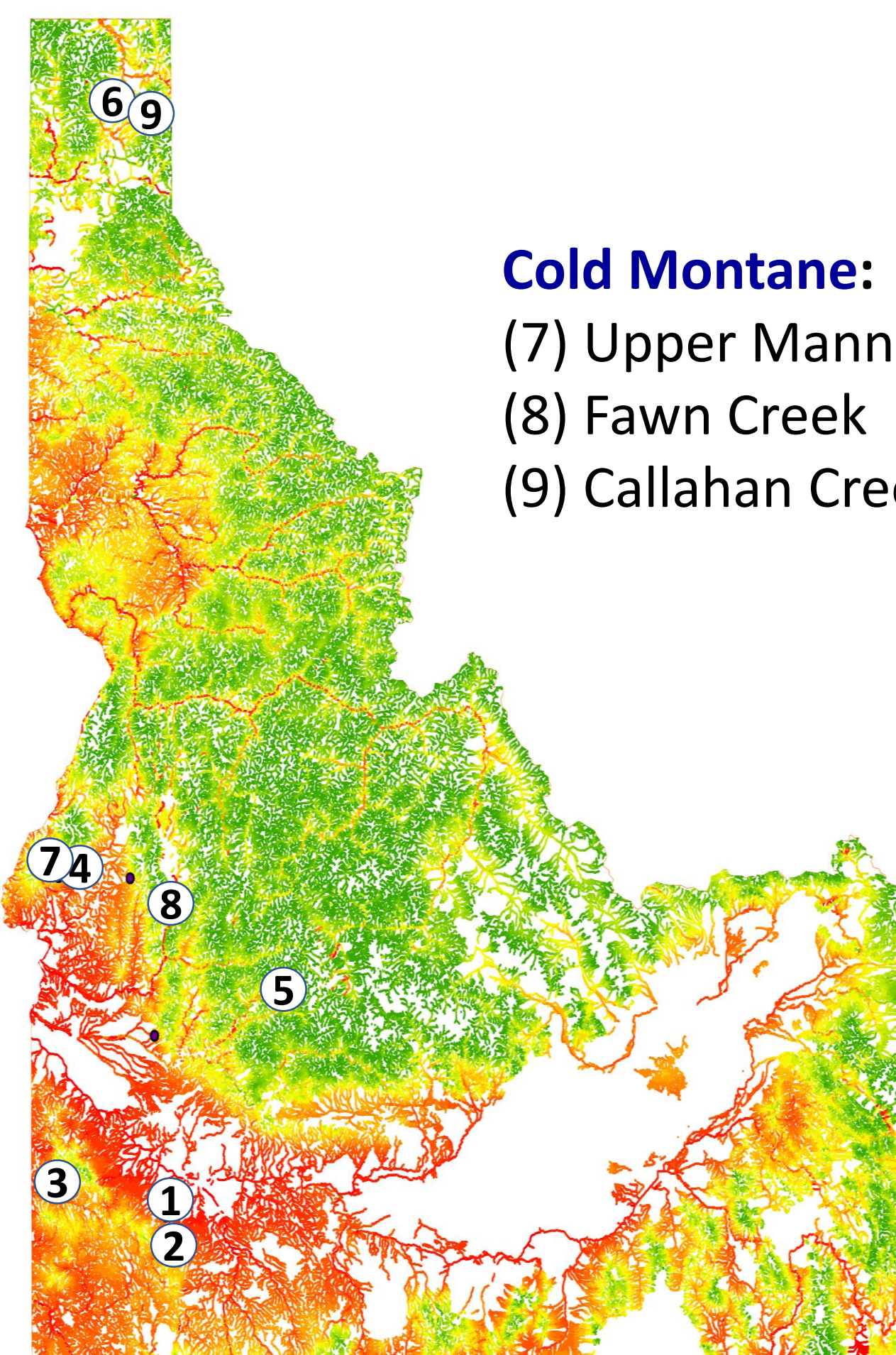
Cold montane



Cool Montane:
(4) Keithley Creek
(5) Whiskey Jack Creek
(6) Trail Creek

