YELLOW PERCH LARVICULTURE

To: FarmoryWorks Aquaculture Technician Program

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Presentation Overview

- Introduction to Early Life History Dynamics
- Chapter 1: Embryonic Development
  - Spawning through first hatch
- Chapter 2: Larval Development
  - First hatch through 30 days

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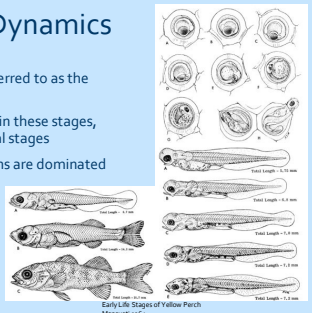
Early Life History Dynamics

- The first year of development is referred to as the early life history
- High mortality rates (~99%) occurs in these stages, specifically the embryonic and larval stages
- Consequently, many fish populations are dominated by few year classes



Early Life Stages of Yellow Perch
Mansueti 1964

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Early Life History Dynamics

- Recruitment is influenced by many variables that determine the production and survival of fish through early life stages
- Biological factors such as maternal effects are present in fishes but their impacts on recruitment are small compared to environmental conditions experienced during early life stages

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CHAPTER ONE

Embryonic Development

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Spawning Yellow Perch

- Identifying a Ripe Female
- Techniques
  - Strip-spawning
  - Natural spawning
- Handling Ripe Fish

Figure 3.1. Ripe female yellow perch can be identified by examining the urogenital pore, which becomes markedly swollen and slightly reddish. Fish A is under ripe; fish B is ripe (photo by Jeff Malison).

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Fertilization Rates and their impacts

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Let's Do Some Math

	90% Fertilization Rate	75% Fertilization Rate
Eggs/Ribbon	25,000/Ribbon	25,000/Ribbon
Fertilization Rate	25,000 x (0.90)	25,000 x (0.75)
Viable Eggs	= 22,500 viable eggs	= 18,750 viable eggs
Difference/Loss		-3,750 difference
Total Larval System	= 810,000 viable eggs	= 675,000 viable eggs (-135,000)

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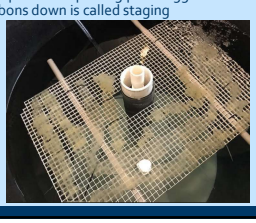
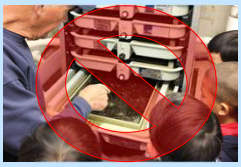
Egg Handling/Staging

- Ribbons through a kink in the works
- The process of pinning perch egg ribbons down is called staging





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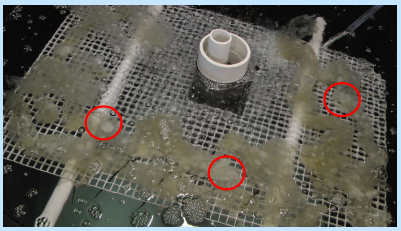
Fugus = Incubation Period Nightmare

- DANGER!
- Saprolegnia loves dead eggs
- Treatments
  - Formaldehyde (Formalin)
  - Saltwater



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Embryonic Development

- Embryonic development starts as soon as the embryo is fertilized
- Incubation length is highly dependent on water temperature
- Temperature does not influence egg mortality, but it does influence hatching success

Figure 4.5. Eggs 6 –8 d early eyed stage (photo by Jun Held).

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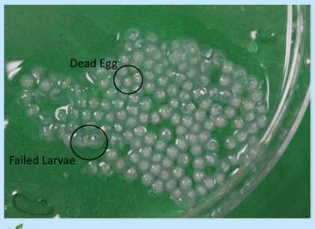
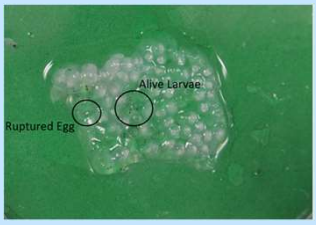
Dead Larvae Phenomenon





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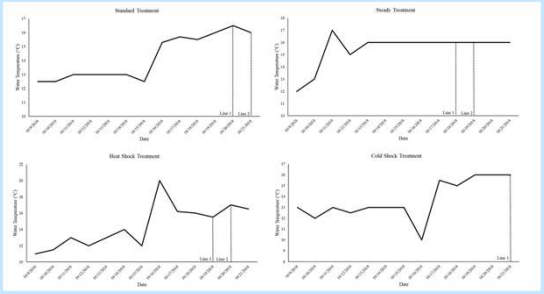
Incubation Periods of each Group



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Dead Larvae Phenomenon

Treatment	Percent Viable Larvae (%)	Percent Dead Eggs (%)	Percent Failed Larvae (%)
Steady	27.9 (ab)	49.2	22.9 (a)
Standard	30.8 (ab)	65.4	3.8 (b)
Cold Shock	49.6 (a)	49.6	0.8 (b)
Heat Shock	19.9 (b)	62.5	17.6 (a)