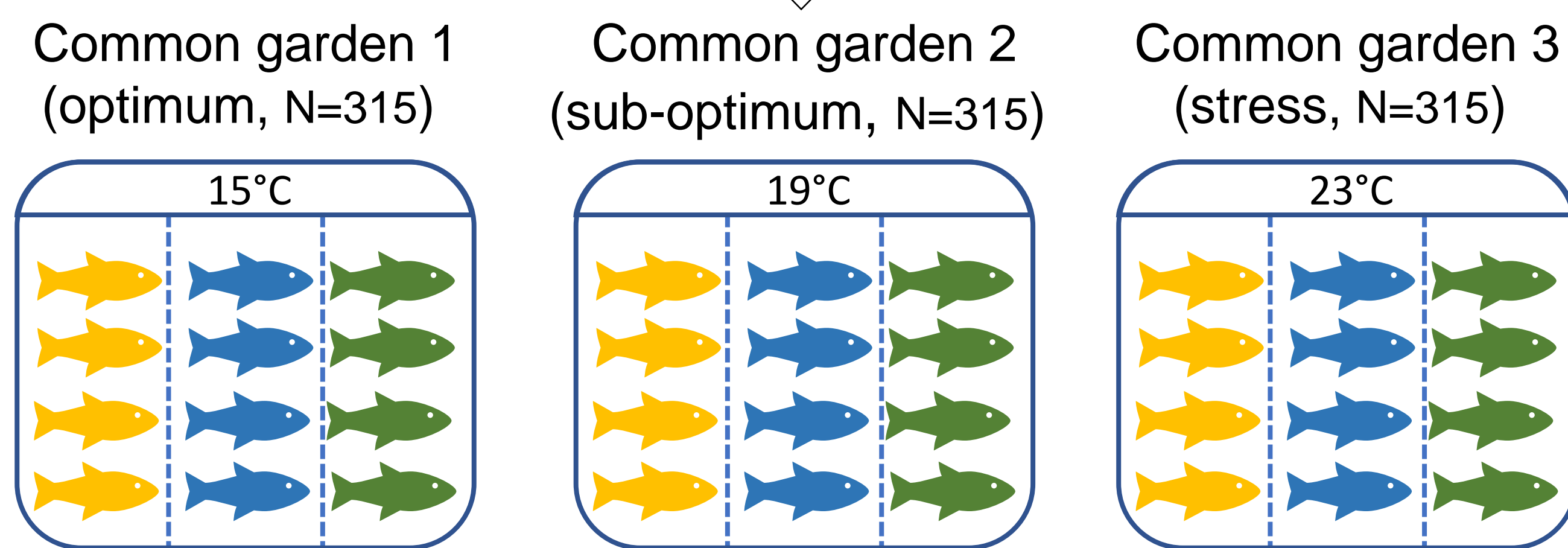
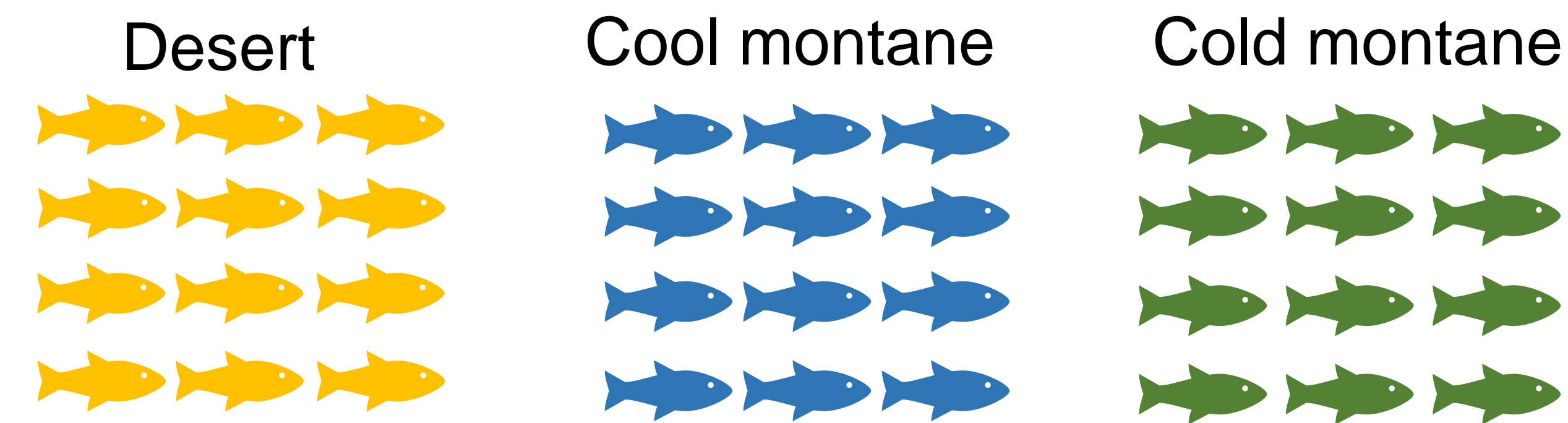
Cold Montane:
(7) Upper Mann Creek
(8) Fawn Creek
(9) Callahan Creek