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Let's Do Some More Math

COLDER INCUBATION	90% Fertilized	75% Fertilized
Initial Amount of Viable Eggs	22,500 viable eggs	18,750 viable eggs
Actual Hatch Success Rate	0.496 x 22,500	0.496 x 18,750
Viable Larvae	= 11,160	= 9,300 (-1,860)
Total System	= 401,760	= 334,800 (-66,960)

HOTTER INCUBATION	90% Fertilized	75% Fertilized
Initial Amount of Viable Eggs	22,500 viable eggs	18,750 viable eggs
Actual Hatch Success Rate	0.279 x 22,500	0.279 x 18,750
Viable Larvae	= 6,277	= 5,231 (-1,046)
Total System	= 225, 972	= 188,316 (- 37,656)

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When to Prep for Hatch-Out

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CHAPTER TWO

Larval Development

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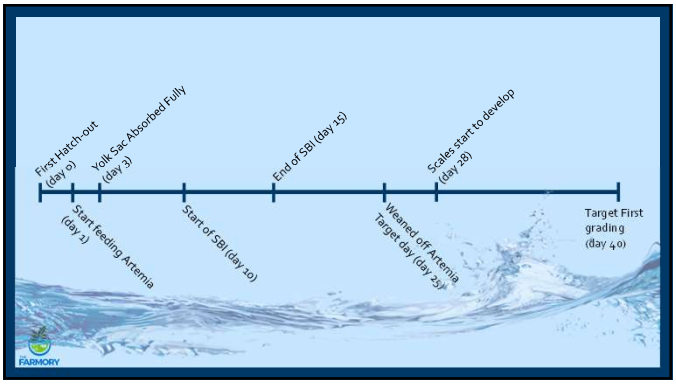

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First Signs of Hatch

- Eggs will look swollen and the larval fish will be constantly moving
- Hatch out overnight
- You will see a few black dots swimming around

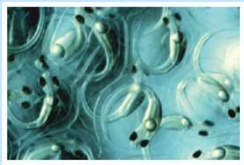

Figure 4.4. Eggs 10–12 d post-fertilization; ready to hatch (photo by Jim Held).

Figure 4.6. Hatched fry (photo by Jim Held).

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WHAT DO YOU DO WITH THE SKEIN NOW?

REMOVE AS QUICK AS POSSIBLE

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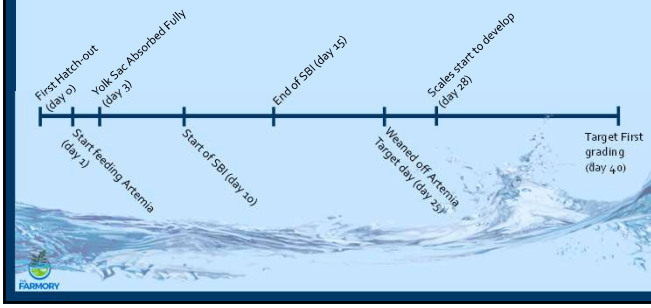

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First Feeding

- Once first sign of hatch has occurred start prepping artemia
- Larval perch will live off their yolk sac for ~2 days
- First feeding is highly important!

Figure 4. Larval yellow perch and Artemia nauplius.

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Artemia Culturing 101

- Takes 24 hours for them to hatch out
- Salt concentration of AT LEAST 20ppm
  - I shoot for 25ppm usually
- Temp of 75-80F is ideal
  - Tank heaters needed
  - Chicken lights on for 24hrs
- 2 kinds of eggs
  - Capsulated
  - Decapsulated

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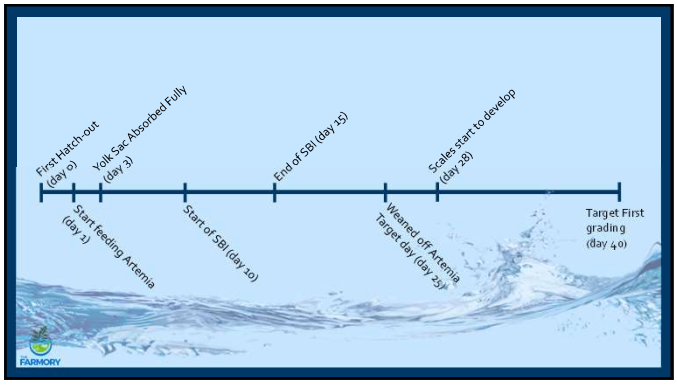

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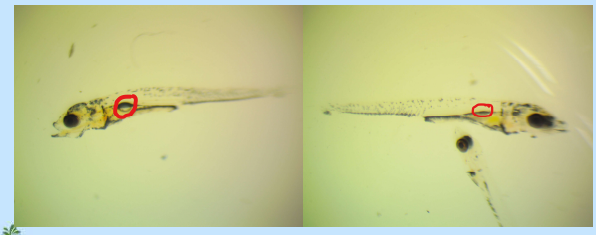
Swim-bladder Inflation



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WHAT IF THEY DON'T INFLATE?