Desert:
(1) Little Jacks Creek
(2) Duncan Creek
(3) William Creek



2. Common garden acclimation

Age-0 fish collected from natural streams



3 ecotypes × 3 water temperatures (in triplicate)

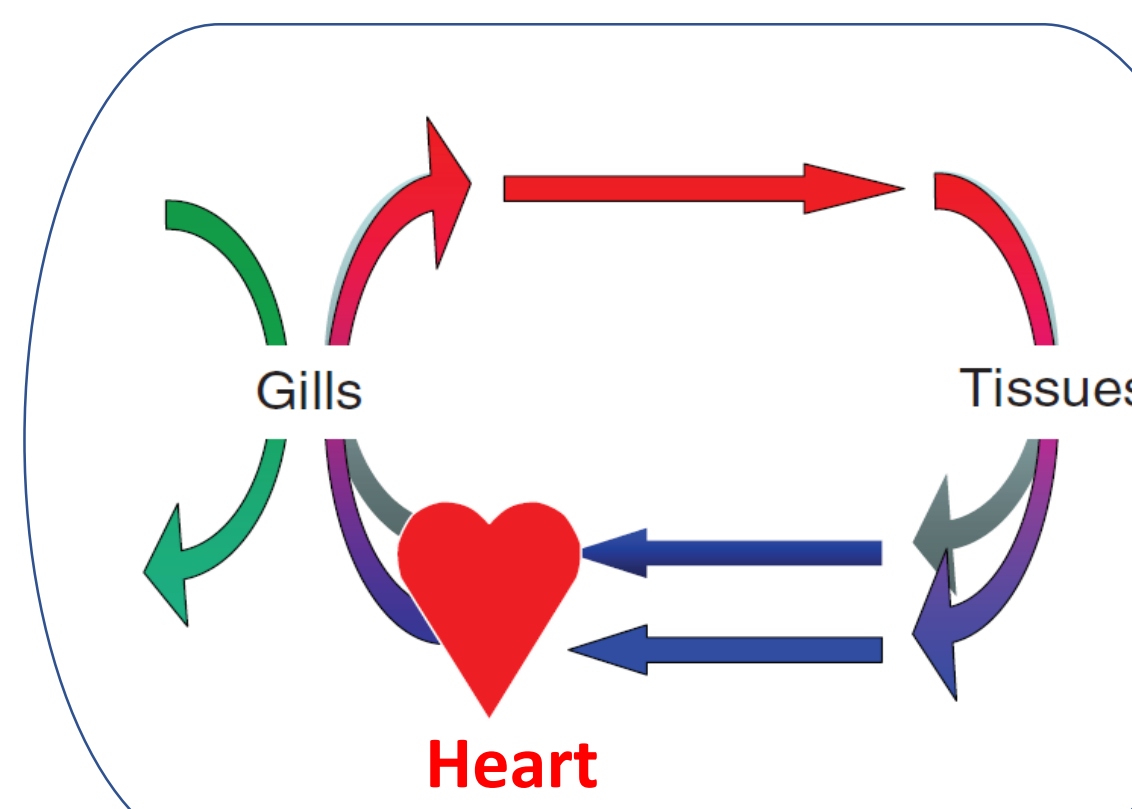
- Growth study (12-16 weeks)
- Growth performance & efficiency
- Maturation and Fecundity
- Egg size & number
 - Reproductive physiology



3. Physiology studies

Animal performance

- Thermal tolerance
- Thermal preference
- Swimming
- Growth
- Behavior

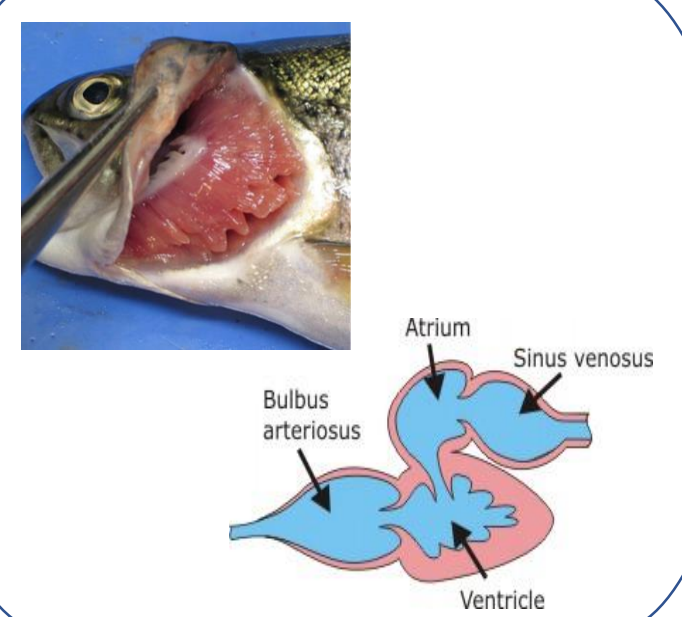


Energetics

- Survival
- Swimming
- Feeding and digestion

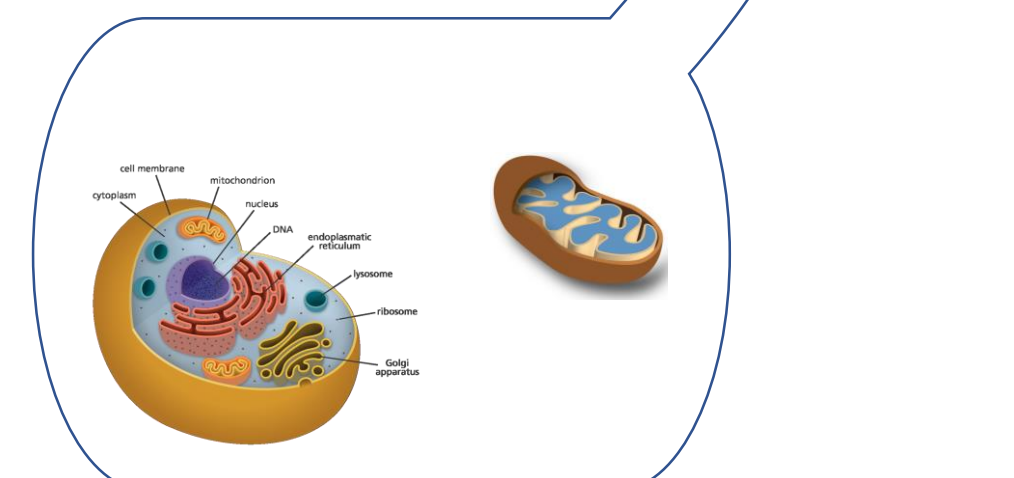
Functional limitation

- Heart rate
- Gill surface area
- muscle



Cellular & molecular

- Mitochondria
- Enzyme activity
- Transcriptome



Summary

Data generated from common gardens will be used to compare intraspecific differences in life history traits and genotypes. It can also be incorporated into agent-based models to predict adaptive capacity and population densities under climate change scenarios.

4. Genomic studies

Whole genome resequencing

Discover candidate genes

- Population differentiation
- Trait association
- Thermal plasticity