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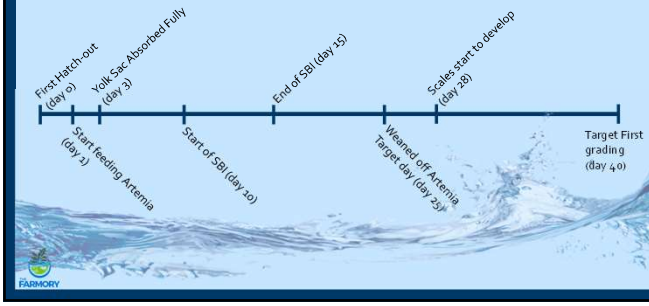

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Feed Training

- Process in which you expose and manipulate feeding amounts so larval fish eat non-live feed
- When do you start to introduce powdered feed?
- Otohime vs Alltech

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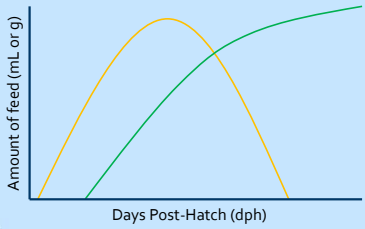
Weaning off Live Feed



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Cannibalism

- Cannibalism is well documented in fish especially during early life stages and is prominent in aquaculture
- Studies have reported that cannibalism is an effect of a wide variation in larval growth and size
- What can you do to prevent cannibalism?

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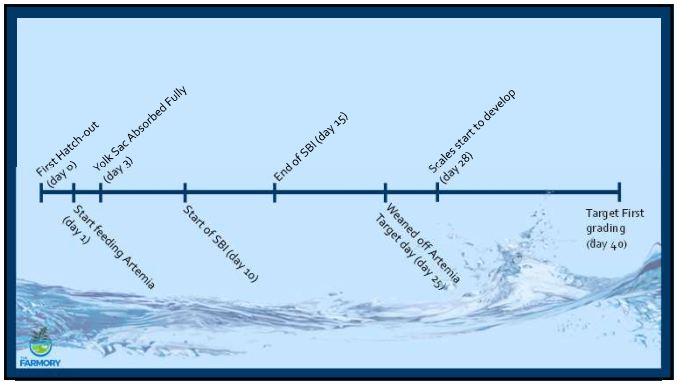
First Hatch-out (day 0)
Yolk Sac Absorbed Fully (day 3)
End of SBI (day 15)
Scales start to develop (day 28)
Start feeding Artemia (day 1)
Start of SBI (day 10)
Weaned off Artemia Target day (day 25)
Target First grading (day 40)
FARMORY

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Scale Development
• Fish are getting closer to being able to be graded!
• This will be around the same time as a mortality burst from feed weaning
29 days old Starting to develop scales! Check out that light reflection!
FARMORY

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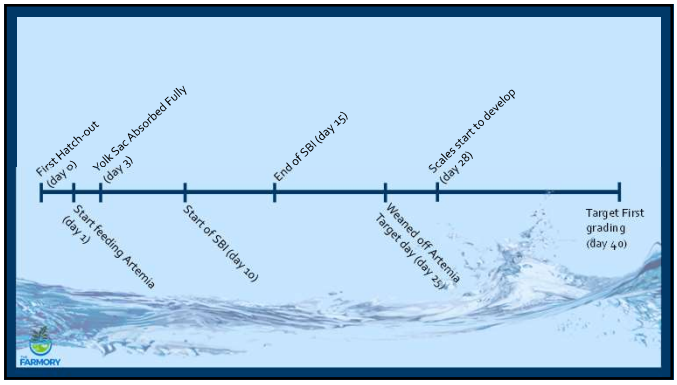
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Start of SBI (day 10)
Weaned off Artemia Target day (day 25)
Target First grading (day 40)
FARMORY

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Fingerling Status

- Technically after about 30-35 days the fish are no longer larval fish
- Days 40-45 post hatch should be the targeted first grading
- Much easier to rear now!

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Status of Yellow Perch Aquaculture

- Restrictions and closures of commercial fisheries coupled with an increasing demand for yellow perch has fueled the interest in generating yellow perch as an aquaculture species
- Even with the high demand for yellow perch, the aquaculture industry in the United States does not have high enough production
- Current studies have investigated improving culture conditions during the grow out periods in addition to selecting genetic strains that have higher growth rates
- Very little research has been conducted on early life stages of yellow perch for aquaculture practices

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QUESTIONS?

THANK YOU!

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